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CORRUGATION SPECIAL

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Image credit: Rahul Kumar

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Corrugation must resist commodity game and avoid historical mistakes



There was a time when corrugated boxes were viewed simply as brown cartons designed to transport products from one location to another. Today, they have become an integral part of the global supply chain, brand protection, sustainability initiatives, and customer experience. In India, corrugated packaging has evolved from being a commodity into a strategic business enabler.

The Indian corrugation industry, estimated to be worth over INR 40,000-crore, is growing at an

impressive pace, supported by the rapid expansion of eCommerce, organised retail, FMCG, pharmaceuticals, electronics, food processing, agriculture, and exports. Industry experts expect sustained double-digit growth over the next few years, making corrugation one of the fastest-growing segments within India's packaging ecosystem.

The demand story

India is witnessing unprecedented demand for corrugated packaging. Every online order, pharmaceutical shipment, fresh produce consignment, industrial component, or consumer electronics product requires reliable and sustainable packaging. Government initiatives such as Make in India, Production Linked Incentive (PLI) schemes, rising exports, and improved logistics infrastructure are further accelerating the demand for high-performance corrugated packaging.

Unlike mature markets, India still has significant headroom for growth. As manufacturing expands and organised retail penetrates deeper into tier-II and tier-III cities, corrugated packaging consumption is expected to rise steadily. The future of the industry is being driven by multiple high-growth industries simultaneously.

Few packaging materials are as naturally aligned with sustainability as corrugated boards. Manufactured primarily from renewable paper fibres, recyclable materials, and increasingly circular production systems, corrugated packaging has become the preferred solution for brands looking to reduce their environmental footprint. However, sustainability today goes far beyond recyclability. The industry is now focusing on reducing paper consumption without compromising performance. Lightweight boards with superior strength, efficient flute profiles, optimised box design, energy-efficient manufacturing, water conservation, and waste reduction are becoming essential competitive advantages.

Beyond the box

Perhaps the biggest transformation in the industry is the changing perception of corrugated packaging itself. Customers no longer buy boxes. They buy protection. They buy efficiency. They buy branding. They buy shelf appeal. They buy logistics optimisation.

Today's corrugated packaging is expected to protect products during transportation, enhance warehouse efficiency, improve stacking strength, reduce logistics costs, enable automation, and even strengthen a brand's sustainability credentials.

One of the most interesting realities of the Indian corrugation industry lies on the shop floor. Chinese machinery has rapidly gained market share by offering attractive pricing, improving technology, and shorter return-on-investment periods. Many converters, especially small and medium-sized businesses, find these machines difficult to ignore.

European manufacturers continue to represent the benchmark in precision engineering, productivity, automation, and long-term reliability. However, the high capital investment required often places these solutions beyond the reach of many Indian converters.

Indian machine manufacturers, meanwhile, have made commendable progress over the past decade. Yet, many still face challenges in matching global standards in automation, speed, digital integration, precision, and consistent quality. This creates an important opportunity.

The changing market

Traditionally, corrugated packaging has been associated with secondary transport packaging. That narrative is changing. High-quality graphics, digital printing, offset-laminated boxes, shelf-ready packaging, retail-ready displays, premium gifting solutions, and luxury packaging are enabling corrugated boards to move into primary and consumer-facing applications.

Brands increasingly recognise corrugated packaging as a communication medium rather than merely a shipping container. This shift creates tremendous opportunities for converters willing to invest in printing quality, structural design, finishing technologies, and value-added solutions.

Artificial intelligence, Industry 4.0, predictive maintenance, machine connectivity, ERP integration, robotics, vision inspection systems, digital workflow management, and data analytics are gradually becoming part of modern corrugation plants.

The next generation of factories will rely less on manual intervention and more on intelligent manufacturing systems that improve productivity, reduce waste, minimise downtime, and enhance consistency. Customers are increasingly evaluating suppliers not only on pricing but also on quality assurance, delivery reliability, traceability, and sustainability metrics.

Looking ahead

India's corrugation industry stands at a defining moment. Demand has never been stronger. Sustainability has never been more relevant. Technology has never evolved so rapidly.

Yet, success will depend on how effectively the industry embraces innovation, develops indigenous manufacturing capabilities, invests in people, and moves up the value chain.

The future belongs to companies that think beyond converting paper into boxes. It belongs to businesses that create intelligent packaging solutions, embrace automation, deliver consistent quality, and partner with customers to solve real-world challenges.

At *PrintWeek* and *What Packaging*, we have witnessed this industry's remarkable transformation over the years. Through this Corrugation Special, our objective is to celebrate not only the technology and businesses driving this sector but also the people, ideas, and innovations shaping its future.

The box may still be brown. But its future has never looked brighter.

Rahul Kumar is associate editor at *PrintWeek* and *What Packaging*

Surging demand will separate the haves from the have nots

A sector that spent decades in the shadows of small-scale reservation is now navigating the turbulence of overcapacity, Chinese dominance, and thin margins. Yet pockets of manufacturing are quietly redefining what is possible. Manish Patel of SIPM shares his expert opinion



Manish Patel, managing director of South India Paper Mills (SIPM)

An insight Manish Patel, managing director of South India Paper Mills (SIPM) offers is, corrugated packaging is a follower industry, and not a leader. The quality of packaging in any given segment is determined by what the end market demands, and what the end market demands is shaped by the sophistication, scale, and expectations of the manufacturing or retail sector it serves.

"Packaging is a follower business, not a leader business," Patel states. "We are set on our domestic demand and domestic consumption. We follow; we can't initiate. We can innovate a bit and suggest solutions, reduce weight, and offer digital printing for custom service packs. But we follow."

China's corrugated industry was transformed not by box-makers innovating their way to better margins but by the growth of Chinese manufacturing, which created demand for export-quality graphic cartons, electronics packaging, and transit boxes at an unprecedented scale. American brands designing for

Chinese production followed; the packaging SOP became a part of the DNA.

Manish Patel says, "India's corrugated industry will not be transformed by a trade association, a machinery choice, or even a change in procurement approach alone. It will be transformed when the industries it serves, including electronics assembly, processed food, pharmaceuticals, horticultural exports, and eCommerce, grow to a scale and quality level that creates non-negotiable packaging requirements.

In the meantime, the operators who have found a niche in the market like export customers, quality-conscious FMCG brands, and electronics assemblers with zero-defect requirements have charged a premium.

Meanwhile a majority of the brown box manufacturers will continue their uncomfortable arithmetic: thin margins, excess capacity, and an investment cycle that makes Chinese machinery cheap to enter and difficult to exit. The opportunity lies at the edges, in the niches, and in the applications that the 75% segment has neither the equipment nor the ambition to serve.

Flashback into the 20th century

There is a particular kind of candour that comes from someone who has watched an industry from both ends of the supply chain: first as a paper mill owner feeding it raw material, then as a converter competing within it. Manish Patel brings that dual vantage point to a conversation about India's corrugated packaging sector: where it came from, where it has arrived, and the uncomfortable truths that sit between those two points.

The story, it turns out, begins not with a machine or a market, but with legislation.

For much of independent India's history, the corrugated box industry was a reserved sector, protected for small-scale manufacturers under the government's post-independence drive to maximise employment. Investment ceilings were set at INR one-crore, machines were semi-automatic at best, and the sun, quite literally, was part of the production process, drying board in open yards.

"The kind of industry that developed was fragmented, small-scale, and very labour-intensive," Patel observes. "In some ways it was energy-efficient. Sun-

drying was used. It employed more people and used less energy. And these were the limitations which the industry worked in."

The tax regime of the era reinforced this structure in ways that are difficult to appreciate without understanding the cascading nature of pre-GST excise duty. Paper mills producing below a threshold of 3,500-tonnes were exempted from excise duty, making their material cheaper for box-makers operating below the excise radar. The incentive to think small was etched into the mindset.

The back-end paper industry shaped itself accordingly. Non-conventional raw materials, including recycled fibre, bagasse, and agricultural residues, were actively encouraged through lower tax rates. Wood-based paper attracted higher duties. The cheapest paper in the market was, almost inevitably, recycled-fibre paper of variable quality. That characteristic would prove surprisingly durable.

When the global brands started arriving in the liberalisation era, the contradictions became acute. A global beverage company, subject to 24% excise duty on its product, could not set off the taxes embedded in its packaging inputs, because its box supplier was either too small to be in the excise net at all or was structuring itself to stay beneath the threshold. Value was left on the table at every tier of the chain, but no single player had the incentive or the scale to change the equation.

An industry at crossroads

The industry began to change in phases.

Corrugated board-making was de-reserved in 2006–07; box-making followed in 2007–08. With the investment ceiling lifted, the door was open for a different class of operator to enter.

"That's when some early movers decided to invest," Patel recalls. "If the investment was more than the ceiling in those days, you couldn't enter that business."

The timing coincided with the arrival of Chinese continuous corrugating lines, machines that replaced the multi-step, weather-dependent, semi-automatic processes that had defined the sector for half a century. Their impact was transformative on two fronts: quality and consistency. For the first time, board quality was decoupled from the weather. Gluing and drying became inline and controlled. Structures that should have moved from five-ply to three-ply decades earlier, but had been held back by inferior converting equipment, could now be light-weighted using quality paper.

"With the advent of the continuous corrugated process, good things happened to the quality of the board," Patel notes. "For the same paper grade, you could get a stronger board with the continuous inline gluing and drying. Deliveries in the monsoon became weather independent."

From 2009–10, investment accelerated. The Indian Corrugated Case Manufacturers Association (ICCMA), formed around 2010 with an initial membership of 20–25 players, provided an early forum for this new generation of

operators. They pushed back against reverse auctions, argued for quality-based procurement, and for a period succeeded in altering the conversation.

That golden phase did not last.

Brief theory about the fragmentation

As of now, by Patel's reckoning, at least 400 continuous corrugating lines are operating in India, a majority of these are Chinese manufactured. The FMCG sector, which accounts for approximately 75% of total corrugated consumption by volume, has become the dominant, competitive battleground.

"Brown box manufacturing is operating in a cluster," Patel explains. He describes the Bengaluru cluster, encompassing Hosur, Coimbatore and stretching towards Chennai, as representative of a pattern in South India: total monthly demand of perhaps 35,000 to 40,000-tonnes, served by a large number of converters, the biggest of whom notch up 5,500 to 6,000-tonnes. The rest is fragmented demand across dozens of smaller operations.

Paper mill capacities in the same clusters have grown to match or slightly exceed that demand. The result, as Patel says, is that converters are "sourcing raw material from and selling finished goods into the same constrained geography."

The financial consequences are predictable. Operating profit margins across the mainstream FMCG corrugated segment have compressed to a 7–8% band. As per Patel's calculation, this is structurally insufficient. A business owner investing in a full corrugating and con-



South India Paper Mills factory

THE CARDBOARD ECONOMY: INDIA'S CORRUGATED PACKAGING INDUSTRY IS TRAPPED IN A RACE TO THE BOTTOM BY MANISH PATEL

India's corrugated packaging industry is, in many ways, a mirror held up to the broader manufacturing economy. What it reflects is not always flattering. A sector that touches nearly every product made and sold in this country. Pause for a moment. Boxes are compulsory for biscuits to smartphones, from mangoes to medicines. This industry is mired in overcapacity, margin destruction, and a procurement culture that systematically punishes quality. Unless something changes, the industry will continue to produce the economic equivalent of a well-designed box that collapses under its own weight.

The numbers tell part of the story. India now hosts approximately 400 continuous corrugator lines, the majority running on Chinese-manufactured machinery. That sounds like progress. Well, in some respects it is. The transition from the sun-dried, small-batch production of the 1970s to modern continuous corrugation has been genuine. But expansion has outrun discipline. In nearly every regional cluster, from Bengaluru to Hosur and Pune to Guwahati, manufacturers are competing for the same clients, sourcing the same recycled fibre, and slowly grinding each other's margins to dust. Operating profit margins for mainstream players sit at 7% to 8%. This is barely enough to service the capital investment that modern equipment demands.

The proximate cause is procurement. India's fast-moving consumer goods sector accounts for roughly 75% of corrugated box demand, and the purchasing departments of its largest companies have discovered that the reverse auction is a remarkably efficient tool for them. Vendors are pitted against one another in price wars that can reduce the value-add on a contract to three rupees per kilogram. The corrugated box, in the eyes of many procurement managers, is a commodity. It is weighed, not evaluated. Its performance under load, its resistance to humidity, its dimensional precision. The brown box as an engineering product is invisible to a system that measures success in kilograms saved.

The consequences are predictable. When price is the only variable, quality retreats. Paper weights are specified at one grade and supplied at another. Laboratory test results are, shall we say, optimistically interpreted. Food contact safety is a genuine concern in a country that still lacks a reliable domestic

supply of food-grade recycled fibre. But contact safety is treated as a compliance formality rather than a consumer protection imperative. The entire edifice of the industry rests on a foundation of institutionalised mediocrity.

This need not be the case. The same industry contains proof of what is possible when manufacturers escape the commodity trap. A producer in Hyderabad exports pizza boxes to an European country at returns four to five times higher than anything achievable in the domestic market. High-grade industrial packaging commands margins that would be unimaginable in the FMCG segment. A small number of players (perhaps 10% to 15% of the market) achieve operating profits above 15% by focusing on specialised applications: export-oriented work, precision industrial packaging, or products where performance specifications matter more than purchase price.

The lesson is not complicated. Value-based niches exist and they are profitable. The obstacle is structural: a fragmented, oversupplied market where the pressure of the next reverse auction is always more immediate than the discipline of specialisation.

Two shifts are urgently needed. The first is a change in the unit of commerce. The industry's insistence on weight-based contracts. Basically this, pricing boxes by the kilogram is an anachronism that actively works against innovation. When a manufacturer succeeds in lightweighting a box, achieving equivalent compression strength with less material, the current system penalises them: the client pays less because the box weighs less, even if it performs identically or better. A transition to pricing per square metre, the standard in more mature markets, would align incentives correctly. Lightweighting would be rewarded rather than punished. Clients would pay for performance, not mass. This is

not a radical idea; it is simply rational.

The second shift is harder and requires buyers to change their behaviour. The corrugated box will never be treated as a value-added product by suppliers until it is treated as one by customers. This means replacing reverse auctions with performance specifications, demanding food-safety certification rather than accepting verbal assurances, and recognising that a box engineered to protect its contents through a monsoon season and a 500-kilometre journey is worth more than one that merely passes a static laboratory test.

The structural conditions for change are slowly improving. India's e-commerce sector, though it has not driven corrugated demand in the way American e-commerce has, is generating new requirements. This translates into smaller formats, better presentation, and paper-based alternatives to plastic packaging for perishables. Legislative momentum is building around sustainable packaging, which opens markets for barrier-coated, small-fluted boards that can replace plastic clamshells in cold-chain logistics for fruit and vegetables. These are not marginal opportunities; they represent a significant, currently underdeveloped segment.

But the industry cannot wait for markets to rescue it from itself. The corrugated packaging sector has spent too long as a "follower industry" — an expression I use not as a criticism but as a structural observation. Packaging follows manufacturing; it cannot lead it. Yet within that constraint, there is ample room to stop following the lowest common denominator.

The producers who will thrive over the next decade are those who treat the cardboard box as an engineering product rather than a bulk commodity. The rest will continue to race to the bottom, and they will eventually win that race in ways they will not enjoy.





verting line, comprising corrugator, flexo-folder-gluer and die-cutter, requires a sales-to-investment ratio of at least 2:1, combined with interest costs of 9–10%, to justify a margin of around 10% OPM. At the volumes achievable in a fragmented cluster, even a 1:1 ratio is difficult to attain.

The break-even tonnage for a flexo-folder-gluer paired with a corrugating line, Patel estimates, sits at 1,200-tonnes per month. In many clusters, the available business does not support that throughput at current capacity levels.

"The information and data flow about capacity utilisation is poor," Patel observes. "Very often the understanding of financial requirements is absent. You go to an investor who should be looking at ROCE and ROI, but many people in our industry don't know what that is. Brute animal instinct takes over. That's how the industry is fragmenting."

The China conundrum

No discussion of the Indian corrugated sector's evolution can avoid the role of Chinese machinery. In 2011, reliable flexo-folder-gluer were sourced from Europe. The Chinese manufactured continuous corrugators but could not offer dependable downstream converting equipment.

That has altered. By 2016, Chinese flexo-folder-gluer were in serious competition. Technology transfer through partnerships with Japanese and Italian machinery makers accelerated the devel-

opment of electronics and systems. Historically this was an area where the Chinese machines lagged. Today, Chinese corrugating lines represent the choice for Indian converters, at approximately one-third the cost of a European equivalent.

SIPM itself runs a 100% European corrugating line, a decision made in 2012 when the high-end Chinese alternative was not yet credible. It has served the company well. But Patel is candid that he would not make the same investment in this day and age, at least not at European prices. European manufacturers that have adapted, producing in lower-cost environments or localising production elements, have retained a foothold. A European machinery maker's operations in Pune are cited as an example of meaningful work being done in the Indian market. But the pull of the Chinese price point is alluring, and it has effectively a no-entry barrier for brown box manufacturers who are catering to the mainstream FMCG segment.

Patel says, the irony is that India has the engineering capability to manufacture corrugating machinery domestically. He shares an anecdote about how the manufacturing line had a cassette for a single-facer which was repaired by an Indian paper machine engineer. But the economics of one-off component development is different from the scale at which Chinese manufacturers have industrialised their supply chains. "If you were to execute hundred such projects

like the Chinese, your initial investment in development, design, and trials will be recovered," Patel notes. No Indian manufacturer has assembled the critical mass to make the arithmetics work.

Patel feels there is an opportunity for European manufacturers to establish manufacturing roots in India. The benefits are lower labour costs, superior intellectual property protection than in China, and a domestic market.

The importance of clusters

The post-GST landscape has rendered the geography of Indian corrugated manufacturing obsolete. Excise concessions that once drew FMCG investment to hill-state locations such as Baddi and Rudrapur as well as Daman-Silvassa are no longer the decisive factor. What matters now is logistics.

Clusters have formed around the points of FMCG and pharma activity. Patel says, Jharkhand and Bihar is where the next cycle of FMCG investment will be.

Meanwhile urban centres carry an advantage which very few people speak about. This is proximity to old corrugated container (OCC) feedstock. Waste paper collection is densest in cities; paper mills located within clusters benefit from the lowest possible logistics cost on their primary raw material. The pull of OCC and the pull of end-market demand are, in most cases, pointing in the same direction.

Patel describes the cluster dynamic as having "gone around the cycle" in different regions at multiple speeds. The South and West are mature (perhaps over-mature), with capacity exceeding demand and margins under severe pressure. The East is earlier in its journey. Recent geopolitical disruptions, including the impact of the Iran-USA conflict on export trade flows through the textile and related sectors, have added volatility to clusters dependent on export-oriented industries.

The challenge of cost-cutting

The mainstream FMCG segment, that is 75% of the market, is, in Patel's analysis, a structural trap for anyone seeking to build a sustainable, high-return corrugated business. Quality expectations are modest. Procurement is increasingly managed through reverse auction. The cost of a regular slotted container is easily computed by any analyst with a spreadsheet and a cursory knowledge of current paper prices. This makes the box an easy target for



The Bobst FFG 8,20 Discovery at SIPM plant

procurement managers who seek to cut corners and target cost reductions.

The temptation to cut corners is significant. Sub-specification paper, falsified laboratory approvals, and lightweighting the GSM are the norm. Light-weighting, which ought to be a value-creating exercise for the value chain, becomes an opportunity for covert spec reduction, with the converter focussing on paper saving while the buyer pays for the originally specified weight.

The light-weighting conversation itself reveals a structural dysfunction. SIPM developed lower-weight, higher-performance paper combinations using its HRC paper that demonstrably met or exceeded the compression strength of heavier conventional structures. A leading FMCG brand, for example, saw successful light-weighting trials that reduced board weight while maintaining performance. But when the next reverse auction came around and boxes were bid on a per-kilogramme basis, the efficiency gain was captured by the buyer in the form of a lower payment rather than shared as a margin improvement for the converter.

"The FMCG buyer also needs to change his attitude," Patel observes. "It does not come unless the markets compel him to do it. And that is not happening in a very fragmented market because there is so much oversupply. The guy is sitting pretty."

The remaining 25% of the market includes electronics, pharmaceuticals, cosmetics, export packaging, food service, and specialised industrial applications. Investment barriers are higher. Quality requirements are more demanding. And the players who have built defensible positions in these segments tend to be quieter, more focused, and considerably more profitable.

Patel describes brown box manufacturers in regional markets who are oper-

ating at 15–16% OPM, double the mainstream norm, without owning a flexo-folder-gluer. Their competitive advantage lies in converting capability, special applications, export-grade zero-rejection standards, or proprietary knowledge of demanding end-use requirements. "They are not chasing volumes. They are chasing quality and focusing on margins."

eCommerce: What next ...

The corrugated industry's great anticipated growth driver, eCommerce, has not materialised in India in the manner that it transformed the sector in the USA. The American model, built on large fulfilment centres, platform marketplaces, and box deliveries to suburban homes, generated enormous corrugated volume over the past decade. In India, the growth path has diverged.

Dark stores, hyper-local delivery, and the dominance of platform models that use existing retail as distributed inventory have shifted the packaging requirement away from the transit box and towards paper sleeves, pouches, and small protective wraps. The large branded shipping box arriving at a residential door, with its associated corrugated volume, is far less prevalent in Indian eCommerce than it became in the USA.

"India is a country of small SKUs and lower purchasing power," Patel argues. "Fragmented markets, congested cities, short deliveries, dark stores: that part of eCommerce is different. The qualitative sector directly doesn't have the same impact."

There is a further complication: quality. The corrugated boxes that do appear in Indian eCommerce fulfilment are frequently of insufficient standard for a market - that has historically tolerated inferior packaging - is becoming increasingly quality-conscious at the consumer

end. The structural deficit in raw material quality for food-contact applications, a legacy of the recycled-fibre heritage, means that opportunities such as food delivery packaging, barrier-coated small-flute solutions, and cold-chain horticultural export boxes remain unrealised.

The path ahead ...

Where does growth come from in a sector with overcapacity, squeezed margins, and a dominant end-market that is structurally resistant to value-based procurement?

Patel's answer is consistent: move away from the mainstream, move towards application. SIPM is investing in 2026–27 in value-added packaging capabilities, specifically small-flute boards with barrier coatings, positioned as a replacement for solid boards in applications requiring good graphics combined with functional properties. The economics of small-flute corrugated can, in the right applications, compete with more expensive substrates while offering lighter weight, printability, and recyclability.

The legislative tailwind behind plastic replacement is significant and growing. Paper bags have made substantial inroads since the restriction of single-use plastics. Patel sees bag-making as a serious opportunity. Beyond bags, there is a broader universe: paper crates with moisture-resistant coatings for fresh produce and dairy, pizza boxes with food-safe liners (already commonplace in Europe and North America with recycled board, but still resisted in India due to raw material quality concerns), and barrier packaging for food service.

"Plastic replacement is a huge opportunity," Patel says. "But on a one-to-one comparison, everything else being equal, paper cannot compete with plastic for performance, barrier properties, and a multitude of other things. When you do make it compete, the cost per square metre goes up. But there are people doing smaller volumes who are finding very interesting niches."

Export is another avenue. A corrugated converter in Hyderabad, buying paper from SIPM and printing a wood-effect design with a basic flexo press, exports pizza boxes to Italy at four to five times the domestic price. The margins that are unavailable in the domestic FMCG segment are accessible, for those who have built the quality and reliability credentials to access them, in export markets that hold Indian packaging to international standards. ■

Why India's packaging industry must think beyond the box

To the insider, the corrugated packaging landscape reveals a complex architecture, a sector in the midst of a profound structural transformation, writes Pankaj Shah of Supack International



Pankaj Shah of Supack

For decades, the Indian corrugated packaging industry has been unfairly pigeonholed as a low-trust, commodity-driven sector. To the casual observer, the industry appears to be a mere manufacturer of brown paper containers. To the insider, however, the landscape reveals a far more complex architecture: a sector in the midst of a profound structural transformation, transitioning from a provider of simple containers to a sophisticated partner in the holistic supply chain.

The prevailing narrative of a “low-trust” commodity market is a relic of the past, increasingly divorced from commercial reality. Today, the corrugated manufacturer’s portfolio ranges from modified atmosphere packaging for fresh grapes and moisture-protected floral exports to specialised housings for heavy engineering goods. When the product dictates the design, as it must for any “tailor-made” solution, the packaging becomes an integral component of the product itself, not a fungible commodity. Those segments of the market that remain stuck in a low-trust model do so only because their demands have not yet evolved.

The import paradox

The industry’s maturity is perhaps best evidenced by its resistance to external shocks. Despite the persistent arrival of shipping containers laden with Chinese

machinery, corrugated imports remain marginal, hovering between 5% and 7%. This suggests that the domestic industry is not merely surviving; it is adapting at the speed of the market. The influx of imported technology, far from being a threat, has served as a catalyst for local upskilling. Manufacturers are leveraging these imports to learn, upgrade, and optimise.

The eCommerce catalyst

The rise of eCommerce has acted as both a boon and a headache. It has driven unprecedented volume and demanded higher aesthetic standards, but it has also exposed a critical operational weakness: the “right-sizing” problem. Unpredictable product dimensions in eCommerce often lead to oversized, inefficient packaging—a waste that the industry must solve through better design standards.

Furthermore, the industry is pivoting its operational strategies to meet this surge. The debate between “mini-plant” scalability and massive, centralised factories is no longer an “either-or” proposition; it is a question of strategic fit. Similarly, the shift from offline to inline converting reflects a broader market bifurcation: inline for high-velocity volume, and offline for the bespoke diversity that modern, short-run demands require.

Innovation beyond steam

Once, innovation in board plants was defined by the singular, modest goal of

reducing steam consumption. Today, the definition has broadened significantly. True technical innovation now resides in material science and structural design. We see this in the widespread adoption of corrugated fitments. For example, replacing environmentally unfriendly styrofoam. Then there are ingenious designs like the “S-Fold.”

Yet, significant technical hurdles remain. Two key failure points are odour and fracture. Both continue to plague raw materials. While paper mills are making incremental progress, the industry still has significant “runway” ahead before these structural integrity issues are fully resolved. Manufacturers must also grapple with the tyranny of environmental variables.

The conversion cost illusion

Perhaps the most significant shift required is a move away from the outdated concept of “Conversion Cost.” Grouping the entire process from kraft paper to a ready-to-deliver box into a single cost metric may have served a purpose in a simpler era of low volume. Today, it obscures reality. Adhesive costs fluctuate by ply-count; costs vary for simple printing to attractive multi colour displays. Energy systems, be it, whether steam, thermic fluid, or electric, create vastly different overheads. Transparency in costing is not just an accounting preference; it is a strategic imperative.

From converter to partner

The future of the sector lies in the shift from being box converters to “holistic packaging solution providers.” Forward-thinking firms are integrating themselves into their clients’ logistics chains. This means, supplying pre-formed, ready-to-pack boxes, or managing returnable pallets to accelerate truck turnaround times. The goal is to move the industry toward harmonised specifications, particularly regarding paper gsm. While Western markets have standardised some of these variables, India has a long way to go. Yet, the path is clear: harmonisation leads to the consolidation of variables, which drives scalability and cost optimisation for both buyer and seller. ■

Amber Packagers: Building beyond the corrugation box

Rahul Kumar visits Lucknow-based Amber Packagers, where managing director Wafa Abbas explains why automation, quality and disciplined investment are shaping the company's next phase of growth

Lucknow has long been celebrated for its Nawabi heritage – the *adabs* and *tehzeeds*, *chikankari* craftsmanship and celebrated cuisine. It is not, however, a city that immediately comes to mind when discussing India's corrugated packaging industry. That conversation is usually dominated by manufacturing clusters in Gujarat, Maharashtra, Tamil Nadu, and the National Capital region.

Yet, on the outskirts of Uttar Pradesh's capital, Amber Packagers is quietly challenging that perception. The 2002 established print-packaging specialist is in the midst of its most ambitious expansion to date, one that will increase its kraft paper conversion capacity from 2,000 tonnes to 6,000-tonnes a month and establish one of North India's larger integrated corrugated packaging operations. "Customers don't buy boxes. They buy consistency."

Wafa Abbas delivers the line without hesitation. Standing amid a factory that is steadily being transformed by new civil works, automation and a second integrated production line, the managing director explains that Amber's latest investment is not really about producing more boxes. "Capacity is only one outcome," he says. "Our objective is to build a manufacturing system that delivers the same quality every single day." It is a philosophy that surfaces repeatedly during a walk through the facility and one that explains almost every decision the com-



Wafa Abbas, managing director, Amber Packaging: Capacity is not the only thing

pany has taken over the past few years.

Walking through the plant, the scale of the project gradually becomes apparent. Fresh foundations sit alongside existing production buildings, engineers move between machinery awaiting installation, and forklifts weave through the shopfloor carrying reels and finished cartons. This is not a factory preparing for another machine installation. It is a factory reorganising itself for a different scale of operation. Every addition appears designed to complement what already exists rather than simply increase output.

Amber's own evolution reflects that thinking. What began as a commercial printing business gradually expanded into folding cartons before corrugated packaging emerged as its principal growth engine. Commercial printing, mono cartons and publishing remain part of the portfolio, but fibre-based packaging now sits firmly at the centre of the company's plans. Abbas describes the transition as a response to changing customer requirements rather than a

deliberate reinvention. "Every manufacturing sector today needs sustainable transport packaging," he says. "Corrugation has become the preferred solution."

There is another side to Abbas that perhaps explains his approach to business. Before packaging became his profession, he was a familiar face on the bodybuilding circuit, winning titles such as Mr Lucknow and Mr Uttar Pradesh. He laughs when the conversation turns to those days, but the comparison is difficult to ignore. Building a competitive manufacturing business, he says, demands much the same qualities as competitive sport: discipline, consistency and an unwillingness to become complacent. The machinery may have replaced the medals, but the mindset has remained remarkably similar.

Building momentum

Amber's expansion comes as corrugated packaging enters a period of sustained growth. The rise of eCommerce, organised retail, quick commerce,



The facility is situated amid mango orchards rather than congested industrial estates

pharmaceuticals, food processing and electronics manufacturing has steadily increased demand for paper-based transport packaging. At the same time, brand owners are asking more of secondary packaging. Boxes are expected not only to protect products but also to support merchandising, withstand increasingly complex logistics networks and reflect the quality of the brands they carry.

For Abbas, these are not temporary market conditions.

“Five or ten years ago, people were buying boxes,” he says. “Today they are buying reliability. They want a supplier who can deliver the same quality every time, irrespective of the quantity.”

That shift has changed the economics of investment. Capacity alone is no longer enough. Converters are expected to reduce waste, shorten lead times, improve repeatability and maintain tighter process control across every stage of production. Amber’s latest expansion has therefore been planned as an integrated manufacturing programme

rather than a collection of individual machine purchases.

Why Lucknow?

For many converters, locating a major corrugated packaging operation in Lucknow might appear unconventional. India’s best-known packaging clusters have traditionally grown around Gujarat, Maharashtra, Tamil Nadu and Delhi NCR, where manufacturing ecosystems developed over several decades.

But Abbas sees opportunity where others see geography.

“We don’t believe customers choose suppliers only because of location,” he says. “They choose suppliers who deliver consistently, respond quickly, and understand their business.”

From Lucknow, Amber today serves customers across Uttar Pradesh and neighbouring states, benefiting from improving highways, expanding logistics infrastructure and a steadily diversifying industrial economy. Investments in food processing, warehousing, electronics and defence manufacturing are creating

fresh demand for sophisticated corrugated packaging, allowing regional converters to compete for work that might once have gone elsewhere.

The factory itself reinforces that long-term outlook. Set amid mango orchards rather than crowded industrial estates, the campus offers something increasingly difficult to find in mature manufacturing centres: room to grow. New buildings are rising alongside existing production areas, leaving sufficient space for future investments without disrupting operations.

“We are not simply adding another machine,” Abbas says. “We are building another complete production ecosystem where every machine complements the other.”

It is perhaps the most revealing sentence of the day. Amber is not measuring success by the number of machines it installs, but by how effectively those machines work together. The objective is to create two largely independent manufacturing streams capable of operating simultaneously, allowing capacity →



The factory is designed around the production flow rather than individual machines

to grow without creating bottlenecks elsewhere in the factory.

Engineering growth

The centrepiece of the expansion is a new 1,600-mm automatic corrugation board line capable of operating at speeds of up to 300-mtr/min. Equipped with automatic splicers, advanced process controls, grinders and filtration systems, it has been specified to handle multiple board grades and flute combinations while maintaining consistent quality across long production runs.

Supporting the corrugator is an equally significant investment in converting, material handling and downstream operations, ensuring that every department grows together. Once fully commissioned, the project will increase Amber's monthly kraft paper conversion capacity from 2,000-tonnes to around 6,000-tonnes.

"The machine is important," Abbas says as the tour pauses beside the new line. "But what matters even more is what happens after the machine starts running. That is where quality is built."

Automation edge

The new corrugator may dominate the investment programme, but Abbas is quick to point out that a corrugated box is only as good as the processes that follow it. In his view, the industry's next competitive advantage will come not from producing more board, but from converting it more intelligently.

"Customers don't judge you by how many sheets you produce," he says. "They judge you by the quality they receive every single time." That philosophy has prompted Amber to invest heavily in finishing and converting, ensuring that downstream operations keep pace with increased board production. Instead of treating finishing as a separate department, the company has designed the expansion so that every stage of manufacturing functions as part of a single, integrated workflow.

Among the most significant additions is BoxStream, an automated converting solution capable of producing lock-bottom and crash-lock cartons in a continuous online process. According to Amber, it is the first BoxStream installation in

India, enabling the manufacturing of premium shelf-ready and retail-ready packaging with fewer manual interventions and shorter production cycles.

Complementing the installation are new converting systems from Shinko Machine and Robus India, broadening the company's capability in value-added corrugated packaging for FMCG, electronics, food and organised retail.

Walking through the converting department, the emphasis on workflow becomes apparent. Material movement has been planned to minimise handling, while production lines have been laid out to reduce interruptions between printing, converting and dispatch. It is a factory designed around flow rather than individual machines, a subtle distinction, perhaps, but one that Abbas believes becomes increasingly important as production volumes rise.

Quality, he adds, can no longer be checked by just looking at the finished box. "It has to be built into every stage of manufacturing," he says. "Global customers don't evaluate only the final product. They look at your systems, your

traceability, your quality controls and increasingly your sustainability practices.”

To meet those expectations, Amber is strengthening process control throughout the factory while working towards internationally recognised quality standards that will support future engagement with multinational customers. The objective is straightforward: remove variability wherever possible so that every order, regardless of size, leaves the factory to the same specification.

Smart investments

One of the more interesting aspects of Amber's expansion is Abbas's pragmatic approach to machinery selection. For years, European manufacturers were regarded as the benchmark for corrugated equipment. It may still be, but Abbas believes that assumption deserves reconsideration.

Why and how? “The performance gap has reduced significantly,” he says. “Premium Asian machines now offer excellent automation, reliability and productivity, while giving much better value for money and easier service support.”

For a company investing simultaneously across corrugation, converting

and material handling, that balance matters. Rather than pursuing equipment simply because of its country of origin, Amber has evaluated each investment on its ability to improve productivity, reduce waste and generate long-term returns.

That commercial realism runs through the entire expansion. Every investment has been assessed not as an individual purchase but as part of a larger manufacturing strategy. A faster corrugator would achieve little without corresponding improvements in converting. Likewise, additional finishing capacity would offer limited value if board production became a constraint. The company's solution has been to expand every department in tandem, creating two integrated production ecosystems capable of operating independently while maintaining a common quality standard.

Beyond capability

Although corrugated packaging has become Amber's principal growth engine, Abbas is already looking beyond the current expansion. Commercial printing and mono cartons continue to serve established customers, while the publishing division is expected to produce close to 3,000,000 books during

its first year. The company is also evaluating opportunities in paper bags, flexible packaging, plastic moulding and in-mould labels.

“We don't want to diversify simply because a market is growing,” Abbas says. “It has to make sense for our customers and for the business.”

That measured approach reflects his broader view of manufacturing. Growth, he argues, should strengthen the business rather than distract it. New product categories will be considered only where they complement Amber's existing capabilities and allow the company to deepen relationships with its customers rather than merely broaden its portfolio.

The conversation eventually turns to the future of corrugated packaging itself.

Abbas believes the next decade will be shaped less by faster machines than by smarter factories. Artificial intelligence, integrated ERP and MES platforms, robotics, predictive maintenance and data-driven production planning will steadily reshape how converters operate.

Sustainability, too, will move from being a customer expectation to a manufacturing necessity, driving greater use of lightweight board structures, recyclable materials and water-based barrier technologies.

“The industry is moving from volume manufacturing to intelligent manufacturing,” he says. “Speed alone won't define success. Data, automation, sustainability and quality will become equally important.”

Standing on the shopfloor, it becomes clear that Amber's latest expansion is not defined by a new corrugator or even the leap from 2,000 to 6,000-tonnes a month. Those numbers merely illustrate the scale of the ambition.

The more significant change is the manufacturing system taking shape around them—one designed to improve workflow, reduce variability and prepare the business for the next phase of growth.

Abbas watches as work continues around the new production line before offering one final thought. “The machine is important,” he says. “But what matters even more is what happens after the machine starts running.”

That belief has shaped every decision Amber Packagers is taking today. The machinery may increase capacity. But the manufacturing system taking shape around it may prove to be the company's more enduring investment. ■



Amber Packagers' team has been in investment mode

Volatility in kraft paper

It has a direct impact on manufacturing costs and profitability, say Anantha Shayana and Pramod Shayana of Best Corrugators, in an interview with **Rahul Kumar**

Father and son duo, Anantha Shayana and Pramod Shayana assert that at Best Corrugators, the focus is on engineering the right packaging solution. Their Mysuru-based production facility conducts fitment trials for new developments, optimises carton dimensions, and recommends the most cost-effective paper specifications that meet the customers' required strength and performance criteria.

Rahul Kumar (RK): The Indian corrugation industry is growing rapidly with the expansion of eCommerce,

FMCG, retail, and exports. What, in your opinion, are the biggest opportunities and challenges that will shape the industry over the next five years?

Anantha Shayana (AS): The Indian corrugation industry has a very promising future, with FMCG and eCommerce continuing to be the primary growth drivers. FMCG offers consistent demand due to the rising consumption and expanding distribution networks, while eCommerce is driving the need for stronger, lighter, and more sustainable packaging that can withstand increasingly complex supply chains. These sectors also expect higher quality, faster turnaround times, and innovative packaging solutions, creating opportunities for corrugators to move beyond being just box manufacturers.

At the same time, the industry faces a few significant challenges. The first is the continued volatility in kraft paper prices, which has a direct impact on manufacturing costs and profitability. The second is the shortage of skilled manpower and,

more importantly, workforce stability. It is becoming increasingly difficult to retain trained operators, and unexpected attrition can disrupt production and affect delivery commitments. Addressing these challenges will require greater investment in employee development, automation, and process standardisation.

Over the next five years, companies that focus on operational efficiency, technology adoption, and building long-term customer partnerships will be best positioned to capitalise on the industry's growth while navigating these challenges successfully.

RK: Corrugated packaging is increasingly becoming a strategic branding and supply chain tool rather than just a transport box. How are brand owners' expectations changing, and how is your company adapting to these evolving demands?

AS: The role of corrugated packaging has evolved significantly over the years. While protecting the product remains its



Best Corrugators' manufacturing facility at Mysuru

r prices is a challenge

primary function, brand owners today also expect packaging to enhance brand visibility, optimise logistics, improve sustainability, and deliver a better overall customer experience. Depending on the product category, many customers now seek premium-looking cartons with superior print quality, better strength, optimised dimensions, and shorter lead times. At the same time, there are customers who continue to be highly cost-conscious, so striking the right balance between performance and cost remains essential.

For large brands, the carton artwork and branding guidelines are often already well established. However, wherever required, we work closely with our customers on aspects such as print quality, colour requirements, selection of the appropriate top liner, and the most suitable printing process to achieve the desired visual impact.

Beyond aesthetics, our focus is on engineering the right packaging solution. We conduct fitment trials for new devel-

opments, optimise carton dimensions, and recommend the most cost-effective paper specifications that meet the customer's required strength and performance criteria.

RK: Raw material costs continue to fluctuate and significantly impact profitability. What strategies do you adopt to optimise paper consumption, improve efficiencies, and protect margins without compromising quality?

Pramod Shayana (PS): Raw material price volatility, particularly in kraft paper, continues to be one of the biggest challenges for the corrugation industry. In many cases, especially with large customers, the carton specifications are finalised after extensive R&D, with defined strength requirements and board gsm or box weight. This leaves limited scope for further optimisation. However, wherever the opportunity exists, we work with customers to optimise the paper specification while ensuring the required box compression test (BCT) or

edge crush test (ECT) performance is fully maintained.

Internally, waste reduction plays a critical role in protecting margins. Effective production planning based on running sizes and flute combinations, optimised machine settings, operator training, preventive maintenance, and regular quality checks all contribute to minimising waste and improving overall manufacturing efficiency.

Managing raw material price fluctuations also requires transparency with customers. Whenever there is a significant increase in paper prices, we engage with customers to discuss the impact. Similarly, when prices decline, we believe in voluntarily passing on the benefit wherever applicable, as this helps build long-term trust and strengthens customer relationships. For customers operating under long-term contracts, pricing flexibility is naturally more limited.

Regardless of market conditions, there are certain aspects we never compromise →



on—meeting the specified box strength, maintaining quality standards, and honouring our delivery commitments.

RK: Automation and digitalisation are transforming manufacturing. Which investments have delivered the highest return on investment for your business?

PS: For us, the highest returns have come from investing in core manufacturing automation. Upgrading to a modern corrugator line has significantly improved productivity, board quality, and operational efficiency. Another major milestone was transitioning from a two-stage process involving a printer slotter and a separate folder-gluer to an integrated flexo folder gluer (FFG). This has streamlined production, reduced handling, improved consistency, and lowered manpower requirements.

We have also invested in a well-designed boiler system that enables the corrugator to operate at optimal speeds while maintaining consistent board quality. Reliable steam generation is often an overlooked factor, but it plays a vital role in achieving high productivity and minimising quality variations.

Collectively, these investments have resulted in higher production output, faster job changeovers, reduced wastage, improved quality consistency, and better utilisation of manpower. While digitalisation and AI are gaining momentum across the industry, we believe the greatest returns come from first building a strong foundation with efficient, reliable, and automated manufacturing processes.

RK: Sustainability has become a business imperative. Beyond using recyclable materials, what initiatives has your organisation undertaken to reduce waste, energy consumption, carbon footprint, and overall environmental impact?

AS: Sustainability is an integral part of our manufacturing philosophy and extends well beyond the use of recyclable corrugated packaging. We continuously focus on reducing waste, improving resource efficiency, and minimising our environmental impact across our operations.

All waste paper, corrugated boards, and rejected cartons generated during production are systematically segregated and recycled through authorised paper mills, supporting the circular economy. To reduce our dependence on conventional energy sources, we have installed solar power systems at our facility. We have also invested in a state-of-the-art

QUICK Q&A WITH ANANTHA SHAYANA



Like father, like son – Anantha Shayana (I) and Pramod Shayana

If you were not in the corrugated packaging industry, which profession would you have chosen and why?

I have always wanted to build something of my own. Even when I was working for other companies, I never measured my work solely by the salary I earned. Instead, I looked at every opportunity as a chance to learn, take on new responsibilities, and gain knowledge across different aspects of business. That mindset has been invaluable in my entrepreneurial journey.

What is one piece of advice you received early in your career that still guides your decisions today?

Success comes from three things – hard work, hard work, and hard work.

Which book, business leader, or entrepreneur has inspired your leadership style the most?

Rather than being inspired by a particular book or a globally recognised business leader, my inspiration came from much closer to home. I come from a village background, where there were only a few industries. Seeing those businesses grow and provide employment to people in my village – including my relatives, neighbours and friends – left a lasting impression on me.

If you could spend an evening with any one global business icon, who would it be, and what one question would you ask?

I would choose NR Narayana Murthy. I have always admired the way he transformed Infosys into a globally respected organisation through strong values, disciplined execution, and a long-term vision. The one question I would ask him is: "What are the key factors that enable a small or medium-sized business to evolve into a globally recognised organisation, while staying true to its core values?"

boiler that operates with higher fuel efficiency, helping us reduce energy consumption while maintaining consistent production quality.

Environmental responsibility also extends to our printing operations. We have an effluent treatment plant (ETP) to treat wastewater generated during processes such as stereo cleaning and ink handling. This ensures responsible disposal of waste ink while enabling the recovery of treated water.

We are also proud to be FSC-certified, reinforcing our commitment to responsible sourcing and sustainable forestry practices. Looking ahead, we plan to strengthen our sustainability initiatives further through carbon footprint tracking and the gradual adoption of electric vehicles within our operations.

RK: High-quality graphics and premium packaging are creating new opportunities for corrugated products. How do you see flexographic, digital, and hybrid printing technologies influencing the future of corrugated packaging?

AS: Flexographic printing will continue

to remain the most cost-effective and productive printing technology for the corrugated packaging industry, particularly for high-volume applications. Modern advancements such as reel-to-reel printing with automatic register correction have significantly enhanced print quality, enabling flexographic printing to deliver results that, for many applications, approach offset-quality standards while maintaining high production speeds. However, the initial investment and development cost for reel-to-reel flexographic printing technology is relatively high, making it more suitable for large-volume production where the investment can be justified through economies of scale. In addition, any minute change in carton design or size typically requires new printing plates and other tooling, resulting in additional development costs and making frequent design changes less economical compared to digital printing.

Digital printing, on the other hand, is well-positioned to serve short production runs, customised packaging, and person- ➔

alised branding requirements. As brands increasingly look for limited editions, promotional campaigns, and faster product launches, digital printing will continue to find its place. However, the relatively higher cost means its adoption for large-volume production will remain selective for the foreseeable future.

We are also witnessing growing demand for premium packaging with multi-colour graphics, coated top liners, varnish finishes, and laminated post-print solutions, particularly from customers looking to strengthen their brand presence.

Over the next decade, I believe the industry will adopt a healthy mix of flexographic and digital printing technologies, with each serving different market needs. Flexography is likely to remain the preferred choice for large production volumes, while digital printing will continue to expand in applications where flexibility, customisation, and shorter run lengths offer greater value.

RK: Many corrugators still compete primarily on price. How can the industry move towards value-added packaging solutions through structural design, innovation, and customer-centric services?

PS: Price will always remain an important factor in the corrugated packaging industry, and I do not believe it can be overlooked. Even companies that consistently deliver superior quality, reliable service, and innovation must ensure their pricing remains competitive. Customers may be willing to pay a small premium for consistent quality and dependable supply, but cost will continue to be one of the most sensitive aspects of our business.

The industry can move towards value-added packaging when innovation creates measurable benefits for the customer. This may include structural designs that reduce material consumption while maintaining strength, improved printing that enhances brand visibility, or packaging solutions that improve logistics efficiency and product protection. When these innovations generate tangible value, customers are more likely to look beyond price alone.

However, in the case of outer corrugated cartons, which are primarily part of the B2B supply chain rather than consumer-facing packaging, the scope for value addition is naturally more limited. This makes it even more important for manufacturers to balance innovation, quality, service, and competitive pricing. The companies that

consistently deliver value across all these areas will be best positioned to build long-term customer relationships.

RK: The adoption of AI, Industry 4.0, predictive maintenance, and smart factories is accelerating globally. How prepared is the Indian corrugation industry for this transformation, and what should companies prioritise?

PS: The Indian corrugation industry is certainly progressing towards greater automation and digitalisation, but the pace of adoption is not uniform. Larger organised players are investing significantly in advanced manufacturing technologies, while many small and medium-sized companies are still in the early stages of this transformation.

Before focusing on AI, I believe companies should first build a strong digital foundation through production automation, reliable data collection, and robust ERP implementation. These systems generate the accurate and consistent data that AI requires to deliver meaningful insights and operational improvements.

Looking ahead, AI has tremendous potential in areas such as production planning, predictive maintenance, inventory management, and demand forecasting. In the longer term, as machine vision and machine connectivity continue to evolve, AI may also assist in quality monitoring by comparing images of cartons against predefined quality standards. While such applications still present technical and practical challenges, they represent an exciting direction for the future of smart manufacturing.

RK: If you were setting up a new corrugated packaging plant today, what would be your top five investment priorities to build a globally competitive and future-ready business?

AS: If I were setting up a new corrugated packaging plant today, my priorities would focus on building a strong manufacturing foundation with efficient and reliable operations. My first investment would be a state-of-the-art corrugator, as it forms the backbone of any corrugation plant. A modern corrugator delivers higher productivity, superior board quality, reduced wastage, and the flexibility to meet diverse customer requirements.

The second priority would be a high-performance flexo folder gluer (FFG). Integrating printing, slotting, folding, and gluing into a single process improves productivity, reduces manpower require-

ments, and ensures greater consistency in finished cartons.

The third priority would be an efficient boiler system. Reliable steam generation is essential for achieving consistent board quality and enabling the corrugator to operate at its optimum speed and efficiency.

The fourth would be a well-designed glue kitchen, as consistent adhesive preparation directly influences board bonding, product quality, and machine performance.

Finally, I would invest in smart conveyor and material handling systems throughout the plant. Efficient movement of boards and cartons between different production stages minimises manual handling, reduces damage, improves workflow, and enhances overall plant productivity.

Together, these investments would create a highly efficient, future-ready manufacturing facility capable of delivering consistent quality, operational excellence, and long-term competitiveness.

RK: How has the current global geopolitical and economic uncertainty impacted your business, and what strategies are you adopting to navigate these challenges while ensuring sustainable growth?

AS: Like many companies, we have been affected by fluctuations in kraft paper prices and increasing freight costs, both of which have had a direct impact on operating margins. In today's global environment, businesses must be prepared to adapt quickly to changing market conditions.

To strengthen our resilience, we have diversified our customer base, enabling us to reduce dependency on any single market segment while maintaining a stable business pipeline. Internally, we have focused on improving operational efficiency by creating a culture of quality and accountability. One of the initiatives we have introduced is a performance incentive linked to rejection levels, ensuring that every employee understands the importance of minimising waste and contributing to overall operational excellence.

We believe sustainable growth is achieved not only through investments in technology but also by building a strong organisational culture where every individual plays a role in improving quality, reducing waste, and enhancing customer satisfaction. This approach has helped us remain agile and better prepared to navigate an increasingly uncertain business environment. ■

Brand owners want consistent consumer experience

At Corrucase, the goal is to become a packaging partner rather than just a packaging converter, says Ayush Khetan, director, Corrucase, in an interview with **Rahul Kumar**



Ayush Khetan,
director, Corrucase

Ayush Khetan believes that companies with strong fundamentals, diversified customer portfolios, and a long-term perspective will emerge stronger from periods of uncertainty.

Rahul Kumar (RK): The Indian corrugation industry is growing rapidly with the expansion of eCommerce, FMCG, retail, and exports. What, in your opinion, are the biggest opportunities and challenges that will shape the industry over the next five years?

Ayush Khetan (AK): There is a huge opportunity as corrugated packaging is becoming central to India's consumption and manufacturing story. Growth in eCommerce, organised retail, FMCG, electronics, exports, and the China + 1 supply chain shift will continue to drive demand. At the same time, packaging is evolving from a commodity to a strategic business enabler. The biggest challenge will be balancing this growth with rising customer expectations around quality, consistency, sustainability, speed, and cost competitiveness. Companies that invest in technology, talent, process discipline, and innovation will gain market share, while those competing solely on price will find it increasingly difficult to remain relevant.

RK: Corrugated packaging is increasingly becoming a strategic branding and supply chain tool rather than just a transport box. How are brand owners' expectations changing, and how is your company adapting to these evolving demands?

AK: Brand owners today expect far more than a box. They are looking for packaging that not only protects the

product but also enhances shelf appeal, improves logistics efficiency, supports sustainability goals, and delivers a consistent consumer experience. At Corrucase, we work closely with our customers during the design stage itself. We focus on structural optimisation, value engineering, print quality, supply-chain efficiencies, and inventory management solutions. Our goal is to become a packaging partner rather than just a packaging converter.

RK: Raw material costs continue to fluctuate and significantly impact profitability. What strategies do you adopt to optimise paper consumption, improve efficiencies, and protect margins without compromising quality?

AK: Paper accounts for most of the cost structure in a corrugated box. So, its optimisation is particularly important to control the overall costing, and it begins with design and process control. We continuously focus on right-sizing specifications, reducing waste, improving board combinations through scientific testing, and maximising machine efficiencies. Data-driven production planning, preventive maintenance, process standardisation, and yield improvement initiatives help us reduce wastage while maintaining quality. The goal is to create value through efficiency rather than relying solely on price increases.

RK: Automation and digitalisation are transforming manufacturing. Which investments have delivered the highest return on investment for your business?

AK: While investments in the latest manufacturing technology are essential, some of our strongest returns have come from sustainability-focused initiatives such as our captive solar plant, ETP systems, and rainwater harvesting, which have improved both resource efficiency and long-term cost competitiveness.

On the manufacturing side, invest-



The future will be driven by a combination of technologies rather than a single solution: Ayush Khetan

ments in advanced converting equipment, including a high-graphics FFG, have enhanced productivity, improved efficiencies, and expanded our capabilities in premium printed packaging.

Equally impactful have been our investments in ERP systems, production monitoring, quality management, and real-time data visibility, which have strengthened decision-making and operational control. Ultimately, the greatest value is created when machines, people, and data work together seamlessly.

RK: Sustainability has become a business imperative. Beyond using recyclable materials, what initiatives has your organisation undertaken to reduce waste, energy consumption, carbon footprint, and overall environmental impact?

AK: At Corrugase, sustainability has always been the core to our operations, we believe in not only providing our customers with a sustainable packaging solution but also ensuring that the same is produced in at-most sustainable manner. Sustainability at Corrugase goes beyond producing recyclable packaging—it is embedded in how we manufacture it. We have invested in LED lighting across our facilities, a captive rooftop solar plant, agro-waste briquettes as an alternative to conventional fuels, wastewater treatment and recycling systems, and rainwater harvesting to reduce our environmental footprint. However, we believe the most effective

sustainability initiative is reducing waste and improving efficiency. Every extra box produced from the same resources and every meter of board waste eliminated directly lowers environmental impact. For us, sustainability and operational excellence are closely linked, and continuous improvement remains our most powerful tool for driving both.

RK: High-quality graphics and premium packaging are creating new opportunities for corrugated products. How do you see flexographic, digital, and

hybrid printing technologies influencing the future of corrugated packaging?

AK: The future will be driven by a combination of technologies rather than a single solution. Flexographic printing will continue to dominate high-volume corrugated packaging due to its speed, consistency, and cost efficiency. While digital printing is still at a relatively early stage in the Indian corrugation market, it has strong potential in applications requiring short runs, personalisation, rapid prototyping, and faster product launches. Hybrid solutions that combine →



Data-driven production planning, preventive maintenance and process standardisation help maintain quality



The industry must shift the conversation from price per box to value delivered



the efficiency of flexo with the flexibility of digital will create new opportunities for brands looking for premium graphics, agility, and supply chain responsiveness. Ultimately, the winning technology will be the one that delivers the right balance of quality, speed, sustainability, and total cost for the customer.

RK: Many corrugators still compete primarily on price. How can the industry move towards value-added packaging solutions through structural design, innovation, and customer-centric services?

AK: The industry must shift the conversation from price per box to value delivered. A well-designed package can reduce product damage, improve logistics efficiency, lower inventory costs, enhance sustainability, and strengthen brand perception. Today,

customers are increasingly looking for partners who can add value across their supply chain, not just provide a lower-cost box. This includes collaborating on structural design, value engineering, inventory management, vendor-managed inventory (VMI), and just-in-time delivery models. Corrugators that invest in design capabilities, technical expertise, and customer collaboration will be able to create measurable business value for their clients.

RK: The adoption of AI, Industry 4.0, predictive maintenance, and smart factories is accelerating globally. How prepared is the Indian corrugation industry for this transformation, and what should companies prioritise?

AK: The Indian corrugation industry is at different stages of readiness. While some companies are investing aggressively in →

automation and digitalisation, many are still focused on building the foundational systems required for Industry 4.0.

Before adopting advanced AI tools, companies should prioritise creating clean, reliable data, standardised processes, digital visibility, machine connectivity, quality monitoring, and workforce capability development. Technology delivers value only when supported by disciplined execution.

A positive trend is that several leading global machinery manufacturers have strengthened their presence in India by establishing local manufacturing and support facilities. This not only improves access to technology but also accelerates knowledge transfer and process improvement across the industry. The focus is increasingly shifting from simply selling machines to helping corrugators improve productivity, quality, and overall operational excellence.

RK: If you were setting up a new corrugated packaging plant today, what would be your top five investment priorities to build a globally competitive and future-ready business?

AK: First, I would invest in a highly efficient and reliable manufacturing platform with the right level of automation. A strong and stable corrugator is the foundation of any successful corrugation plant, complemented by advanced high-graphics converting equipment that can cater to evolving customer requirements.

Second, I would build a robust digital infrastructure, including ERP, MES, production monitoring, and data analytics

systems to enable real-time visibility and informed decision-making.

Third, I would focus on building a capable technical and leadership team, as people remain the key differentiator in any business.

Fourth, I would invest in design, innovation, and packaging development capabilities to create customer-centric solutions rather than simply manufacturing boxes.

Finally, sustainability-focused investments such as renewable energy, water management, and resource-efficient operations would be a priority, as they make both environmental and economic sense.

RK: Looking ahead to 2030, what technological, business, and sustainability trends do you believe will redefine the Indian corrugation industry, and how should today's entrepreneurs prepare for them?

AK: By 2030, we will see greater automation, AI-driven decision-making, increased demand for lightweight and sustainable packaging, deeper integration with customer supply chains, and significantly higher expectations around quality and service. Entrepreneurs should focus on building scalable systems, investing in talent, embracing technology early, and developing a culture of continuous improvement. The winners will be those who can combine operational excellence with innovation and sustainability.

RK: How has the current global geopolitical and economic uncertainty

RAPID FIRE WITH AYUSH KHETAN



If you were not in the corrugated packaging industry, which profession would you have chosen and why?

I don't think I would have strayed too far. Manufacturing is in my DNA, so I would most likely have been building another packaging business or leading a manufacturing company.

What is one piece of advice you received early in your career that still guides your decisions today?

"Always focus on creating value for the customer, and the business will follow."

Which book, business leader, or entrepreneur has inspired your leadership style the most?

Without a doubt, my biggest inspiration has been my father. Watching him build the business with integrity, discipline, and an unwavering commitment to customer service taught me that long-term success comes from consistency, trust, and always putting the customer first.



Some companies are investing in automation and digitalisation, many are focused on building the foundational systems required for Industry 4.0

impacted your business, and what strategies are you adopting to navigate these challenges while ensuring sustainable growth?

Global uncertainty has increased volatility across supply chains, raw material markets, and customer demand patterns. While this creates short-term challenges, it also reinforces the importance of resilience and adaptability. Our focus remains on strengthening customer partnerships, diversifying our customer base and segment, maintaining financial discipline, improving operational efficiency, and investing selectively in future-ready capabilities. We believe that companies with strong fundamentals, diversified customer portfolios, and a long-term perspective will emerge stronger from periods of uncertainty. ■

Proper manpower deployment is a must to minimise wastage

Timely maintenance of all machines and keeping them in top-notch working condition is necessary to improve the efficiency of the production process, Navin Kumar Motani of Vaishali, Hajipur-based Excel Paper Packaging, tells **Rahul Kumar**

Navin Kumar Motani says companies should prioritise predictive maintenance, as this will greatly control the breakdown of machinery, ensuring continuous production. It will also reduce the stress of sudden breakdowns, which are often a nightmare for any industrialist.

Rahul Kumar (RK): What, in your opinion, are the biggest opportunities and challenges that will shape the industry over the next five years?

Navin Kumar Motani (NKM): The growth of the industrial sector has created more demand for packaging material. Many MNCs are expanding their units into new territories, which is a welcome boon for all corrugators. An increase in demand is providing us with the opportunity to expand our present setup as well as automate and modernise our machinery to meet that demand. Although looking at the last few years, the world has seen a lot of downsides as well. The pandemic, various wars, and geopolitical tensions have hampered the availability of raw materials, and their costs have increased exponentially, whereas the vendors, especially big MNCs, expect the same pricing. A steady market supply and demand chain is a major issue faced by all industries in general.



Navin Kumar Motani of Excel Paper Packaging

RK: How are brand owners' expectations changing, and how is your company adapting?

NKM: Brand owners now demand specific shapes and designs for the packaging of their materials so that their products stand out in a competitive market. As it is a well-known marketing strategy, to sell more, you need to draw the attention of the public by providing quality products but packing them in a more innovative and eye-catching presentation. To meet their unique demands and to keep up with current trends, we are constantly updating our systems and manufacturing processes with recent innovations and technology to increase the speed of production as well as avoid errors that cause unnecessary wastage. We aim to provide better customer service and better printing quality while keeping production costs in check.

RK: Raw material costs continue to fluctuate. What strategies do you adopt

to optimise paper consumption and protect margins?

NKM: Proper manpower deployment and training are a must to minimise wastage. Timely maintenance of all machines and keeping them in top-notch working condition is necessary to improve the efficiency of the production process. Thus, controlling wastage helps protect margins without compromising quality.

RK: Automation and digitalisation are transforming manufacturing. Which investments have delivered the highest ROI?

NKM: Automation and digitalisation have definitely transformed the industry, and newer innovations and technologies are being introduced at frequent intervals. We have a fully automated corrugation line, a high-speed automatic printing machine, as well as an auto-gluer. All this automation has helped us increase our production capacity to meet the demands of the market and cut down our running time as well. To have a high return on investment, implementing automation in all departments is required for achieving the desired results. That has been our strategy.

RK: Sustainability has become a business imperative. Beyond recyclable materials, what initiatives has your organisation undertaken?

NKM: Sustainability is definitely a business imperative in all sectors. Efficient manpower and the smooth running of machinery have helped us reduce waste. For energy consumption, we shifted from coal to rice husk for our boiler, thus reducing costs as well as our carbon footprint, making our unit more environmentally friendly. In the future, we intend to harness solar energy, which will significantly regulate our electricity demand and further decrease our carbon footprint.

RK: High-quality graphics and premium packaging are creating new opportunities. How do you see printing technologies evolving?

NKM: High-quality graphics and premium packaging are the need of the →



AI and smart factories are the future of the industry in all sectors, not just corrugation: Navin Motani

hour, as discussed earlier. Better printing quality and designs that stand out are a necessity to keep our customers satisfied. Slowly but steadily, we will need to shift to digital and hybrid printing to compete with others, or we will fade away.

RK: The adoption of AI, Industry 4.0, predictive maintenance, and smart factories is accelerating globally. How prepared is the Indian corrugation industry?

NKM: AI and smart factories are the future of the industry in all sectors, not just corrugation. Those who learn, adapt, update, and change will survive, and all others will perish. As is the law of nature: Survival of the fittest. Among these, companies should prioritise predictive maintenance, as this will greatly control the breakdown of machinery, ensuring continuous production. It will also reduce the stress of sudden breakdowns, which are often a nightmare for any industrialist.

RK: If you were setting up a new

corrugated packaging plant today, what would be your top five investment priorities?

NKM: My priorities for a new plant today would be a fully automated corrugation line (seven-ply option) with an interchanging flute system, flexographic as well as digital printing options (multicolour) to provide unique designs and premium packaging options, the ability to manufacture boxes of all sizes and shapes — ranging from mono-cartons to packaging huge machinery, a state-of-the-art electrical setup with inverter backup to ensure continuous production without breaks from power cuts and extremely efficient manpower with proper training.

RK: Looking ahead to 2030, what trends will redefine the Indian corrugation industry?

NKM: Looking ahead to 2030, a shift to complete automation with minimal to no human intervention (except for occasional breakdowns) — starting from paper loading to the manufacture of the box — will be the trend. With AI, maybe

the breakdown part will also be automated. The need to cater to all the demands of customers will trend, creating a one-stop shop for all packaging options. For this, today's entrepreneurs need to keep their minds open and update themselves on all recent trends and developments, as well as all expected future innovations in the pipeline, to improve the efficiency of the industry.

RK: How has the current global geopolitical and economic uncertainty impacted your business?

NKM: Current global geopolitical and economic uncertainty has been a major hindrance in the supply and demand chain. The availability of raw materials, disruptions in the logistics chain, and increases in prices were a few of the major challenges faced. Having trusted and reliable partners with whom we have long-term associations — be it raw material vendors or logistics partners — has certainly helped us navigate through these difficult times, thus ensuring our commitment to our suppliers. ■

Customisation, speed, real-time efficiency are ways to growth

To build a globally competitive, future-ready corrugated packaging plant today, your capital allocation must shift away from traditional metrics and focus on agility, intelligence, and circular compliance, Pradeep Arya of Kamrup Packaging Udyog, tells **Rahul Kumar**



Pradeep Arya of Kamrup Packaging Udyog



The core of your plant must prioritise OEE targets of 75% to 80% with rapid changeover times. Invest in a fully automatic corrugator capable of seamless transitions between A, B, C, E, and micro-flutes to meet multi-sector demands, Pradeep Arya suggests.

Rahul Kumar (RK): What, in your opinion, are the biggest opportunities and challenges that will shape the industry over the next five years?

Pradeep Arya (PA): The corrugated packaging industry is entering a highly transformative phase, with the global market projected to grow steadily over the next five years. This trajectory is heavily shaped by an industrial shift away from volume-driven production toward automated, agile, and ecologically compliant manufacturing.

The rapid rise of qCommerce (10-to-15-minute delivery windows) requires localised micro-fulfilment hubs, creating high demand for specialised, lightweight profiles like E-flute boards. Automated box-on-demand technology allows eCommerce platforms to manufacture customised boxes that precisely fit individual items. This strips out excess

void fillers and avoids steep dimensional-weight freight penalties.

High-speed single-pass digital inkjet presses are growing rapidly, making short-runs under 10,000 linear feet highly profitable. Direct-to-consumer (D2C) brands and retail platforms can co-brand packages directly at the press, transforming standard shipping boxes into high-quality marketing billboards that reduce preprinted inventory waste.

Stringent Extended Producer Responsibility (EPR) regulations and single-use plastic bans across India are forcing consumer brands to swap polymer packaging for paper alternatives. Subsidies for bio-based and water-resistant coatings allow corrugated boxes to displace plastic trays in moisture-heavy fresh produce and food delivery sectors.

Integrating AI with the Industrial Internet of Things (IIoT) enables box plants to utilise real-time performance tracking. This tool actively predicts mechanical failures, optimises scheduling, reduces scrap, and speeds up customer quotation windows.

Among the challenges, relying heavily on recycled post-consumer waste provides cost advantages, but paper prices remain erratic. Non-integrated converters face intense margin compression compared to large, vertically integrated mill systems. Core manufacturing hubs are facing tighter regional sustainability policies. Environmental mandates like

zero-liquid-discharge rules exponentially raise the capital expenditure required to establish or expand production capacity.

The industry trend toward reducing paper grammages (light weighting) cuts down on freight costs and material consumption. However, packaging must still maintain high burst strength and humidity resistance. This is critical for surviving automated robotic picking systems and long-distance interstate movement and maritime shipping. Post-consumer cardboard cannot be recycled indefinitely. Fibres shorten and weaken after roughly seven cycles, creating a perpetual technical dependence on virgin Kraft imports to maintain box integrity.

Introducing high-speed, full-servo-driven machinery and automated robotics reduces the need for basic manual labour. However, it creates a steep, immediate need for highly skilled technicians capable of managing complex, data-driven machinery.

RK: How are brand owners' expectations changing, and how is your company adapting to these evolving demands?

PA: Brand owners in India are radically transforming their packaging expectations, shifting from treating the corrugated box as a mere transit container to viewing it as a strategic brand tool, sustainability credential, and logistics optimiser. Driven by the explosive rise of qCommerce, D2C

brands, and stringent anti-plastic and EPR regulations, brand expectations are higher than ever.

Deploying single-pass digital inkjet presses eliminate costly printing plates and long setup times. This enables you to offer zero-MOQ runs, handle variable data, and co-brand packages on the fly for eCommerce platforms. Offer litho-laminated corrugated boards to provide processed food and beverage brands with the vivid, retail-ready shelf presence they demand.

Designing specialised micro-flutes expand capabilities into E-flute and F-flute production. These finer flutes provide excellent printability and lightweight structural strength, effectively bridging the gap between folding cartons and rigid boxes. Develop custom die-cut cardboard partitions and monolithic structural folds that securely cradle electronics and cosmetics without relying on plastic bubbles or foam.

Applying eco-friendly, water-based barrier coatings to corrugated boards to offer moisture-, vapour-, and grease-resistance. This opens lucrative pathways into fresh produce exports and ready-to-eat hot food deliveries. Using vegetable-based or low-migration inks to guarantee complete compliance with strict food-safety standards and chemical safety regulations.

Ensure your raw Kraft paper utilises a high percentage of post-consumer recycled (PCR) fibre, which typically costs less and acts as a major selling point for brands aiming to fulfil their carbon-reduction goals. Don't just sell boxes—provide the exact data (material origin, recyclability metrics, and light weighting optimisation stats) that brand compliance officers need for their annual sustainability audits.

RK: Raw material costs continue to fluctuate and significantly impact profitability. What strategies do you adopt to optimise paper consumption, improve efficiencies, and protect margins without compromising quality?

PA: To optimise paper consumption, improve efficiencies, and protect margins without compromising quality in the corrugation industry, manufacturers must adopt a data-driven approach combining advanced raw material engineering, precise floor scheduling, and automated waste reduction technologies. Managing the corrugation process effectively requires balancing structural integrity with cost control, as paper raw materials typically

represent 60% to 70% of total manufacturing costs.

Transition from heavy paper grades to high-performance, lightweight liners and fluting. Use advanced paper testing protocols to ensure structural strength (like SCT or STFI values) matches performance requirements instead of relying solely on basis weight.

Install automated moisture control systems on the corrugator. Fluctuations in moisture cause warp, structural weakness, and eventual paper waste during finishing steps.

Trim down the number of roll widths stocked in the warehouse. Standardising roll sizes minimises deckle waste (the unused edge trim on the corrugator machine).

RK: Automation and digitalisation are transforming manufacturing. Which investments have delivered the highest return on investment for your business?

PA: In the corrugation industry, converting equipment and industry-specific software (MES/ERP) deliver the highest and fastest Return on Investment (ROI). While heavy machinery like corrugator lines anchors the plant, digital tools and targeted automation provide the highest financial leverage per rupee spent.

Upgrading to automated, full-servo converting lines dramatically cuts setup and make-ready times. This unlocks profitable eCommerce, high-graphics, and complex structural designs that semi-automatic lines cannot produce. It directly addresses the highest operational cost driver: labour.

Corrugator specific software minimises “trim waste”—the literal shredding of profits. By optimising roll-stock scheduling, sheet sizing, and order pooling, it solves the industry's complex logistical bottlenecks digitally without multi-lakh rupee equipment expenses.

RK: Sustainability has become a business imperative. Beyond using recyclable materials, what initiatives has your organisation undertaken to reduce waste, energy consumption, carbon footprint, and overall environmental impact?

PA: Beyond simply utilising recyclable materials, the corrugated industry must adopt deep operational, structural, and design-led innovations to achieve true de-carbonisation.

Utilising AI-driven automated packaging systems to cut boxes precisely to the dimensions of the product. This directly

reduces excess material use and minimises internal protective void-fill requirements. Redesigning the geometry of fluting to maintain high top-to-bottom compression strength while using lower grammage (thinner, lighter weight) paperboards. Lighter boxes drastically compound carbon reductions during transit logistics. Eliminating multi-material composites. This means ensuring tear strips, reinforcement bands, and structural components are entirely paper-based rather than plastic-coated, creating a seamless circular stream.

Corrugation is notoriously steam-intensive. Upgrading to closed-loop condensate recovery systems allows facilities to capture heat from steam energy and feed it back into the loop.

Installing IoT-enabled thermal, steam, and electricity sub-metres across independent processing lines. This allows energy management software to map out consumption in real-time, eliminating operational energy waste from idling machines.

Replacing heavy chemical glues with starch-based adhesives derived from renewable resources like potato or corn. This makes the box cleaner during decomposition and reduces chemical processing footprints.

Transitioning mills and conversion factories to run on self-generated carbon-neutral biomass (using wood residues and pulping by-products). This is paired with localised rooftop solar arrays to reduce grid dependency.

Moving away from fossil-fuel-burning boilers (coal and heavy oil) toward commercial-scale industrial heat pumps and electric steam boilers powered by green energy contracts.

Mandating a complete shift to water-based, soy-based, or upcycled algae inks. Traditional petroleum-based inks emit volatile organic compounds (VOCs) and heavily contaminate wastewater systems during paper re-pulping. Shifting short-run and customised batches to digital printing presses. This removes the intensive chemical and material waste of producing traditional flexographic plates.

Establishing “sheet plants” or manufacturing hubs physically adjacent to major eCommerce fulfilment centres or agricultural shipping clusters. This cuts out a massive link of empty or heavy logistics transport. Developing heavy-duty, reusable corrugated structures designed to withstand multiple supply-chain delivery trips rather than relying on standard single-use formats. ■

India's corrugation industry is moving beyond volume to value

Arundas CH, managing director, Kapstone Industries, tells Rahul Kumar, how the company is gradually adopting digital data collection and performance monitoring, enabling better decision-making through real-time production insights.

Arundas CH says that hybrid technologies combining conventional and digital processes will become increasingly popular, enabling manufacturers to balance cost, quality, and flexibility. The future belongs to packaging that combines structural performance with premium visual appeal.

Rahul Kumar (RK): What, in your opinion, are the biggest opportunities and challenges that will shape the industry over the next five years?

Arundas CH (ACH): The Indian corrugation industry is entering one of its most exciting phases. Growth in eCommerce, organised retail, FMCG, pharmaceuticals, electronics, agriculture, and exports are significantly increasing the demand for high-quality corrugated packaging.

However, the next phase of growth will not be driven by volume alone. Customers now expect packaging that is stronger, lighter, visually appealing, sustainable, and optimised for automated supply chains. This creates enormous opportunities for manufacturers who invest in technology, design, and process excellence.

The biggest challenges will include volatility in paper prices, rising energy and logistics costs, increasing competition, and the shortage of skilled man-



Arundas CH, managing director, Kapstone Industries

power. At Kapstone, we believe long-term success will belong to companies that continuously innovate, improve operational efficiency, and build lasting partnerships with customers rather than competing only on price.

RK: Corrugated packaging is increasingly becoming a strategic branding and supply chain tool rather than just a transport box. How are brand owners' expectations changing, and how is your company adapting?

ACH: Today's packaging is expected to do much more than protect a product. It must enhance brand identity, improve logistics efficiency, support sustainability goals, and create a better customer experience. Brand owners are demanding consistent quality, precision, faster turnaround, and customised packaging solutions.

RK: Raw material costs continue to fluctuate. What strategies do you adopt

Rapid Fire with Arundas CH

If you were not in the corrugated packaging industry, which profession would you have chosen and why?

I would have chosen to be a manufacturing and business strategist. I enjoy solving complex operational challenges, building efficient systems, and creating sustainable businesses that generate long-term value.

What is one piece of advice you received early in your career that still guides your decisions today?

Never compromise on integrity. Reputation takes years to build but only moments to lose.

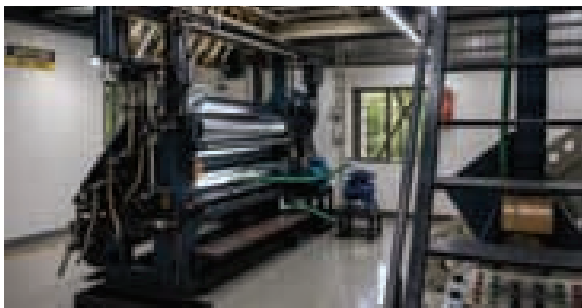
Which book, business leader, or entrepreneur has inspired your leadership style the most?

I admire Ratan Tata for his values-driven leadership, humility, long-term thinking, and commitment to nation-building. His emphasis on ethics and innovation has been a constant source of inspiration.

If you could spend an evening with any one global business icon, who would it be?

I would choose Steve Jobs. My question would be: "How do you consistently transform simple ideas into products that redefine entire industries?"





to optimise paper consumption and protect margins?

ACH: Paper represents the largest component of production cost, making efficient utilisation essential. Our strategy focuses on scientific paper selection, optimised board design, reduction of conversion losses, preventive maintenance, production planning, and continuous monitoring of waste. We also emphasise on process standardisation, quality control, and employee training to minimise rejections and improve productivity. Instead of compromising on quality, we improve efficiency throughout the manufacturing process, allowing us to deliver consistent value to our customers.

RK: Automation and digitalisation are transforming manufacturing. Which investment has delivered the highest ROI?

ACH: Our investments in advanced converting equipment, quality control systems, workflow automation, and production planning have delivered significant returns. Automation has improved productivity, reduced setup times, enhanced consistency, and minimized wastage.

We are also gradually adopting digital data collection and performance monitoring, enabling better decision-making through real-time production insights. In today's competitive environment, data-driven manufacturing has become as important as machinery itself.

RK: Sustainability has become a business imperative. Beyond recyclable materials, what initiatives has your organisation undertaken?

ACH: Sustainability must be integrated into every aspect of manufacturing rather than treated as a separate initiative. At Kapstone, we continuously work toward reducing production waste, improving energy efficiency, optimising paper utilisation, minimising water consumption, and improving process efficiency. We also encourage responsible sourcing, recycling of production waste, and continuous improvement in operational practices. We believe sustainability creates long-term business value while contributing positively to the environment.

RK: High-quality graphics and premium packaging are creating new opportunities. How do you see printing technologies evolving?

ACH: Packaging is becoming an important communication tool for brands. Flexographic printing continues to improve rapidly in terms of print quality and productivity. Digital printing offers tremendous flexibility for short production runs, personalisation, and faster product launches. Hybrid technologies combining conventional and digital processes will become increasingly popular, enabling manufacturers to balance cost, quality, and flexibility. The future belongs to packaging that combines structural performance with premium visual appeal.

RK: Many corrugators still compete primarily on price. How can the industry move towards value-added packaging?

ACH: Competing solely on price is not sustainable. The industry should focus on innovation, structural engineering, packaging optimisation, branding, customer service, and supply chain integration. Value-added packaging helps customers reduce logistics costs, improve product protection, strengthen branding, and enhance consumer experience. Manufacturers who solve customer problems rather than simply supplying boxes will create stronger long-term relationships.

RK: The adoption of AI, Industry 4.0, predictive maintenance, and smart factories is accelerating globally. How prepared is the Indian corrugation industry?

ACH: India has made significant progress, but adoption remains uneven. Large manufacturers have begun investing in automation and digital systems, while many small and medium enterprises are still at an early stage. The next five years will witness accelerated adoption of AI-driven production planning, predictive maintenance, quality monitoring, energy optimisation, and supply chain analytics. Companies should prioritise digital transformation, workforce development, cybersecurity, and data-driven decision-making alongside investments in machinery.

RK: If you were setting up a new corrugated packaging plant today, what would be your top five investment priorities?

ACH: My priorities would be high-speed automated corrugation and converting equipment, advanced quality control and laboratory testing facilities, Industry 4.0-enabled ERP, MES, and AI-based analytics, sustainable infrastructure, including energy-efficient systems and solar power, a highly skilled workforce supported by continuous training and innovation.

RK: Looking ahead to 2030, what trends will redefine the Indian corrugation industry?

ACH: By 2030, the Indian corrugation industry will become significantly more automated, sustainable, and customer-centric. Artificial intelligence, robotics, predictive analytics, digital printing, recyclable materials, smart packaging, and carbon-neutral manufacturing will become mainstream. India has the potential to emerge as one of the world's leading packaging manufacturing hubs due to its strong domestic demand and expanding export opportunities.

RK: How has the current global geopolitical and economic uncertainty impacted your business?

Global uncertainty has increased volatility in raw material prices, freight costs, supply chains, and customer demand. Rather than reacting to short-term fluctuations, our strategy is to build resilience through operational excellence, financial discipline, customer diversification, and continuous innovation. We maintain close relationships with suppliers and customers while focusing on productivity improvements, quality consistency, and responsible cost management. ■

With automation, innova

Meerut-based Vandana Packaging's investment philosophy is simple. It invests in technology that will continue delivering value even after ten or fifteen years, Ashish Goel, director, Vandana Packaging tells **Rahul Kumar**

In the corrugated packaging business, growth is often measured by capacity, conversion volumes and customer acquisitions. At Meerut-based Vandana Packaging, however, growth is equally measured by the willingness to invest ahead of the market, automate every possible process and build a sustainable organisation capable of serving India's evolving packaging requirements.

Established in 1996, Vandana Packaging has transformed itself from a regional corrugated box manufacturer into a technology-driven packaging company supplying customised corrugated solutions to customers across food and beverages, pharmaceuticals, FMCG, apparel and industrial sectors.

Today, the company is managed by the second generation of the Goel family, with Ashish Goel and Nishkam Goel steering the business towards higher automation, digitalisation and sustainable manufacturing.

Educated in the United Kingdom, Ashish Goel (MA in Business Management and Sustainable Development) and Nishkam Goel (BSc in Management) have brought a global perspective to the family business. Exposure to European manufacturing practices and international packaging exhibitions has strengthened the company's focus on automation, sustainability, digitalisation and continuous innovation. Rather than following market trends, the management prefers investing ahead of customer demand.

Long-term investment

According to Ashish Goel, director, Vandana Packaging, the company's investment philosophy has always been simple. "Whenever we invest, we don't look for the cheapest option. We invest in technology that will continue delivering value even after ten or fifteen years," he says.

This philosophy was evident when the company invested in its automatic corrugation line more than a decade ago. Instead of opting for lower-cost

equipment, Vandana Packaging selected premium components, including a Thermax boiler and world-class electrical systems, to ensure long-term reliability.

"Even today, the board line comfortably operates at around 180-m/min. Looking back, we feel that investing in quality equipment was absolutely the right decision," Goel adds.

Unlike converters who expand through frequent greenfield investments, Vandana Packaging has focused on systematically upgrading its existing infrastructure.

The company currently operates an automatic five-ply corrugation line, high-speed converting lines, an automatic flatbed die-cutter with stripping, ahigh-speed Bobst flexo folder-gluer, Oracle ERP across manufacturing, automatic conveyor systems, automatic glue kitchen, automatic waste management system, reel rewinding system and pre-feeder automation, among others.

The next phase of expansion will include a fully automatic seven-ply corrugation line, cassette-type flute change systems and higher production speeds, enabling the company to manufacture virtually every flute combination required by modern brand owners.

For Vandana Packaging, automation is a business necessity. Goel believes



Ashish Goel, director, Vandana Packaging, says, "Even today, the board line comfortably operates at around 180-m/min".

tion and sustainability

THOSE WHO EMBRACE INNOVATION TODAY WILL BECOME COMPETITIVE TOMORROW

Vandana Packaging believes the future of corrugated packaging lies at the intersection of technology, sustainability and customer partnership. Aditya Goel of Vandana Packaging, speaks to Rahul Kumar

Rahul Kumar (RK): The Indian corrugation industry is growing rapidly with the expansion of eCommerce, FMCG, retail and exports. What, in your opinion, are the biggest opportunities over the next five years?

Aditya Goel (AG): India's corrugation market is growing at around 10% year-on-year, driven by rising consumption and the shift away from plastic. Growth could accelerate further if the government introduces stronger environmental regulations similar to Europe's Packaging and Packaging Waste Regulation (PPWR). The opportunity is enormous as corrugated packaging becomes the preferred sustainable packaging material across industries.

RK: Corrugated packaging is increasingly becoming a strategic branding and supply chain tool rather than just a transport box. How are brand owners' expectations changing?

AG: Brand owners now expect packaging to protect the product, enhance shelf appeal, optimise logistics and strengthen brand identity simultaneously. Packaging is no longer viewed as merely a shipping box; it has become an

integral part of the customer's brand experience.

RK: High-quality graphics and premium packaging are creating new opportunities for corrugated products. How do you see flexographic, digital and hybrid printing technologies influencing the future?

AG: Packaging has become an important marketing medium. Flexographic printing continues to improve significantly in both print quality and productivity, while digital printing is opening opportunities for short-run, personalised packaging. Hybrid technologies that combine production efficiency with superior graphics will become increasingly popular. Customers now expect packaging that not only protects products but also communicates their brand effectively.

RK: Many corrugators still compete primarily on price. How can the industry move towards value-added packaging solutions?

AG: Corrugators need to understand the true manufacturing cost of their products rather than reducing prices simply to secure volumes. That often leads to inferior boxes and

compromises on quality. Companies must retain adequate margins to fund future expansion and increase capacity. Competing solely on price is not sustainable. The industry's mindset must shift towards delivering value-added packaging through innovation, engineering and customer collaboration.

RK: AI, Industry 4.0 and predictive maintenance are transforming manufacturing globally. How prepared is the Indian corrugation industry?

AG: The journey has begun, but there is still a long way to go. Larger manufacturers are already investing in AI-driven analytics, predictive maintenance and connected manufacturing systems. Medium-sized companies will increasingly adopt these technologies as they become more affordable.

RK: Where should companies begin their digital transformation?

AG: The priority should be integrating machines, production planning, quality systems and inventory into a single digital ecosystem. Data-driven decision-making will define future competitiveness.



India's manufacturing sector will increasingly face labour shortages, making automation essential for sustainable growth.

"Our focus today is automation. More manpower often means more operational complexity. Intelligent automation helps improve productivity, quality and consistency while reducing dependency on manual operations," Goel says.

This philosophy has shaped every recent investment, including its most significant investment, a Bobst four-colour flexo folder-gluer (FFG).

Earlier, printing and box making required multiple production stages. The Bobst FFG integrated these operations into a single automated process. "The biggest advantage is that two separate operations became one. Production increased, manpower reduced and quality improved simultaneously," explains Goel.

The impact has been significant. The company reports faster production

cycles, higher throughput, reduced handling, lower calibre loss, improved compression strength, better print quality and faster delivery schedules.

"Earlier, a production sequence involving separate printing and gluing operations could take nearly two-and-a-half hours. With the integrated FFG, similar work can now be completed in under an hour, dramatically improving operational efficiency," he adds.

Embracing growth

Vandana Packaging currently manufactures approximately 300,000 boxes per day, with plans to increase capacity to 500,000 boxes daily.

The company presently converts approximately 2,000–2,500 tonnes of paper every month while maintaining around 80% capacity utilisation, leaving room for immediate business expansion without major infrastructure constraints.

Quality at Vandana Packaging extends

well beyond finished boxes. The company has invested heavily in process monitoring and testing. Key quality initiatives include Oracle ERP for complete traceability, CPMS-controlled board line, 500-kVA UPS for uninterrupted production, fully equipped quality laboratory, moisture-controlled water shower system, dual slitter-scissors and regular operator training.

The in-house laboratory includes equipment for grammage, Cobb, burst strength, ECT, RCT, box compression strength, moisture, viscosity and ash content testing, enabling complete quality verification before dispatch.

Complete compliance

Sustainability is integrated into product development rather than treated as an afterthought. The company's in-house R&D team continuously works on material optimisation.

One notable achievement has been redesigning certain five-ply structures



Vandana Packaging has been investing in logistics optimisation



The firm manufactures 300,000 boxes per day, with plans to increase capacity to 500,000 boxes daily

RAPID FIRE QUESTIONS

An alternative career? If not corrugated packaging, I would choose to be an entrepreneur developing sustainable materials and environmentally friendly technologies that could significantly reduce carbon emissions.

Best advice you've received? My father always told me: Don't just be another vendor; be an innovator. If you pursue your goals with clarity, consistency and complete dedication, success follows naturally. Focus on creating unique value for your customers.

Your biggest inspiration? Ratan Tata has been a tremendous inspiration because he demonstrated that a company can pursue profitability while contributing to nation-building with integrity and humility. I also recommend Peter Thiel's Zero to One. Its central message—to create something genuinely new rather than simply replicating what already exists—resonates strongly with entrepreneurs.

One business icon you'd like to meet? Henry Ford. I would ask him: How do you continuously simplify manufacturing while maintaining quality and affordability as customer expectations continue to evolve?

Your mantra? Be an innovator and a creator of impact rather than just another vendor. Focus on developing packaging solutions that create measurable value for customers by improving efficiency, increasing sales and reducing their carbon footprint.



The company converts 2,000–2,500 tonnes of paper every month

into engineered three-ply solutions without compromising performance, helping customers reduce paper consumption while lowering costs.

The development team also focuses on innovative packaging concepts including paper-based bottles, round-corner wrap-around boxes, attached closures and reduced shrink-wrap packaging.

Environmental responsibility forms a central part of Vandana Packaging's manufacturing strategy.

Current sustainability initiatives include rainwater harvesting, biofuel utilisation, electric forklifts, Effluent Treatment Plant (ETP), CPCB-compliant generators, dust collection and filtration systems, tree plantation drives and employee health programmes.

"Our objective is to ensure that business growth and environmental responsibility move together," says Goel.

Beyond manufacturing, Vandana Packaging has also invested in logistics optimisation. The company operates a 50,000-sqft warehouse to support just-in-time deliveries and has introduced compression and handling improvements that significantly increase truck loading efficiency, reducing transportation frequency, fuel consumption and carbon emissions.

"We believe packaging is about engineering solutions that improve efficiency, reduce waste, support sustainability and create value for customers. That is the direction in which we want Vandana Packaging to grow," Goel concludes. ■

High-graphic packaging offers significant opportunities

The future of corrugation lies in automation, advanced screening, AI-driven workflows and high-performance plate technologies, say Raghav Madan and Sudhir Arora, managing partners at Alpha Flex, in a conversation with **Rahul Kumar**

Delhi-based Alpha Flex Market is a specialist in digital flexographic pre-press solutions. With advanced imaging technology and the Esko XPS Crystal LED exposure system, the company manufactures high-quality flat-top dot plates that deliver superior consistency, sharper print quality and reliable performance for modern corrugated packaging applications.

Raghav Madan and Sudhir Arora, managing partners at Alpha Flex, say, “High-quality corrugated printing depends on the right combination of plate technology, screening and anilox selection. At Alpha Flex, our Esko XPS LED exposure system produces consistent flat-top dots and a uniform plate base, delivering the print quality required for demanding multi-colour corrugation jobs.”

According to Madan and Arora, the demand for high-quality corrugated printing continues to grow as packaging shifts from simple transport boxes to brand-focused, multi-colour packaging.

Meanwhile, challenges persist. “Common challenges include flute marks, uneven ink transfer and poor solid coverage. At Alpha Flex, we help overcome these through advanced plate technology and technical expertise,” they say, adding, “We use the Esko XPS Crystal LED exposure system to create



L to R – Raghav Madan and Sudhir Arora, managing partners at Alpha Flex



Photopolymer plates production at Alpha Flex

precise flat-top dots, essential for high-quality multi-colour corrugation printing. The LED exposure provides a highly uniform plate base, resulting in better consistency, ink transfer and print repeatability.”

The company also optimises plate design based on board grade, flute profile and press conditions to maximise print performance. “Our advanced pre-press workflow, colour management and plate-anilox optimisation help corrugators achieve sharper graphics and stronger solids,” they add.

Technology help

According to Madan and Arora, digital



workflows and automation improve accuracy, consistency and turnaround times. “Modern flexo technology reduces waste, improves efficiency and supports sustainable packaging production,” they say, adding, “Growth in eCommerce, FMCG and export packaging is driving demand for higher-quality corrugated print.”

Madan and Arora believe that premium and high-graphic corrugated packaging presents significant opportunities for converters to add value and differentiate themselves.

“The future of corrugation lies in automation, advanced screening, AI-driven workflows and high-performance plate technologies,” ■

Pre-press houses are now print quality consultants

The future belongs to converters who adopt a holistic approach towards print quality. High-quality corrugated printing is no longer determined by the printing plate alone; it is the result of optimising the entire print ecosystem, says Muralidhar Nalli, CEO, Digiflex, a flexographic pre-press solutions provider, in a conversation with **Rahul Kumar**

The Indian corrugated industry is undergoing a remarkable transformation. Corrugated boxes are no longer viewed merely as secondary transport packaging. They have become an important medium for brand communication, shelf appeal and consumer engagement. The rapid growth of eCommerce, FMCG, food and beverages, pharmaceuticals, consumer drabbles and export packaging has significantly elevated expectations regarding print quality, colour consistency and production efficiency.

According to Muralidhar Nalli, CEO of Hyderabad-based Digiflex, today, converters are expected to deliver shorter lead times, greater customisation and premium graphics while maintaining cost competitiveness and sustainability. This changing environment is driving investments in advanced flexo folder-glucers, CI flexo pre-print presses, automation systems, digital workflows and next-generation flexographic plate technologies.



“In my opinion, the future belongs to converters who adopt a holistic approach towards print quality. High-quality corrugated printing is no longer determined by the printing plate alone; it is the result of optimising the entire print ecosystem,” Nalli says.

Print performance engineering

Nalli says over the last few years, demand for high-quality flexographic plates has grown significantly. Brand owners are demanding offset-like graphics, better shelf appeal and colour consistency across multiple manufacturing locations. As a result, corrugated flexography is increasingly competing on print quality and brand impact.

He adds, “However, print quality challenges remain. Corrugated substrates are inherently difficult to print because of flute structures, board calliper variations, uneven surfaces and compression differences. Converters often face issues such as dot gain, print mottle, inconsistent solid coverage, highlight loss, flute marking and wash-boarding effects.”

Modern digital plate technologies have

helped overcome many of these limitations. HD flexo imaging, flat-top dots, advanced surface screening and digital plate making have significantly improved highlight reproduction, dot stability and ink transfer efficiency. These technologies enable converters to achieve smoother solids, finer typography and image quality that was once associated only with offset and rotogravure printing.

Print System Engineering

But technology does not stop at plate-making. At Digiflex, Nalli believes that superior corrugated print quality is achieved through complete print system engineering rather than focusing on any single component.

“Successful print performance starts with understanding the board structure. Different flute profiles such as E, B, C, BC and EB require specific screening strategies, distortion compensation and pressure management. Fine flute boards allow higher screen rulings, whereas coarse flute structures require optimised dot compensation and specialised screening technologies,” he says.

He adds, "One of the most overlooked aspects of corrugated post-print quality is precision plate mounting. Even a registration variation of 0.1-mm can affect colour-to-colour registration, barcode readability and image sharpness."

To ensure maximum registration accuracy, Digiflex utilises the AV Flexologic Flat mount 3000, one of the world's most advanced flat plate-mounting systems for corrugated post-print applications. Accurate plate-to-plate registration before the plate reaches the press results in faster make-ready, lower board waste, reduced operator dependency and consistent print quality throughout production.

Equally important are plate carriers, commonly known as mylar carriers. Although often underestimated, carrier quality directly influences dimensional stability, repeat accuracy and registration consistency. High-quality carrier systems ensure repeatable mounting and minimise plate stretch, thereby improving print consistency.

Mounting tape technology also plays a critical role. The mounting tape forms the interface between the printing plate and the cylinder and significantly affects ink transfer, solid density, dot reproduction and print smoothness.

Nalli says Proshim UK's patented air flow mounting tape technology offers several advantages. "The micro-channel design facilitates controlled air release, eliminating air entrapment during mounting and ensuring uniform adhesion. Faster mounting, improved registration, reduced setup waste and better operator productivity are among its key benefits," he adds.

Similarly, cushion-backed mounting systems are becoming increasingly important in high-graphic corrugated printing. Because corrugated board surfaces are inherently uneven, controlled compressibility provided by cushion technologies helps improve solid ink coverage, minimise flute marking, enhance highlight reproduction and extend plate life. In many cases, the difference between average and premium print quality is determined by proper cushion selection rather than plate technology alone.

Automation and artificial intelligence

Nalli believes automation is rapidly becoming one of the most important competitive differentiators in flexographic pre-press.

Modern workflow platforms automate file pre-flight, trapping, distortion calcu-



The gap between flexography and traditional high-quality printing processes continues to narrow: Nalli

lations, step-and-repeat generation, screening application and plate layout optimisation. Colour management systems provide predictable colour reproduction across multiple presses and manufacturing locations.

"Artificial Intelligence is also beginning to play an important role in artwork analysis, defect detection, colour prediction, workflow optimisation and process analytics. Combined with automation, these technologies reduce human intervention, improve repeatability and significantly shorten turnaround times," Nalli says.

He adds, "Pre-press houses are evolving from plate suppliers into print quality consultants and technology partners."

Sustainability and market opportunities

Sustainability is influencing every aspect of packaging production. Modern flexographic plate technologies contribute through lower VOC emissions, reduced energy consumption, longer plate life and optimised ink transfer characteristics that help reduce ink consumption and setup waste.

"Digital workflows also minimise remakes and improve first-time-right production, making sustainability both an environmental and economic advantage," Nalli says.

Meanwhile, the rapid growth of eCommerce, FMCG, food packaging and exports is creating new opportunities for corrugated converters. Packaging today serves as the first physical interaction between brands and consumers. This has increased demand for retail-ready packaging, shelf-ready displays, promotional packaging, point-of-sale graphics and short-run customised packaging.

Advanced flexographic technologies

enable converters to move beyond commodity box manufacturing and enter higher-value packaging segments where stronger margins and greater customer loyalty can be achieved.

Looking ahead

Nalli says the next five years are likely to be defined by expanded gamut printing, advanced surface engineering, workflow automation, AI integration, digital-flexo hybrid production and data-driven process control.

"Converters who wish to remain competitive should focus on process standardisation, colour management, operator training and close collaboration with technology partners," he says.

He reiterates that the future of corrugated flexography is extremely promising. The gap between flexography and traditional high-quality printing processes continues to narrow. Those who invest in technology, automation and knowledge development today will be best positioned to capture tomorrow's opportunities.

To this point, Digiflex specialises in flexographic pre-press solutions, corrugated print Performance technologies, precision plate mounting and packaging process optimisation.

"At Digiflex, we firmly believe that the future of corrugated printing lies not in individual products but in complete print performance engineering. By integrating advanced digital plate technologies, precision mounting systems, specialised carrier materials, innovative mounting tapes and optimised cushion technologies, converters can consistently achieve world-class print quality, lower waste and greater operational efficiency," he concludes. ■

You must focus on standardising your current processes first

Making sure your existing presses are perfectly calibrated – with consistent target densities and clear dot gain curves – allows your pre-press partner to engineer plates that work flawlessly on the first pass, cutting out costly adjustments on the floor, says Kaveri Satija of Devi Graphics, in an interview with **Rahul Kumar**



Kaveri Satija of
Devi Graphics

Over the last five years, the expectations from corrugated flexographic printing have changed considerably. The growth of eCommerce, FMCG, agriculture, chemicals, and industrial packaging has increased the focus on accurate product information, scannable barcodes, consistent graphics, and reliable print reproduction.

Kaveri Satija of Chandigarh-based Devi Graphics says converters are also working under tighter production timelines and greater pressure to minimise waste and rework. At the same time, improvements in presses, inks, anilox rolls, digital imaging, and plate-making technologies have made it possible to achieve better consistency and repeatability. This has led to a stronger focus on pre-press standardisation and plate technologies that support efficient, predictable print performance.

Technology and challenges

Satija says one of the biggest challenges in corrugated printing is washboarding, where the flute structure shows through the print. Add to that uneven board surfaces, recycled kraft liners, and varying levels of absorbency, and maintaining consistent print quality becomes difficult.

She adds, “Modern plate technologies have helped reduce many of these challenges. Better dot structures, improved screening technologies, and more precise digital plate making allow for cleaner text, stronger solids, and better image reproduction. However, print quality is not dependent on the plate alone. The best results come when plate technology is supported by proper colour management, suitable anilox selection, press standardisation, and a controlled pre-press workflow.”

Technologies like HD flexo, flat-top dots, and surface screening have changed what’s possible on a box. Flat-top dots give you a more stable printing surface, which keeps your solids strong and gradients smooth throughout a long run. Surface screening takes care of ink distribution, cutting down on

mottling and graininess, while digital plate-making eliminates the old guesswork of analogue processing to give you sharp, repeatable images every time.

“But on our shop floor, we don’t push a one-size-fits-all solution. We run both Kodak Flexcel NX and LAMS digital plate-making systems, so we use both flat-top and traditional round-top dots depending on the job,” Satija explains.

Traditional LAMS plates with round-top dots are still the absolute workhorse for most standard corrugated runs because they are incredibly versatile and highly forgiving on the press. But when a brand comes in demanding ultra-crisp highlights and needs zero dot squash on a high-graphics job, that’s where flat-top tech shines. “Having both setups means we don’t have to force a job onto the wrong technology. We just pick what works best for the converter’s specific board and artwork,” she adds.

Satija is of the view that technologies such as flat-top dots, advanced screening, and digital plate making have expanded what is possible in corrugated flexographic printing. They help improve ink transfer, dot stability, and image reproduction, resulting in cleaner text, stronger solids, and better consistency on press.

However, there is no single technology that suits every corrugated application. She explains, “At our facility, we work with both Kodak Flexcel NX and conventional LAMS digital plate systems. Traditional round-top dot plates continue to be the preferred choice for many corrugated post-print applications because of their versatility and forgiving press characteristics. Flat-top dot technologies, on the other hand, can offer advantages in critical artworks where finer detail, stronger highlight reproduction, and greater resistance to over-impression are required.”

The key is selecting the right plate technology for the board, artwork, and printing conditions rather than applying the same solution to every job.

Optimising print

Offset printing has long been the gold standard for high-volume packaging



because of its sharp detail, precise Pantone colour accuracy, and ability to handle premium finishes like spot UV or varnishing. Historically, flexo struggled to compete with that level of crispness, especially on uneven board.

“But we are narrowing that gap significantly,” Satija says. “Today, a pre-press house doesn’t just copy an artwork file onto a plate; we re-engineer it specifically for the mechanics of a corrugated press. By pairing high-definition digital imaging with advanced surface screening and precise colour management, we can deliver deep solids, clean fine text, and smooth gradients directly on the liner-board. This allows brands to achieve that premium retail shelf appeal and high colour consistency while skipping the slow, expensive process of litho-lamination. Ultimately, we are helping corrugators print direct-to-box, saving massive production time and raw material costs without sacrificing the visual impact brands demand.”

She adds that automation and workflow software have also become important because customers expect faster deliveries without compromising on quality. Many of the repetitive pre-press tasks that were once done manually can now be standardised, which reduces errors, improves consistency, and helps jobs move through production more efficiently.

Colour management plays an equally important role. It helps ensure that a design prints as expected across different presses, substrates, and repeat orders, reducing unnecessary adjustments on press and improving overall predictability.

AI is still at an early stage in flexographic pre-press, but Satija believes, it is

beginning to find applications in artwork verification, quality control, and workflow optimisation. While the technology will continue to evolve, the real objective remains the same: reducing errors, improving consistency, and helping converters deliver jobs faster and more reliably.

Sustainably and the market

For Devi Graphics, sustainability starts long before a plate reaches the press. If a converter can achieve the desired print quality in fewer trials, less board and less ink are wasted. That’s where colour management, workflow standardisation, and consistent plate production make a real difference.

“Another important aspect is plate longevity. A well-made plate should not be treated as a single-use product. When plates can be properly stored, reused for repeat jobs, and continue to perform consistently, the need for remakes is reduced, which means lower material consumption and less waste over time,” Satija says, adding, “The industry is also moving towards more efficient processing technologies and lower-solvent workflows. Ultimately, sustainability is about producing reliable plates that help converters reduce waste, improve efficiency, and make better use of resources throughout the production cycle.”

According to Satija, the biggest change the industry has witnessed in the recent years have been the growth in SKU variation. Brands today are catering to much more specific consumer needs than they were a decade ago. Whether it is personal care, food, or FMCG products, companies are creating multiple variants to address different preferences, age groups, usage occasions, and consumer segments. A category that once had a handful of products may now have dozens of variants, each requiring its own packaging and artwork.

“This trend, combined with the growth of eCommerce and faster product launches, has increased the demand for accurate artwork management, efficient pre-press workflows, and faster plate production. Converters are expected to handle more frequent design changes while maintaining consistent print quality, barcode readability, and production efficiency,” Satija says.

She adds, “As a result, the role of pre-press has expanded from simply supplying plates to helping converters manage complexity while delivering reliable and repeatable print performance.”

Opportunities and expectations

A few years ago, most corrugated packaging was expected to do one thing, protect the product during storage and transportation. Today, brands expect much more from it. Packaging has become part of the overall brand experience, especially in eCommerce where the box is often the first physical interaction a customer has with a product.

“We are seeing growing interest in better graphics, inside-out printing, QR-based consumer engagement, and packaging that feels more thoughtful and intentional. Advanced flexographic plate technologies help corrugators support these requirements by reproducing finer details, cleaner text, and more consistent graphics on press,” Satija says.

For corrugators, this creates an opportunity to move beyond being a packaging supplier and become a value-added partner that helps brands communicate, engage, and differentiate themselves through packaging.

Looking ahead, Satija believes, over the next five years, the biggest shift will come down to greater workflow automation, advanced plate manufacturing, and smarter imaging technologies.

“Demand for high-graphics corrugated packaging is only going to grow as brands push for stronger retail differentiation. At the same time, converters will face increasing pressure to manage shorter product cycles, run more SKUs, and maintain quality consistency under tight turnaround times, all the while navigating a tightening crunch in skilled press operators and moving toward eco-friendly ink systems,” she says.

To prepare for this future without making blind capital investments, converters can focus on standardising their current processes first. Making sure your existing presses are perfectly calibrated—with consistent target densities and clear dot gain curves—allows your pre-press partner to engineer plates that work flawlessly on the first pass, cutting out costly adjustments on the floor.

“It is also incredibly valuable to bridge the gap between your internal design teams and your pre-press partner so files are built from day one around the structural realities of your specific flutes and board grades. Technology will keep evolving, but the plants that succeed will be the ones that invest in training their workforce to handle precision digital workflows, ensuring they get consistent results efficiently and repeatably out of their current and future equipment,” Satija concludes. ■

Digital is the name of the game today

Digital workflow improves quality and automation and avoids mistakes, which happens with manual interference, says S Giridharan, executive director, Kapoor Imaging, in an interview with **Rahul Kumar**

Rahul Kumar (RK): How are advancements in flexo plates, imaging technologies, and pre-press workflows helping corrugators meet higher print-quality expectations?

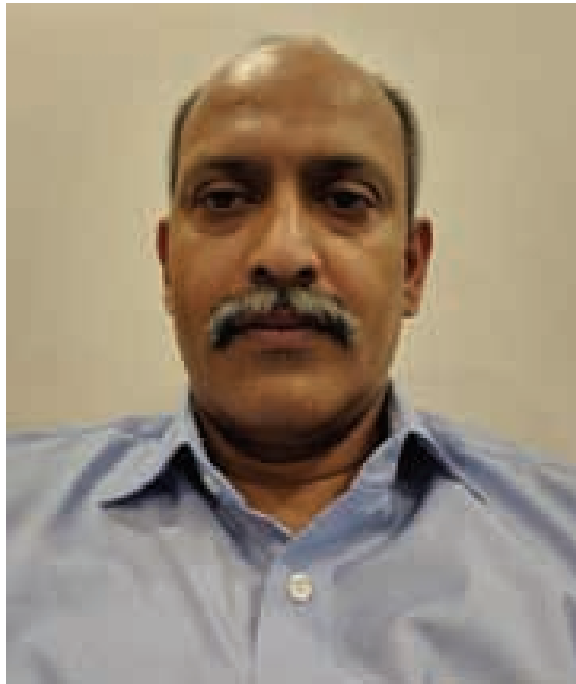
S Giridharan (SG): We are working with Sumei. Since we recommend digital plates, the imaging is superior and as long as customers maintain the conditions recommended by Sumei, the plates will reproduce good with perfect dot fidelity. Normally, we recommend softer plates for corrugation 4.70 with a shore hardness of 30. Of course, we help customers to work with some standard operating procedure, which is developed when plates are calibrated at the customers' place.

RK: What are the most significant technological developments in flexographic plate making and CTP technology over the past few years?

SG: Flexo is really competing with other major printing process today with fine resolution. There are customers who print a 175-lpi (some have started 200-lpi) on regular basis. This is possible because of digital plate-making in flexo. Some manufacturers have automated the entire processing line after CTP with front exposure and processing, which saves time and limits errors.

RK: Brand owners are demanding shorter runs, faster turnaround times, and consistent print quality. How are your solutions helping corrugators address these requirements?

SG: Shorter runs and flexo is bit difficult.



S Giridharan, executive director, Kapoor Imaging

Customers can choose digital printing (roll form), which complements flexo and enables you to go with short-run and also VDP. There are very good options available in digital with Pantone inks.

RK: Sustainability has become a major industry focus. What initiatives has your company undertaken to reduce waste, improve plate-making efficiency, minimize solvent usage, or enhance the environmental performance of flexo pre-press operations?

SG: We are working with few European companies to explore possibilities for installing solvent recovery in all the presses, which will help printers with solvent recovery to recycle and recover. Customers who are into water washable plates also need to be careful as the polymer is still there in the water and this need to be recovered before disposal. We are working on both fronts. Once we are ready, we will advertise and help customers with recycling and recovery.

RK: What are the most common challenges faced by Indian corrugators when it comes to print quality and pre-press processes, and how can technology help overcome them?

SG: The biggest challenge is the plate, which at times are 60x80-inch or tough to manage both in pre-press and on the press as well, but with the introduction of sleeves this will become easier. Things are moving fast. So, we should see lot more happening soon.

RK: Automation and workflow integration are transforming manufacturing. How do you see digital workflows, automation, and data-driven processes influencing the future of flexographic pre-press?

SG: Yes. Digital is the mantra today in every manufacturing process, and we are not different. Digital workflow improves quality and automation completely avoids mistakes (which happens with manual interference). Data Analytics is again a new jargon used in every field, which helps bring repeatability and quickness in operation.

RK: How important are training and technical support?

SG: Knowledge and training is must both in theory and in practice. Through knowledge is must in every field and professional knowledge has to be gained or acquired, knowledge is a must for success. There is no compromise. There are many trainers in the industry who are available to impart training. We are new and will take time to get to this level.

RK: What trends do you expect to shape the corrugated printing market over the next five years, and how is your company preparing for these changes?

SG: Corrugation is going to expand exponentially due to eCommerce. Many printers have already taken a plunge. This is going to be a big vertical soon and we will see printers specialising in corrugation.

RK: If you could give one piece of advice to corrugators looking to upgrade their print quality and pre-press capabilities, what would it be?

SG: The investment is going to be big. So, please do your homework before getting into corrugation. Since all the eCommerce companies and MNCs will demand quality (today quality is a given) be prepared to have decent automation to ensure timely delivery with all operations in-house. ■

Process standardisation is the

By implementing standardised plate-making procedures, colour management practices, and press optimisation techniques, converters can significantly improve quality consistency while reducing waste and downtime, says Prasenjit Das, general manager, XSYS South Asia, in an interview with **Rahul Kumar**

Rahul Kumar (RK): How are advancements in flexo plates, imaging technologies, and pre-press workflows helping corrugators meet higher print-quality expectations

Roy Schoettle (RS): Corrugated packaging has evolved far beyond its traditional role of protecting products during transportation. Today, it serves as an important brand communication medium, particularly with the rapid growth of retail-ready packaging and e-commerce. Brand owners increasingly expect high-quality



graphics, vibrant colours, and consistent reproduction across every production run.

Recent advancements in flexographic printing technology have significantly improved overall print quality. Modern photopolymer plates incorporating Flat Top Dot technology provide enhanced ink transfer, improved tonal reproduction, sharper highlight reproduction, and higher solid ink density. In addition, they help reduce fluting effects and minimise board crush, resulting in more consistent and higher-quality print performance.

Equally important are the developments in imaging technology. High-resolution Imaging systems combined with advanced screening technologies - Like XSYS Woodpecker Screening allow precise imaging of fine details while maintaining excellent print stability on corrugated substrates. Automated digital workflows further improve consistency by minimising operator intervention, reducing errors, and ensuring repeatability across multiple production locations.

Together, these innovations enable corrugators to produce premium-quality

graphics while maintaining the productivity and cost efficiency that flexography is known for.

RK: What are the most significant technological developments in flexographic plate-making and CTP technology over the past few years, and how are they benefiting corrugated converters?

RS: The past few years have seen remarkable progress across the entire flexographic pre-press ecosystem. High-resolution laser imaging, advanced flat-top dot technologies, improved plate formulations, automated plate processing equipment, and sophisticated workflow software have collectively transformed plate production. Today's Imaging Systems like Thermoflex Imager from XSYS, offer exceptional imaging accuracy, faster throughput, and improved repeatability.

Modern plate materials have advanced considerably, providing increased durability, greater exposure latitude, and superior ink transfer performance on a wide variety of corrugated boards and liners.



Roy Schoettle,
vice president sales APAC,
XSYS Thailand

the key to the future growth



Fully automated processing systems, such as our Catena+ line, ensure highly consistent plate quality while reducing manual intervention and minimising process variability.

For corrugated converters, these innovations result in several measurable benefits. These includes faster plate production and shorter lead times, improved print consistency across multi-jobs, reduced make-ready time and substrate waste, longer plate life and lower replacement costs, higher overall equipment effectiveness (OEE), and greater ability to handle both short-run and high-volume production efficiently.

RK: Brand owners are demanding shorter runs, faster turnaround times, and consistent print quality. How are your solutions helping corrugators address these requirements while maintaining profitability?

RS: The market today demands more flexibility than ever before. SKU proliferation, seasonal packaging, regional campaigns, and e-commerce are driving shorter production runs with significantly reduced delivery times.

At XSYS, our strategy focuses on delivering a complete integrated workflow rather than individual products. Our portfolio combines advanced flexographic plates, industry-leading Thermoflex imaging systems, efficient processing equipment, and intelligent workflow software.

These integrated solutions help converters by accelerating plate production, reducing setup and make-ready times, delivering consistent print quality from first to last impression, minimising waste during production and improving overall press productivity.

Our technologies also provide excellent repeatability, allowing converters to reproduce identical print quality across repeat orders without lengthy adjustments. This consistency is particularly valuable for multinational brand owners operating across multiple manufacturing sites.

RK: What initiatives has your company undertaken to reduce waste, improve plate-making efficiency, minimise solvent usage, or enhance the environmental performance of flexo pre-

press operations?

RS: At XSYS, sustainability is embedded into both our product development and manufacturing processes. Our innovations focus on reducing environmental impact while improving operational efficiency.

The launch of the Nyloflex ECO Series represents an important milestone in XSYS' commitment to delivering sustainable, high-performance solutions for the corrugated packaging industry.

As corrugated converters face increasing pressure to improve print quality, reduce production costs, and meet ambitious sustainability goals, the ECO Series has been specifically developed to address these evolving market requirements. The plates combine print performance with enhanced processing efficiency, enabling converters to achieve sharper graphics, excellent solid ink coverage, and consistent print reproduction while reducing overall environmental impact.

One of the key advantages of the ECO Series is its optimised plate formulation, which replaces a portion of fossil-based raw materials with 20% renewable feedstocks. This enables faster and more efficient processing, helping to reduce energy consumption, processing times, and overall manufacturing costs.

For the corrugated industry, where productivity and press uptime are critical, the ECO Series delivers excellent process stability, reliable print quality, and faster job changeovers. These advantages enable converters to efficiently manage shorter production runs and increasing SKU complexity while maintaining high productivity, operational efficiency, and profitability.

The ECO Series also aligns with the industry's broader sustainability objectives by supporting resource-efficient manufacturing and helping converters reduce their environmental footprint while maintaining the premium print quality demanded by brand owners.

At XSYS, sustainability is not viewed as a trade-off against performance. With the Nyloflex ECO Series, we have demonstrated that it is possible to deliver both—providing corrugated converters with a future-ready plate technology that combines productivity, print excellence, and environmental responsibility. →





The key initiatives include development of high-performance plates that require fewer press adjustments and generate less startup waste, highly efficient plate processing equipment that optimises energy and solvent consumption, automated workflows that minimise plate remakes and operator errors, long-life plate technologies that reduce overall material consumption, and continuous investment in sustainable manufacturing processes and responsible resource utilisation.

RK: What are the most common challenges faced by Indian corrugators when it comes to print quality and pre-press processes, and how can technology help overcome them?

RS: India's corrugated packaging industry has experienced tremendous growth, but several challenges remain.

Some of the most common issues include variations in board quality, limited process standardisation, manual workflow dependencies, inconsistent plate quality, skill shortages, and pressure to reduce production costs while improving quality.

Technology plays a critical role in overcoming these challenges. Modern flexographic plates offer greater process latitude, allowing converters to main-

tain consistent print quality despite substrate variations. Advanced imaging systems ensure precise plate reproduction, while automated workflows reduce human error and improve repeatability.

Equally important is process standardisation. By implementing standardised plate-making procedures, colour management practices, and press optimisation techniques, converters can significantly improve quality consistency while reducing waste and downtime.

RK: Automation and workflow integration are transforming manufacturing. How do you see digital workflows, automation, and data-driven processes influencing the future of flexographic pre-press?

RS: The future of flexographic pre-press is increasingly digital, automated, and data driven. Automation reduces manual intervention throughout the entire workflow. Digital workflow integration improves communication between design, pre-press, plate production, and printing press, reducing bottlenecks while increasing overall efficiency.

Looking ahead, data analytics and artificial intelligence will play an increasingly significant role in predictive maintenance,

process optimisation, quality monitoring, and production planning.

RK: How important are training, technical support, and process standardisation in helping corrugators achieve optimal print performance, and what initiatives has your company taken in this area?

RS: At XSYS, we consider technical service and customer education to be strategic differentiators. Our experienced technical teams work closely with customers to optimise the complete printing process—from plate selection and imaging parameters to press setup and troubleshooting.

We also collaborate closely with OEM partners and industry stakeholders to help customers adopt standardised production practices that improve consistency, productivity, and profitability.

RK: What trends do you expect to shape the corrugated printing market over the next five years?

RS: Several trends will significantly influence the corrugated printing industry over the next five years. These include continued growth of eCommerce packaging, increased demand for high-quality graphics, greater emphasis on sustainability, shorter production runs, increased automation, digital workflow integration, greater use of data analytics and artificial intelligence, and rising adoption of Industry 4.0 manufacturing principles.

RK: If you could give one piece of advice to corrugators looking to upgrade their print quality and pre-press capabilities, what would it be?

RS: Rather than focusing on individual components, invest in the complete printing ecosystem.

True print quality is achieved when plates, imaging technology, processing equipment, workflows, press settings, inks, anilox rolls, and operator expertise all work together as an integrated system.

Equally important is viewing technology as a long-term investment rather than simply a capital expense. The right technologies deliver measurable improvements in productivity, waste reduction, consistency, sustainability, and profitability. Those converters who embrace integrated solutions, automation, and continuous process improvement will be best positioned to succeed in the increasingly competitive corrugated packaging market. ■

Process intelligence: Corrugator's biggest competitive advantage

After decades of investing in faster machines, India's corrugated box industry is turning its attention to something less visible but equally important: information. Sangeet Gupta and Puneet Gupta of Faridabad-based Finsys ERP Software, explain why operational discipline is becoming the sector's most valuable asset

For much of the past decade, India's corrugated box manufacturers have pursued growth through investment. Automatic corrugators, flexo folder-glueers, die-cutters and material handling systems have become commonplace as converters expanded to serve FMCG, consumer durables, pharmaceuticals, electronics and, increasingly, eCommerce. Capacity has grown; factories have become larger and production lines faster.

Yet the industry's next phase of growth is being shaped by something less visible than a new machine. It is information.

"Corrugators are sandwiched between the giants," says Sangeet Gupta, co-founder of FinSys ERP Software, capturing the commercial reality facing converters today. On one side are paper mills and large paper traders that influence raw material prices. On the other are multinational brands and organised manufacturers with increasing purchasing power and demanding supply-chain requirements. Corrugators have little influence over either.

"The selling price is rarely in the con-



(l-r) Puneet Gupta and Sangeet Gupta of Finsys Infotech

verter's control, and neither is the price of paper," Gupta says. "The only area where corrugators can consistently improve is process cost and operational efficiency."

That observation explains why conversations within the industry have changed. Investment decisions are no longer driven solely by machine speed or installed capacity. Increasingly, they revolve around planning, production efficiency, inventory control, wastage and the ability to make faster operational decisions.

Puneet Gupta, co-founder of FinSys ERP Software, believes the industry has entered a phase of disciplined growth. "Supply chains have become more organised, brand owners expect greater consistency, and engineered corrugated packaging is replacing loose packaging across several industries," he says. "Mid-sized corrugators, from Punjab to Pondicherry and Gujarat to Guwahati, have consciously upgraded both machinery and management systems to match global manufacturing practices."

The shift is evident across the country. While converters continue investing in automation, they are also recognising that machines alone do not improve prof-

itability. The gains increasingly come from how effectively those assets are planned, monitored and utilised.

From 'Dabbawala' supply chain partner

The corrugation industry's role has changed as dramatically as the factories themselves.

"When we started working with converters more than three decades ago, many maintained manual *bahi khata*," recalls Gupta. "Today, owners monitor receivables, production, machine efficiency and dispatches on their phones."

He has watched businesses evolve from handwritten ledgers to live dashboards that provide instant visibility into operations. But the industry's own transformation has been equally significant.

"There was a time when corrugators were viewed simply as 'dabba wala'," Gupta says. "Today packaging has become an integral part of the product and the delivery chain."

That change reflects the growing importance of corrugated packaging within modern manufacturing. Whether producing refrigerators, automotive components, FMCG products or pharmaceuticals, manufacturers cannot dispatch finished goods without boxes

arriving on time and to specification. Packaging has moved from being a procurement item to becoming an essential part of production continuity.

"The box manufacturer has to be as systematic as the customer, if not more systematic," says Puneet. "If packaging is delayed or specifications vary even slightly, it affects the customer's production schedule."

The growth of eCommerce has accelerated that transition. Products that once moved in consolidated shipments are now packed and dispatched individually, creating millions of additional corrugated boxes every day.

"What once travelled in one large carton is now delivered as individual shipments," says Gupta. "Every order requires another corrugated box."

Demand has therefore expanded, but so have expectations. Customers increasingly expect consistent quality, shorter lead times, accurate delivery schedules and complete visibility into the supply chain. At the same time, volatile kraft paper prices and continuous pressure on selling prices have narrowed margins, making operational efficiency a commercial necessity rather than a management aspiration.

According to Puneet, successful converters increasingly differentiate themselves not by adding capacity alone, but by improving planning accuracy, reducing wastage, increasing machine utilisation and strengthening management information systems.

Factory that thinks differently

The most significant transformation has taken place inside the factory.

For many years, information moved through separate departments. Sales maintained customer records. Production relied on manual schedules. Stores tracked inventory independently. Accounts generated invoices after dispatch. Information existed, but rarely in one place or in real time.

That approach is steadily disappearing. Manufacturing ERP platforms now connect enquiries, quotations, order booking, production planning, corrugation, conversion, dispatch and invoicing into a continuous workflow. Rather than digitising paperwork, they create a common information layer across the business.

"What we are seeing is the end of isolated systems," says Gupta. "Factories are moving away from Tally-plus-Excel environments towards manufacturing systems where every department works on the same bit of data."

The impact is visible on the shopfloor. Management teams increasingly monitor overall equipment effectiveness (OEE), machine throughput, paper inventory, wastage and dispatch status while production is still in progress. Instead of discovering problems after the shift has ended, they are able to intervene while jobs remain on the machines.

Some converters now track an order from invoice generation to dispatch and finally to customer delivery, providing complete visibility across the transaction.

"Customers today expect visibility, not just products," Gupta says. "Many plants know exactly when material was invoiced, when it left the factory and when it reached the customer's premises."

The rapid adoption of automatic corrugators, print-slotter-die-cutters, reel tracking systems and online glue measurement has reinforced this shift by allowing production data to flow directly into management systems. Decisions that were once based largely on experience are increasingly supported by live operational data.

The implications extend beyond day-to-day production.

Gupta recalls a recent visit to a newly commissioned corrugation plant in Rajasthan, where the promoter assigned responsibility for ERP implementation to his 25-year-old son, who had just entered the family business.

"The father told us that if his son understood the ERP, he would understand the business," Gupta says. "He would learn enquiries, procurement, production planning, inventory, finance and customer service through one integrated system."

The anecdote illustrates how digital platforms are increasingly becoming management tools rather than IT projects. For many second-generation entrepreneurs, understanding manufacturing now begins with understanding the flow of information across the enterprise.

That approach is also reflected in the industry's growth. Gupta notes that many corrugators his team has worked with have doubled, tripled or even quadrupled their businesses over the past five to six years. New machinery has undoubtedly supported that expansion, but he argues that stronger planning, better visibility and more disciplined execution have enabled those investments to deliver sustained returns.

The corrugated box remains the industry's final product.

Increasingly, however, competitive

advantage is determined by everything that happens before the first sheet of paper enters the corrugator.

Rethinking costs

If margins are determined by operational efficiency, costing can no longer remain an exercise for the finance department alone.

For years, many corrugators viewed conversion cost as a broad measure that covered the journey from kraft paper to finished box. That approach suited a business with fewer product variants, longer production runs and less demanding customers. Today's factories operate under very different conditions.

Multiple flute profiles, customised board combinations, shorter runs and faster turnaround times mean that every stage of production carries its own cost implications. An additional gramme of paper, higher setup time, excess wastage or an avoidable machine stoppage can quickly erode already thin margins.

"The winner today is the company that monitors its raw material," says Puneet. "Large customers understand their own costing in great detail and continuously expect productivity improvements from their suppliers." The focus therefore shifts from merely calculating conversion cost to understanding what drives it.

Procurement teams are rationalising paper purchases through approved supplier lists and negotiated pricing. Production planners seek to improve machine utilisation while reducing changeover time. Inventory is monitored to eliminate slow-moving stock and unnecessary working capital. Every operational decision ultimately feeds into profitability.

Sangeet Gupta argues that treating conversion cost as a single number often masks where value is actually created or lost. In practice, profitability depends on hundreds of decisions made every day, from purchasing and planning to scheduling, production and dispatch.

Factory beyond its gates

Digital transformation no longer stops at the dispatch dock.

As supply chains become increasingly connected, converters are integrating their production systems with those of their customers. Instead of depending on emails or telephone calls, production updates now move automatically between software platforms.

Application programming interfaces (APIs) enable manufacturing systems to exchange information directly with cus- →



Team Finsys Infotech with their customers

tomers' enterprise platforms. Dispatch status, delivery schedules and production milestones become visible without manual intervention.

"Customers no longer want to call and ask whether material has left the factory," says Puneet. "They expect to see that information inside their own systems."

The same principle extends to warehouse operations.

QR codes and barcode-driven processes help ensure that the right consignment reaches the right customer. Operators validate shipments before loading, reducing dispatch errors, debit notes and unnecessary customer complaints. Automatic job closure, electronic dispatch advice and integrated invoicing further shorten the time between production and delivery.

Viewed individually, these may appear to be incremental improvements. Together, they reduce delays, improve traceability and give management greater confidence in everyday operations.

Just-in-time manufacturing

Nowhere is this operational discipline more visible than in just-in-time manufacturing.

Large manufacturers increasingly expect corrugated boxes to arrive in line with production schedules rather than warehouse inventories. Instead of storing weeks of packaging material, customers rely on suppliers capable of replenishing stock several times a day.

"The objective is simple," says Gupta. "Why should the customer maintain large stores when the supplier can replenish material every few hours?"

Meeting that expectation requires far more than transport planning. Production schedules, dispatch, inventory and logistics have to work as one coordinated system. Gupta points to customer relationships where delivery windows are measured in minutes rather than hours, with delays carrying significant commercial penalties.

Such demands are also changing factory networks.

Some of India's larger converters are adopting hub-and-spoke manufacturing models. Central facilities operate high-capacity corrugators producing board around the clock, while smaller satellite plants located close to industrial clusters convert the board into finished boxes for local delivery. The model improves asset utilisation at the hub while reducing lead times for customers.

Gupta says, "It is another example of efficiency being driven as much by planning as by production equipment."

Leadership matters

Throughout the discussion, Gupta and Puneet return repeatedly to one point: technology succeeds only when management treats it as a business initiative rather than an IT project. "ERP does not fail," says Puneet. "Implementation fails when management assumes the staff alone will drive the system."

The distinction is important

Factories where leadership actively defines workflows, reviews information and uses data for decision-making tend to embed digital processes into everyday operations. Where technology is delegated without management involvement, adoption often remains incomplete.

The transition is also being shaped by a new generation of business leaders.

Many younger entrepreneurs entering family-owned corrugation businesses are comfortable working with integrated digital systems from the outset. Rather than learning one department at a time, they increasingly understand manufacturing as a connected process linking customers, procurement, production, logistics and finance.

For Gupta, this reflects three decades of watching the industry evolve. Working alongside converters across the country has allowed ideas developed in one factory to be refined and adapted elsewhere, gradually spreading better manufacturing practices across the sector.

From automation to intelligence

The industry's next chapter is likely to be defined by how effectively information moves through the factory.

Manufacturing ERP, IoT platforms and artificial intelligence are beginning to work together rather than as separate technologies. Machines generate production data, IoT captures it in real time, while AI increasingly helps managers interpret that information and retrieve it more quickly.

"People will increasingly speak to computers rather than search through menus," says Puneet. "The information already exists. The challenge is making it available instantly for better decisions." He views AI not as a replacement for experienced managers but as a tool that allows them to respond faster and with greater confidence.

At the same time, factories continue to improve through less visible changes. Standardising paper specifications, reducing inventory variants and simplifying box dimensions all contribute to lower working capital, better planning and improved responsiveness.

For Gupta, these developments reinforce a simple conclusion. Corrugators cannot dictate paper prices, nor can they determine what customers are willing to pay. "What they can influence is how efficiently they convert paper into finished boxes," concludes Gupta. ■

Corrugators must focus on the long-term value of technology

It's a strategic investment, not an expense, Manish Madhusudan, co-founder, Renuka Softtec, tells **Rahul Kumar**

Manish Madhusudan of the Indore, MP-based ERP service provider argues that ERP systems provide end-to-end visibility across operations, making digitalisation a key differentiator for businesses looking to stay ahead

Rahul Kumar: How do you assess the current state of the Indian corrugation industry, and what key trends are influencing customers?

Manish Madhusudan (MM): The current Indian corrugation industry is moving from volume-based manufacturing to controlled, quality-driven, cost-sensitive, and technology-enabled production. People are investing not only in machines but ERP systems that help them reduce wastage, manage raw material volatility, improve delivery performance, and protect margins.

RK: How do you help corrugators improve productivity, reduce waste, enhance quality, and lower operating costs?

MM: We offer full-fledged and proven ERP solutions which are being adopted by corrugators across India.

RK: What are the major challenges which suppliers and technology providers in the Indian corrugation market are facing and what steps are needed to accelerate the adoption of advanced solutions?

MM: The biggest challenge is that many companies still make investment decision based on initial cost rather than long-term value. Rising raw material



Manish Madhusudan, co-founder, Renuka Softtec

prices and margin pressure make them cautious about investing in new technology. At the same time, there is shortage of skilled manpower, resistance to changing traditional methods, and difficulty integrating new solutions into the existing machines and software. That's why corrugators must focus on the long-term value of technology. It's a strategic investment, not an expense.

RK: To what extent are automation, digitalisation, Industry 4.0, AI, and data-driven manufacturing influencing customer requirements, and how do you respond to it?

MM: Automation, digitalisation, Industry 4.0, AI, and data-driven manufacturing have become the expectations from customers. Businesses today need real-time visibility into production, inventory, costing, and delivery to make faster and better decisions. We customise our ERP solutions to each customer's unique business processes.

RK: How important is local manufacturing with support in today's market, and how do you manage it?

MM: Customers these days don't just buy a product but invest in it as a long-term partner. That's why local availability of the products, responsive after-sales

service, and deep understanding of customers' business are more important than ever. We make it truly feasible for our customers to the fullest.

RK: Hikes of raw material & energy prices, and supply chain disruptions continue to impact the industry. How can technology & process innovations help corrugators navigate these challenges more effectively?

MM: Protecting margins is the biggest challenge corrugators nowadays are facing. Their solution is not buying new machines but technology to improve operational efficiency. By digitising the entire manufacturing process, they can optimise everything. In this, our ERP provides real-time visibility and actionable insights that help customers respond quickly to the changing market conditions.

RK: What opportunities do you see in the Indian corrugation market in the next five years and what supportive role will you play in it?

MM: There will be tremendous growth driven by the expansion of eCommerce, exports, and increasing demand for sustainable paper-based packaging. As always, we will remain as the technology partner in the transformation, helping corrugators improve productivity, reduce wastage, optimise costs, and gain complete visibility across their operations.

RK: If you recommend one strategic investment that corrugators in India must prioritise in the next three years, what would it be and why?

MM: It would be the digital transformation through an industry-specific ERP integrated with the shop floor. In the coming years, the biggest competitive advantage will not come from owning more machines, but using data to make faster and better decisions. A well-implemented ERP provides complete visibility. In my view, those investing in digitalisation today will be the ones who lead the industry tomorrow. ■

Why information speed now beats machine speed

Vivek Mukherjee, manager marketing, Samadhan, explains how Microsoft Dynamics 365 Business Central connects finance, sales, purchasing, inventory, warehousing, manufacturing, and customer service into a single platform, and how Samadhan brings corrugation expertise and industry best practices

It is mid-afternoon and a key customer calls with an urgent order. The question sounds simple, can you deliver?

For many corrugated manufacturers, answering that question still means checking spreadsheets, calling multiple departments, reviewing inventory levels, and validating production schedules. Valuable time is lost before a confident answer can be provided.

Yet some corrugated manufacturers respond within minutes.

The difference is not machine speed. It is information speed.

In today's corrugated industry, the ability to access accurate information quickly has become a competitive advantage. Faster decisions lead to better customer service, stronger margins, and more efficient operations. The companies gaining market share are increasingly those that can see their business clearly and act faster than their competitors.

The changing industry

The corrugated business looks familiar on the surface. Corrugators still run. Converting lines still produce boxes. Customers still demand quality and competitive pricing. What has changed is the level of complexity behind every decision.

Paper prices fluctuate more frequently. Customer expectations continue to rise. Product specifications are becoming more diverse. Delivery windows are tighter than ever. At the same time, management teams are expected to make faster decisions with greater accuracy.

The challenge is no longer collecting data. Most corrugated manufacturers already have plenty of data. The challenge is turning that data into actionable intelligence.

Historically, ERP systems were designed to record transactions and con-



▲ **Vivek Mukherjee,**
manager
marketing,
Samadhan

trol processes. They helped organisations manage finance, inventory, purchasing, production, and sales. Those capabilities remain important, but manufacturers now need more than transaction processing. They need answers — which orders are at risk? which customers are truly profitable? where are production losses occurring? which materials are creating cost pressures?

The businesses that answer these questions quickly gain an advantage over those that spend days compiling reports.

A trusted foundation

Every intelligent business begins with a trusted source of data. Microsoft

Dynamics 365 Business Central connects finance, sales, purchasing, inventory, warehousing, manufacturing, and customer service into a single platform. Instead of working with disconnected systems, teams operate from a shared source of truth. This creates greater visibility across the organisation and ensures that decisions are based on accurate, real-time information.

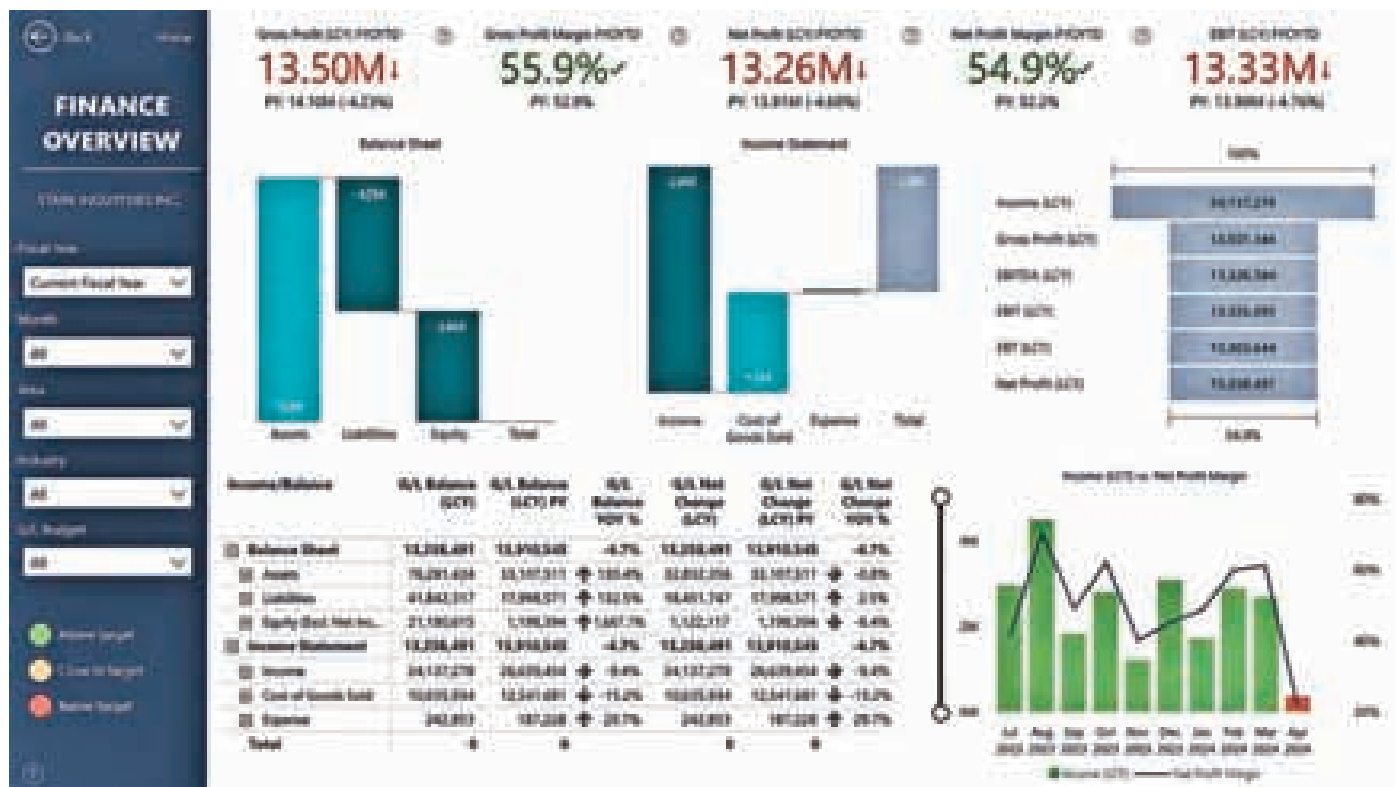
For corrugated manufacturers, it means stronger control over costs, inventory, production performance, customer commitments, and profitability. It also creates the foundation for the next generation of business intelligence.

Artificial Intelligence is rapidly transforming the way businesses interact with their data. Rather than searching through reports or waiting for analysts, users can simply ask questions and receive answers immediately.

Satya Nadella, chairman and CEO of Microsoft, summarised this shift perfectly: "Copilot is the UI for AI."

This statement reflects a major change in how technology supports business users. AI is no longer limited to technical experts. Production managers can ask which orders are likely to miss delivery dates. Sales teams can identify profitable customer segments. Finance leaders can analyse margins and performance trends. The information arrives in seconds, allowing faster and more informed decision-making.

Microsoft Copilot brings natural language interaction directly into the business environment. Instead of building complex reports, users can simply ask: Show me delayed production orders? Which customers generated the highest margins last quarter? What inventory items may create shortages next week? The system interprets the request, analyses available data, and delivers relevant insights. This dramatically reduces the



While AI helps users ask better questions, business analytics service Power BI helps organisations visualise the answers

time required to find information while making business intelligence accessible to everyone.

Turning data into decisions

While AI helps users ask better questions, business analytics service Power BI helps organisations visualise the answers. Interactive dashboards provide visibility into production efficiency, machine utilisation, paper consumption, waste and rejection trends, inventory performance, customer profitability, and financial KPIs.

Instead of reviewing static reports at month end, management teams gain real-time visibility into what is happening across the business. This allows leaders to identify issues earlier and take corrective action before profitability is affected.

Corrugated manufacturing has unique operational requirements that generic ERP systems often struggle to address. Estimating costs requires understanding paper grades, flute profiles, board combinations, conversion costs, and waste factors. Production planning requires balancing machine capacity, changeovers, delivery schedules, and material utilisation.

Inventory management requires pre-

cise control of paper consumption and procurement timing. These are not generic manufacturing challenges. They are corrugation-specific challenges.

Samadhan solution

Built on Microsoft Dynamics 365 Business Central, Samadhan's Corrugation ERP solution combines enterprise-grade technology with deep industry expertise.

For more than twenty-five years, Samadhan has focused on packaging industries including corrugated packaging, folding cartons, flexible packaging, composite packaging, BOPP films, commercial printing, garments, leather, and tannery operations.

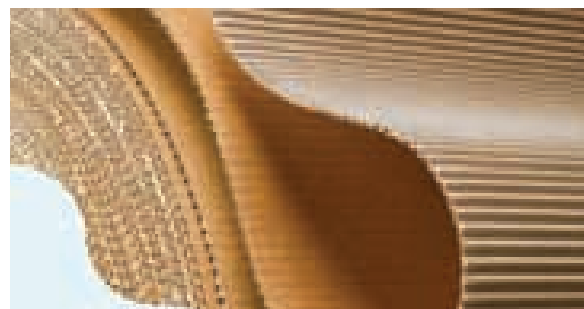
Its Microsoft-certified solutions are available through Microsoft AppSource and incorporate industry best practices developed through years of real-world implementation experience.

Samadhan provides specialised capabilities for corrugation costing and quotation management, paper and inventory management, production planning and shop floor control, quality management and traceability, real-time operational visibility, and profitability analysis and business intelligence. The result is a solution that understands the language of corrugated manufacturing.

The best of both worlds

The future belongs to manufacturers that combine operational excellence with intelligent decision-making. Microsoft Dynamics 365 Business Central provides the trusted digital foundation. Microsoft Copilot and Power BI deliver AI-driven insights and analytics. Samadhan brings deep corrugation expertise and proven industry best practices.

Together, they provide the best of both worlds: Microsoft's global technology leadership and Samadhan's specialised packaging industry knowledge. In an increasingly competitive market, success will depend on how quickly organisations can access information, make decisions, and respond to change. The manufacturers that master information speed today will be the industry leaders of tomorrow. ■



Converters who can offer value to end buyers will win

In corrugation business you can address up to a distance of 300-km or sometimes even less, and just-in-time delivery is the essence of the game, says Venugopal Menon of Bobst in a conversation with **Rahul Kumar**

India is still 90% or more brown RSC box market with one or two-colour printing. But, Venugopal Menon says multicolour printing is also catching up where flexo can be replaced by offset print laminated and where the brand owners are looking at transport boxes which also markets their products or give a premium feel to the packaging.

Rahul Kumar (RK): The corrugated packaging industry is witnessing rapid growth, driven by eCommerce, FMCG, and organised retail. How do you assess the current market, and what are the biggest opportunities for converters over the next five years?

Venugopal Menon (VM): A lot of new manufacturing plants in consumer durables, food, FMCG, and beverages are coming up across India. Just look at Odisha. The state recently saw almost INR 6,500-crore worth of investment in this space with companies like Nestle, ITC, Britannia setting up new factories. Meanwhile, Daikin is setting up Asia's largest plant outside Japan in Tamil Nadu. There are many more examples. Corrugated being tertiary packaging, this is unavoidable



Venugopal Menon
of Bobst

and cannot be replaced as a form of packaging in the segments I mentioned above. Thus, corrugation requirement will grow and you need additional capacities to address it.

RK: Brand owners today expect packaging that is not only strong but also visually appealing and sustainable. How is Bobst helping corrugators achieve the perfect balance between productivity, print quality, and sustainability?

VM: From the sustainability perspective, corrugation packaging is the second to none. Today, the corrugation converters who can give value to end buyers will win. By value, I mean, in terms of right sizing, light-weighting but still giving the required strength, which can be achieved only by better fluting and board quality and in-line converting like a case-maker. In corrugation business you can address up to a maximum distance of 300-km or sometimes even less and just-in-time delivery is the essence of the game. The boxes need to be very square to ever demanding automatic case erecting lines at the end customer. India is still 90% or more brown RSC box market with one or two-colour printing but multicolour printing is also catching up where flexo can be replaced by offset print laminated and where the brand owners are looking at transport boxes which also markets their products or give a premium feel to the packaging.

RK: Automation and digitalisation are transforming manufacturing globally. Which technologies will have the biggest impact on corrugated box production?

VM: In the corrugation business, you make money when you scale up operations, it's a volume game. Also, globally, if you see, the corrugation business is fully integrated on the back

and front end. Major players also manufacture their own kraft paper. But that doesn't mean that converters who do less volume do not make money, but then they are addressing a niche business, or meeting stringent demands of the end users which they cannot get easily from other suppliers or if you do value-added business combined with high graphic printing and special die-cut complex boxes.

But corrugation industry is a typical industry where the automation, robotics, digital workflow can be applied and with bigger the scale of operation the automation (full automatic conveyor system in shop floor for material movement), robotics (machine in feed and palletisation), digital workflow to manage the job sequencing on board line and converting line, material inventory management (since in corrugation business, the number of SKUs is huge and with multiple paper combinations, flute combinations). This is absolute must when you reach a certain scale of conversion.

RK: Many Indian corrugators still compete primarily on price. What strategic investments should they make to evolve into high-value packaging solution providers rather than commodity box manufacturers?

VM: The corrugation industry in India is unfortunately still working on per kg conversion and sell the boxes also in kg, unlike in sqmt in rest of the world. Thus, all the selling prices are based on per kg conversion. Today, corrugation boxes are still considered as a means to transport material from one place to another by the end user. They don't want to spend much on quality or print enhancement. Few brand owners, depending upon the market segment,

want to reduce the packaging cost and try to find every opportunity to replace corrugation by say shrink sleeve or plastic wrap (beverages) or by plastic re-usable trays (fruits, vegetables, eCommerce). In a segment like fruits and vegetables (corrugated die-cut trays or RSC for apple, banana, grapes), high graphic printing on semi / coated board to replace offset in segments like shoes, food/pizza, rice, electrical appliances, and beverages is where corrugation players can look at high value-added packaging and differentiate with other players.

RK: High-graphics corrugated packaging is becoming increasingly important for shelf-ready packaging and eCommerce. How do you see flexographic printing, digital printing, and hybrid technologies shaping the future of corrugated packaging?

VM: High-graphic flexo printing is still at a nascent stage in India but it is catching up slowly. Flexo post-printing is much more cost-effective, offers better value in terms of box/ board quality, strength, and appeal since you print directly on the corrugated board (three/five-ply). Unlike in offset print laminated, which is predominantly the way it's done in India, involves multiple operations, multiple handling, not so great fluting quality, which eventually gets crushed due to multiple handling. Its most important is the format of printing (1,060x760-mm). In flexo post-print, you can print in large-format much more cost-effectively and have multiple ups, and thus increasing the yield (formats up to 2,400x1200-mm). Also, the paper gsm combination with lightweighting but offering similar strength vis-a-vis offset print laminated is possible with flexo post-print.

Shelf-ready packaging has still not caught up in India and this is where the big difference lies between the developed economies and us. In organised retail in Europe and Americas, the products on the shelf are displayed with shelf-ready packaging (all flexo post-print corrugation boxes and die-cut). This happens due to format of these shops and the labour cost, since replenishing the items on shelf manually (like in India) versus by shelf-ready packaging is much fast and economical and brands can add value with nice print to attract buyers and are ready to spend that much more.

RK: Investment decisions in corrugation involve significant capital. In your opinion, where should a medium-sized converter invest first to maximise ROI – corrugator lines, converting equipment, inspection systems, logistics automation, or software-driven workflow?

VM: The first step in corrugation business is to produce good quality board — good fluting quality offering better strength. The board should be dry when produced, so that it is easy for converting, and importantly, it can optimise the paper usage and paper combinations to reduce cost and importantly reduce waste. This can be achieved only with a fully automatic board line offering descent automation, right deckle size (helps in optimising the line production with multiple outs).

With the labour availability and increasing costs becoming a challenge, automation on the shop floor will become a necessity going forward. Thus, automation in converting process also becomes important. A casemaker or a flexo folder gluer (FFG) lines helps optimising paper combination, reduce

RAPID FIRE WITH VENUGOPAL MENON

One technology that will have the biggest impact on the corrugated packaging industry over the next decade?

End-to-end automation.

One investment every corrugator should prioritise before expanding capacity?

Right factory layout and workflow.

Flexo, digital, or hybrid – which printing technology will dominate the future of corrugated packaging?

Flexo printing. From long-term perspective digital will have space.

What is the biggest challenge facing Indian corrugators today?

Labour, pricing, and quality of paper.

What is the biggest business opportunity that the industry is currently overlooking?

Automation through in-line process from multiple process.

One common mistake converters

make while investing in new machinery?

Short term view and lack of understanding of the technology and investing on hearsay.

If you could recommend only one KPI for every corrugated plant to monitor daily, what would it be?

Downtime and wastage.

What is more important for the future of corrugation?

Automation and innovation.

Complete this sentence: "The future belongs to corrugators who _____."

Adapt and upgrade to fast-changing market dynamics.

In one line, how would you describe the Indian corrugated packaging industry in 2030?

Consolidation with some big players going multilocal and the industry will adapt to automation and better technology due to challenges of labour and push from the buyers.



The Bobst FFG 8.20 Discovery is an automated flexo folder-gluer with a production speed of up to 18,000 boxes per hour

labour, minimise wastage, increasing throughput and addressing just-in-time deliveries, optimise and reduce consumption of consumables like glue, and ink, produce much better-quality box in terms of squareness. We feel after a certain threshold level, of say 1,000-mt per month and above, the way forward is to optimise and automate the production process to the maximum, including material handling, logistics around the machine up to the loading bay.

RK: The Indian market is becoming increasingly quality conscious. How important are precision engineering, process standardisation, and preventive maintenance in achieving world-class productivity and consistent box quality?

VM: The way forward is to remain competitive, profitable and scalable by adopting the right technology, which is reliable, productive, efficient, flexible (in terms of types or variety of jobs it can produce) and offers the best automation in its class. For that one needs to address operational excellence by ways of process standardisation, ERP-MIS system, investment in trained operating and maintenance team, avoid cutting corners, which can affect productivity and wastage.

RK: Bobst has consistently advocated connected packaging production and digital transformation. How do you envision the concept of a "smart corrugation factory" in India over the next decade?

VM: Bobst is actively driving the future of packaging industry based on our four pillars of automation, connectivity, digitalisation and sustainability. We have transitioned from manufacturing and supplying of just machines to providing end-to-end solutions and processes. For the corrugation industry, we offer solutions to address automation (pre-feeders to load jobs on to the machine, robotics and auto-palletisation at end of the line), connectivity and digitalisation (Bobst Connect, which helps retrieve machine production data, OEE, machine down, JDF to address the job workflow, machine connected to clients ERP), consultation to address in plant conveyor system for material handling, workflow and logistics.

RK: Finally, if you were advising a young entrepreneur planning to establish a new corrugated packaging business today, what would be your top five recommendations to build a globally competitive and future-ready enterprise?

VM: One, decide which market segment you want to address and where you want to see your company 10 years from now. Two, right-size operations (factory layout, area), which is scalable and you can expand and grow when needed.

Three, adopt the technology which will enable you to be efficient, productive and which make a differentiation (increase the entry barrier for competition) and which will add value to the buyers.

Four, plan and invest on right automation and workflow management from the right beginning.

Five is to embrace digitalisation (connected workflow, ERP).

RK: Chinese manufacturers have significantly expanded their presence in the global corrugation equipment market. How do you view this growing competition, and what differentiates European machine manufacturers in terms of technology, quality, and long-term value?

VM: The customers are the best judge when it comes to what technology is best-suited for them and it depends upon volumes to be converted, value they can add, how they can be one step ahead of their competition, what market segment and finally, whether the investment is for short- or mid-term or mid- to long-term. I always say, adopt the technology which is reliable, scalable, productive, adds value to your offerings and differentiates you from others, helps you to automate to max extend. Today, space is at a premium and there is a challenge to get people. The industry landscape is changing fast. The market needs are dynamic. Thus, what you invest in for today has to be relevant for the near future too. Don't invest for today's requirement. One has to think mid to long-term. One doesn't do capex investment at short intervals. Thus, selecting what best suits your need makes you more competitive and gives you the most preferred supplier status with your client. ■

Why BHS Corrugated is betting on affordability, AI and skills

Bijendra Sharma, managing director, BHS Corrugated India, shares his views on industry growth, automation, AI, sustainability, customer profitability, and why India's corrugators must focus on technology and process excellence to remain competitive, in an interaction with **Rahul Kumar**

As India's corrugation industry marches towards becoming a significantly larger and more sophisticated packaging ecosystem, technology suppliers are playing a crucial role in shaping its future. Among them, BHS Corrugated India has emerged as one of the most influential players, strengthening its local manufacturing footprint, expanding service capabilities, introducing innovative financing models, and investing in skill development.

Bijendra Sharma, managing director, BHS Corrugated India, says the Indian corrugation market is on a strong growth trajectory. It is growing steadily and is moving closer to double-digit growth. As per industry estimates, India currently produces around 13,000-million-sqmt of corrugated board annually, and by 2030, this could reach 18,000-million-sqmt, translating into a CAGR of approximately 7–8%.

According to Sharma, this growth is being driven by multiple factors — infrastructure development, industrial expansion, eCommerce penetration, growing consumption in tier-II and tier-III cities, and increasing demand from sectors such as electronics, FMCG, food processing, solar energy, and exports.

"Today, almost everything is shipped in a box. Whether it's a laptop, washing machine, solar panel, automotive component, or frozen food product, corrugated packaging has become indispensable," he says.

The growth story is strong, but there are challenges too. Sharma says, one major issue is the GST disparity between

paper and corrugated boxes. Paper attracts a significantly higher GST rate compared to corrugated boxes, creating working capital pressures for converters. Currency fluctuations are another concern, particularly for businesses dependent on imports. These uncertainties directly impact planning and profitability.

BHS philosophy

Sharma explains, at BHS, the company's philosophy is simple — better, faster and cheaper. By cheaper, I don't mean lower quality. I mean making solutions more affordable and cost-effective by eliminating unnecessary costs. Our objective is to help customers manufacture better boxes, faster boxes and more economical boxes. Ultimately, customer profitability is our primary focus. "With local manufacturing, local infrastructure and local service support, we can deliver products and solutions much faster while reducing logistics costs, customs duties and currency-related risks," he says.

The company recently inaugurated a new facility in Pune spread across more than six acres. The facility manufactures corrugating rolls, pressure rolls, applicator rolls and doctor rolls for both BHS and non-BHS customers. Interestingly, more than 70% of its roll production currently serves non-BHS customers. The



Bijendra Sharma,
managing director,
BHS Corrugated India

facility also houses a global capability centre (GCC) supporting BHS operations worldwide. The market response has been extremely encouraging, and the plant is already operating in three shifts.

BHS is known for premium technology. How are the company addressing cost-sensitive segments? Sharma says, “We recognised that the Indian market requires a wider spectrum of solutions. That’s why we introduced Eco Neo, a budget-friendly corrugator specifically designed for India. Components such as roll stands, bridges and stackers are manufactured locally, while other parts are sourced from BHS Shanghai. This enables us to offer customers a highly competitive solution without compromising reliability. We have already sold close to ten Eco Neo installations and expect that number to grow rapidly.”

The company has also initiated the NICE Scheme, which designed to reduce capital expenditure for customers. Under this model, the corrugating rolls remain the property of BHS and are provided on a pay-per-use basis. Customers essentially pay based on running metres rather than making a large upfront investment. This allows them to preserve capital while accessing high-quality technology. “Since launching our local manufacturing operations, the number of rolls under NICE has increased from just two to more than twenty in less than two years,” Sharma says.

According to Sharma, today, BHS is no longer just a corrugator manufacturer. It offers what it calls the Box Plant Concept. From corrugation and conversion to digital printing, logistics systems, conveyors, robotic pre-feeders and material handling solutions, it can support an entire box factory. “Customers increasingly want integrated solutions rather than dealing with multiple suppliers, and that is precisely where BHS is positioned,” he explains.

He says, today, brownfield upgrades are becoming extremely important. “We have successfully upgraded several non-BHS corrugators to BHS technology in a phased manner. Instead of a single 45-day shutdown, we break the project into multiple phases, allowing customers to continue serving their markets while modernising their plants. This approach is easier on cash flow and delivers immediate gains in productivity and quality,” Sharma explains.

The future of the industry

What concerns Sharma most about the industry’s future? His answer is skill



development. Technology is available, but skilled manpower remains scarce. Recruiting, training and retaining talent is becoming increasingly difficult. “To address this challenge, we have established the BHS Academy in Pune. The academy offers training programmes covering production, maintenance and operational excellence. This is one of the most important investments we have made because technology alone cannot transform an industry—people do,” he says.

And what about AI? Sharma says AI is going to change everything. The corrugation plant of the future will be highly automated and increasingly AI-driven. Every business has the same 24 hours in a day. AI enables us to make those 24 hours more productive. “At BHS, we are investing aggressively in AI because we believe it will play a significant role in improving efficiency, reducing waste, optimising production and enhancing profitability,” he explains.

He is equally vocal on the subject of sustainability. For him, it is a way of operating. “True sustainability means maintaining improvements consistently over time. Whether it is cost control, resource optimisation or operational excellence,

the key is consistency. Technology helps, but sustainable results come when technology is combined with disciplined processes and trained people,” he says.

Project 2030

Sharma believes by 2030, the industry will continue to grow, adopt newer technologies and become increasingly sophisticated. “We are already seeing second-generation entrepreneurs entering the business, bringing fresh perspectives and a greater willingness to embrace automation and innovation. However, reaching global standards will depend on factors such as skill development, government support, infrastructure and continued investment in technology.”

He adds, “My advice is simple: invest in the right technology and the right processes. Technology should not be over-engineered; it should be appropriate for your business. More importantly, focus on creating sustainable systems that deliver consistent results. At BHS, our commitment remains unchanged—helping customers produce better boxes, faster boxes and more cost-effective boxes, because customer profitability remains our ultimate goal.” ■

Driving the future through automation and sustainability

As packaging manufacturers face increasing pressure to improve productivity, advanced machinery and process optimisation have become critical. Veena Ajay, business development head, Boxtech Bengaluru shares her insights

India's corrugation and packaging industry is entering a new era of growth, powered by expanding demand from eCommerce, FMCG, pharmaceuticals, electronics, agriculture, and industrial manufacturing. As packaging requirements become increasingly sophisticated, manufacturers are shifting their focus from simply increasing production volumes to improving efficiency, consistency, and long-term profitability. According to Veena Ajay, business development head at Boxtech Bengaluru, this transformation is encouraging corrugators to adopt advanced automation technologies that deliver measurable operational advantages.

One of the most significant changes in customer behaviour is the way machinery investments are evaluated. Instead of selecting equipment based solely on its purchase price, packaging manufacturers are increasingly considering the total value generated over the machine's lifecycle. Factors such as production efficiency, reduced downtime, energy consumption, lower wastage, faster job changeovers, and consistent product quality have become key decision-making criteria. "Businesses are looking for equipment that not only increases production capacity but also improves operational excellence while



▲ L to r - Veena Nayak, Ananth Nayak and Ajay Nayak from Boxtech Bengaluru

lowering manufacturing costs," Ajay says.

Innovation remains central to this evolution. "Boxtech has consistently invested in research and development to design folder-gluer and packaging automation solutions that deliver higher speeds, greater accuracy, shorter setup times, and reliable gluing performance," she says, adding, "Modern machines are expected to handle a wide variety of carton styles while reducing manual intervention and maintaining production stability. Such advancements enable converters to achieve higher throughput, minimise production losses, and improve profitability through better utilisation of resources.

Sustainability has emerged as another defining priority across the packaging value chain. While machinery manufacturers may not directly produce sustainable packaging, they play a crucial role in enabling environmentally responsible manufacturing. Efficient equipment helps reduce paperboard wastage, optimise adhesive consumption, lower energy usage, and maximise usable output. As environmental regulations become stricter and brand owners increasingly prioritise sustainable supply chains, investments in resource-efficient production technologies are becoming an essential part of business strategy rather than an optional initiative.

Digitalisation and Industry 4.0 are also reshaping the future of packaging manufacturing. Today's corrugators expect machines equipped with real-time production monitoring, machine connectivity, predictive maintenance capabilities, and performance analytics. These technologies provide valuable insights into machine utilisation, production planning, quality control, and maintenance scheduling, enabling manufacturers to reduce downtime and optimise overall equipment effectiveness. "As factories become smarter and more connected, equipment manufacturers must continue developing intelligent solutions that support data-driven decision-making and digital manufacturing environments," she adds.

Another critical success factor is after-sales service. Packaging manufacturers increasingly recognise that dependable technical support is just as important as machine performance. Quick access to spare parts, timely maintenance, operator training, and continuous technical assistance are essential to ensuring uninterrupted production. Local manufacturing capabilities provide an added advantage by enabling faster response times and a better understanding of customer requirements. Building long-term relationships through reliable service strengthens customer confidence and maximises the value derived from technology investments.

Looking ahead, the future of India's corrugation industry remains highly promising, Ajay says. Continued expansion of eCommerce, organised retail, food delivery, pharmaceuticals, exports, and manufacturing is expected to drive sustained demand for corrugated packaging. "At the same time, increasing emphasis on sustainability, automation, and digital transformation will encourage converters to modernise their operations. Companies that invest in advanced machinery, process optimisation, and intelligent manufacturing systems will be better positioned to enhance productivity, improve product quality, and strengthen their competitive advantage," she said. ■

Sustainability, operational efficiency go hand in hand

The most sustainable manufacturing process is one that minimises waste, optimises resource utilisation, and maximises output quality, say Chandrashekhar Dhote and Kapil Dev, directors, Druckncut India in an interview with **Rahul Kumar**



▲ (l-r) Kapil Dev and Chandrashekhar Dhote of Druckncut India

Chandrashekhar Dhote and Kapil Dev say, at Druckncut India, the company's focus has always been on introducing practical and proven technologies to Indian corrugators while ensuring strong local support.

Rahul Kumar (RK): How do you assess the current state of the Indian corrugation industry, and what key trends are influencing customer investments in equipment, consumables, and technology?

Chandrashekhar Dhote (CD): The Indian corrugation industry is currently witnessing a significant transformation driven by rapid growth in eCommerce, FMCG, electronics, consumer durables, and retail-ready packaging. Corrugators are increasingly moving beyond conventional brown box production and are investing in value-added packaging solutions that offer superior aesthetics, strength and functionality. The key trend influencing investments today is the growing focus on productivity, consistency, and automation. Customers are seeking equipment that can deliver higher output with lower dependence on skilled manpower. At the same time, rising quality expectations from brand owners are pushing converters to invest

in high automation-based equipment that ensure precision, repeatability and reduced wastage.

RK: What innovations or solutions has your company introduced recently to help corrugators improve productivity, reduce waste, enhance quality, and lower operating costs?

CD: At Druckncut India, our focus has always been on introducing practical and proven technologies to Indian corrugators while ensuring strong local support.

Our Rolam servo folder-gluer is designed with advanced automation features, including motorised adjustments and servo-controlled folding systems. One of the biggest challenges in folder-gluing while running corrugated boxes are fishtailing and cross-pasting. The servo-controlled folding section significantly minimises these issues, ensuring higher box quality while reducing operator dependency. One of our customers reported doubling their production after installing our folder-gluer, compared to the output achieved with their previous equipment.

Similarly, our Youbond servo flute laminators have been well-accepted across India, with multiple successful installations at leading corrugated packaging companies, including two high-

speed five-ply flute laminators. Most customers have replaced conventional mechanical laminators with Youbond three- and five-ply machines because of their superior automation, higher productivity, better registration accuracy and significantly lower dependence on skilled operators.

Another proud milestone for Druckncut India is the successful supply of India's first automatic label laminating machine for corrugated packaging. This technology enables precise pasting of offset printed sheets onto large corrugated sheets, opening new opportunities for premium packaging and display applications.

In addition, our dry film lamination solutions support packaging converters in producing premium value-added cartons with excellent surface finish, improved durability, and enhanced visual appeal.

RK: Sustainability is becoming a key purchasing criterion across the packaging value chain. How are your products, technologies, or services helping customers achieve their environmental and sustainability goals?

Kapil Dev (KD): Sustainability and operational efficiency go hand in hand. The most sustainable manufacturing process is one that minimises waste, optimises resource utilisation, and maximises output quality.

Our servo-based technology and automated set up functions in folder-gluer and flute laminators are designed to reduce sheet wastage through accurate registration, stable feeding, and consistent production quality. Reduced rejections directly translate into lower paper consumption and lower environmental impact. In addition, higher machine efficiency enables customers to achieve greater output with lower energy consumption per finished product. By helping converters reduce waste, improve material utilisation, and enhance production efficiency, our solutions contribute meaningfully to their sustainability objectives.



RK: What are the major challenges facing suppliers and technology providers in the Indian corrugation market today, and what steps are needed to accelerate the adoption of advanced solutions?

KD: One of the biggest challenges is the industry's continued focus on initial purchase cost rather than total cost of ownership. While many converters recognize the benefits of advanced technologies, investment decisions are often influenced by short-term considerations.

Another challenge is the shortage of skilled operators capable of managing sophisticated equipment. To accelerate technology adoption, the industry needs greater awareness regarding productivity gains, waste reduction, labour savings, and long-term profitability. Technology providers must also strengthen local service infrastructure, training programs, and customer education initiatives to build confidence in advanced solutions.

RK: To what extent are automation, digitalisation, Industry 4.0, AI, and data-driven manufacturing influencing customer requirements, and how is your company responding to these developments?

KD: Automation today has become a necessity. Today, customers are actively seeking solutions that reduce dependency on manpower while ensuring consistent quality and higher productivity. Customers increasingly expect machine intelligence, production monitoring, quick diagnostics, and easier operation.

At Druckncut India, we are seeing growing demand for servo-driven systems, intelligent control interfaces, automated adjustments, and production data visibility. Our equipment portfolio is aligned with this shift by offering advanced automation features that improve machine performance and simplify operations. As the industry evolves toward Industry 4.0, we expect machine connectivity, predictive maintenance, and data-driven decision-making to become increasingly important, and we

are committed to supporting customers in this transition.

RK: How important is local manufacturing, technical support, and after-sales service in today's market, and what strategies are you adopting to strengthen customer relationships in India?

KD: In today's market, after-sales service often plays an even bigger role than the machine itself. Customers expect quick response times, readily available spare parts, technical expertise, and continuous support throughout the machine's lifecycle. Production downtime can have significant financial implications, making reliable service a critical factor in purchasing decisions.

At Druckncut India, we have invested heavily in strengthening our technical support network, spare parts availability, and customer training initiatives. Our approach is based on building long-term partnerships rather than transactional relationships. We work closely with customers to maximise machine performance, productivity, and return on investment.

RK: Raw material costs, energy prices, and supply chain disruptions continue to impact the industry. How can technology and process innovations help corrugators navigate these challenges more effectively?

KD: Technology plays a vital role in helping corrugators remain competitive during periods of cost pressure. Advanced automation reduces material wastage, improves production efficiency, and minimizes human errors. High-precision laminating and folder-gluing systems ensure better utilization of paper and board, helping converters extract maximum value from every sheet. Process optimisation, faster changeovers, improved machine uptime, and preventive maintenance also contribute significantly to reducing operating costs. Companies that invest in efficient technologies are generally better positioned to absorb fluctuations in raw material and energy costs.

RK: Looking ahead, what opportunities do you see for growth in the Indian corrugation sector over the next five years, and what role will your company play in supporting this growth?

KD: The growth prospects for the Indian corrugation industry are extremely promising. Rising consumption, organised retail, eCommerce expansion, export-oriented manufacturing, and increasing demand for premium packaging will continue to drive investment across the sector. We also expect significant growth in printed and laminated corrugated packaging as brands place greater emphasis on shelf appeal and consumer experience.

Druckncut India aims to play an important role in this evolution by providing world-class converting technologies that enable corrugators to produce higher-quality packaging more efficiently. Our mission is to bridge the gap between global technology and Indian manufacturing requirements through advanced machinery, local support, and strong customer partnerships.

RK: If you could recommend one strategic investment that every corrugator should prioritise in the next three years, what would it be and why?

KD: If we had to recommend one strategic investment, it would be automation through high-productivity equipment. Whether in upstream processes or downstream operations such as flute laminating and folder gluing or any other processes, automation delivers multiple benefits simultaneously higher productivity, reduced waste, improved consistency, lower labour dependency, and better profitability. As customer expectations continue to evolve and market competition becomes more intense, investing in intelligent automation will enable corrugators to increase efficiency, scale their operations and build a sustainable competitive advantage for the future. The future belongs to efficient, automated and quality-focused operations, and automation will be the foundation of that transformation. ■

The rise of the Indian corrugation

In this exclusive writeup, Chiranjeevi Sastry, sales director, Emba Machinery, shares a first-hand experience on the evolution of the Indian corrugation industry

During every vacation from the Middle East until 2003, I visited corrugated plants across the southern, western, northern, and eastern regions of India to assess the prevailing level of technology. In 2003, the decision to work for Emba in India was finalised in Barcelona, Spain. I must thank industry veteran Russell Duarte for facilitating the meeting with Weine Widar of Emba Sweden, who had plans to enter this market. My mentor Weine and I travelled across India.

At the time, very few plants had installed Chinese corrugators, effectively locking themselves into a converting bottleneck. However, we saw huge potential for inline flexo folder gluers (FFGs) in the market.

Our immediate target was to identify who could buy and afford our first FFG machine. It took five years of visiting every player in the market and attending FCBM events (from 2005 to 2010) before we sold the country's very first flexo folder-gluer, which was installed in early 2011.

Industry Evolution from 2010 to 2015

Industry majors, who were then equipped with Chinese corrugators, printer slotters, standalone folder-gluers, and stitchers, began moving toward inline flexo folder gluers to ease their converting bottlenecks.

As industry leaders started evaluating inline FFG machines, Bobst made significant progress.

This was also the period when Oji, in association with JK, set up their plant in Neemrana, introducing the BHS Steady Line corrugator to India.



▲ Chiranjeevi Sastry, sales director, Emba Machinery

Technology from 2015 to 2020

While a couple of fully European-manufactured corrugators were installed in India, BHS and Fosber Asia established an aggressive presence in the market, with the former dominating in terms of volume.

Emba innovated the Ultima Platform, featuring True Non-Crush Technology in converting, and successfully installed the country's first six-colour machine in 2015.

During this period, Oji set up additional units in Sanand and acquired another facility in Chandigarh.

Industry pause from 2015 to 2020

The impact of Covid-19 was massive; small players suffered severely, and many plants were forced to close down during this period.

Only large and medium-sized players managed to survive, and capital investments were put on hold. A major event for the industry during this time was JK's acquisition of the Horizon Group and all of its corrugated units.

Trends from 2023 to present

One of the major corrugated converters shifted toward backward integration by setting up their own paper mills.

The Japanese company Rengo Papers established a joint venture with the Vel-Vin Group.

A few players diversified into related paper products, such as paper bags, sustainable food packaging, the label business, and tissue products.

Oji set up their largest plant to date in Sri City, Andhra Pradesh.

Investors continue to be lured by low-priced machinery, which often delivers substandard results. This trend has unfortunately forced a few reputed brands to compromise their own machine quality to compete.

The demand for eCommerce boxes is poised to grow, alongside a rising need for high-graphics printing.

The demand for inline flexo folder-gluers will continue to rise as more small and medium-sized players look to catch up with the rest of the industry.

Digital print capabilities are still under evaluation and might take another 10 years to fully mature in this market.

We expect to see more consolidation in the industry, and we await Westrock's entry into the corrugated business.

The challenges today

The industry is currently suffering from an imbalance in GST rates between raw materials and finished products. Cut-throat competition is driving down margins. There is a distinct scarcity of skilled labour. The poor performance of cheap machinery is compounded by unreliable support from agents who are either inactive or representing competing companies.

Future opportunities

The future of the industry remains highly promising, as highlighted by the following statistics:

8-million mt was converted in India in 2025. **3.5-million mt (50%)** was converted in automated corrugation plants. **3.5-million mt (50%)** was converted across roughly 8,500 small and medium-sized plants. The industry is experiencing a CAGR of 9.6%, with the annual growth rate projected to reach 12%. ■

How digital printing could be the right investment for the corrugation industry

The future is a PLC-controlled, sensor-driven machine that takes a design file and prints it with zero manual setup, says Riddhi Shah of Printpack Engineers. She tells **Rahul Kumar** that, "In our experience, the cheapest option is rarely the most economical one. A supplier who's honest about what a price can deliver is worth more than one who agrees to everything"



(l-r) Harish Sheth and Riddhi Shah of Printpack Engineers

Digital printing on corrugated has been a standard practice in Europe and China for years, Riddhi Shah says. Printpack Engineers is the first company in India to bring single pass corrugated digital printers in the market. The inline UV coating and drying system is icing on the cake without extra handling.

Rahul Kumar (RK): Printpack Engineers has been serving the corrugated packaging industry for several years. Could you briefly introduce the company and its core philosophy?

Riddhi Shah (RS): Printpack Engineers has spent decades helping corrugators

turn paper into boxes, reliably, day after day. Our philosophy is simple — a machine that runs quietly on the shop floor is worth more than one that impresses in a brochure.

RK: How do you assess the current state of the Indian corrugated packaging industry? What major shifts have you observed over the past five years?

RS: India is now the world's third-largest producer of corrugated boxes — about 12-million tonnes a year — and the market is worth roughly INR 1.2-lakh crore, growing at a healthy phenomenal rate. Five years ago, the conversation was about capacity. Today it's about capability to deliver consistently

with tighter tolerances and faster turnarounds.

RK: Which customer segments are driving the highest demand today?

RS: Food and beverage alone accounts for close to 40% of paper-packaging demand in India, and eCommerce cartons now make up nearly half of all eCommerce packaging by share. But the segment we watch closest is short-run FMCG and D2C brands who need different SKUs printed at the click of a button. That's a segment flexo was never built for, and digital is.

RK: Automation has become a necessity rather than a luxury. How is Printpack Engineers helping corrugators improve

productivity with automated solutions?

RS: We chase the boring bottlenecks — manual counting, manual stacking, manual changeovers. Plants happily invest in a faster machine and then lose the gains to manual setup between jobs. Automating the changeover, not just the run, is where the real productivity sits.

RK: Which technologies do you believe will have the greatest impact on corrugated box manufacturing over the next five years?

RS: Single-pass digital printing, without question. A PLC-controlled, sensor-driven machine that takes a design file and prints it with zero manual setup. Digital printing on corrugated has been a standard practice in Europe and China for years. We are the first company in India to bring single pass corrugated digital printers in the market. The inline UV coating and drying system is icing on the cake without extra handling. That's not a future trend; it's already running on our customers' floors today.

RK: Sustainability has become a key focus for packaging. How are machinery manufacturers contributing towards

reducing waste, power consumption, and material usage?

RS: Through precision. Our digital printer, for instance, runs water-based CMYK ink with zero sewage discharge. It is genuinely food-contact safe and cuts out the ink, solvent and plate waste that comes with every flexo make-ready. Every rejected box is wasted board, ink, glue and power, so yes, the greenest machine on a shop floor is usually just the one that makes the fewest mistakes. Skipping plate-making on every job change removes an entire category of waste before printing even starts.

RK: What are the three most important factors customers expect from Printpack Engineers today besides machine performance?

RS: Honesty about what a machine can and can't do, service that shows up when promised, and spares that don't take three weeks to arrive.

RK: What is your vision for Printpack Engineers over the next five years?

RS: To make the case that Indian converters don't have to wait for technology

to arrive from abroad. We introduced single-pass digital corrugated printing here first, and we want that to be normal, not a headline. Fewer plates, fewer rejects, fewer converters finding out about a technology from their competitor's client list. ■

RAPID FIRE WITH RIDDHI SHAH

One technology every corrugator should invest in?

Digital printing.

One production parameter that is often ignored?

Changeover time.

Biggest challenge for Indian corrugators?

Balancing speed with consistency.

One international trend India should adopt?

Data-driven maintenance.

Your definition of manufacturing excellence?

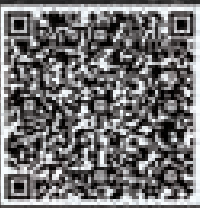
A shift that runs so smoothly nobody notices it.

One word that defines Printpack Engineers?

Dependable.



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SCAN TO SUBSCRIBE

Digital cutting helps reduce waste

It minimises production errors, reduce rework, and lower material consumption, Puranjit Sarangi of TechNova Imaging Systems, tells **Rahul Kumar**

Puranjit Sarangi says by utilising JWEI's advanced digital cutting and automation technology, the company has improved productivity, precision, and workflow efficiency. This enables faster production, reduced material waste, and seamless integration from design to finished product.

Rahul Kumar (RK): How has the demand for digital cutting and finishing solutions evolved in the corrugation industry over the past few years?

Puranjit Sarangi (PS): Demand for digital cutting and finishing solutions is rising rapidly because packaging is becoming more fast-moving, customised, and short-run driven. The key growth drivers are eCommerce expansion, SKU fragmentation, cost pressure on tooling, and the need for faster turnaround times, combined with improved technology and automation capabilities that make digital systems commercially viable at scale.

RK: With shorter production runs, rapid prototyping, and increasing customisation becoming industry norms, how are digital cutting tables helping corrugators improve responsiveness and profitability?

PS: Digital cutting tables help corrugators become more responsive and profitable by speeding up production since no physical dies are needed, enabling quick prototyping and faster approvals, making short-run and custom jobs cost-effective, reducing tooling and setup costs, cutting material waste through better layout optimisation, allowing quick design changes and more job flexibility and eliminating labour dependency.



RK: What recent innovations has your company introduced?

PS: We partnered with JWEI since 2018 to strengthen our corrugated packaging and display production capabilities. By utilising JWEI's advanced digital cutting and automation technology, we have improved productivity, precision, and workflow efficiency. This enables faster production, reduced material waste, and seamless integration.

RK: How do digital cutting technologies help reduce material waste, improve resource utilisation, and support sustainable manufacturing practices?

PS: Digital cutting technologies help reduce material waste through precise cutting and optimised nesting of designs, ensuring maximum use of every sheet. They minimise production errors, reduce rework, and lower material consumption. By improving efficiency and resource utilisation, these technologies support more sustainable and environmentally responsible manufacturing practices.

RK: What are the most common challenges faced by corrugators when adopting digital cutting and finishing technologies?

PS: The most common challenges include the initial investment cost, operator training, and integrating new technology into existing workflows. Corrugators can maximise their return on investment by choosing the right equipment, providing proper staff training, optimising production

processes, and fully utilising the automation and precision features of digital cutting systems to improve efficiency and reduce waste.

RK: How important is workflow integration?

PS: Workflow integration between design, pre-press, digital printing, and finishing is very important for improving efficiency, reducing errors, and speeding up production. Automation helps connect all stages of the process, enabling seamless data flow, faster job setup, consistent quality, and higher productivity.

RK: What opportunities do you see in emerging applications such as eCommerce packaging, retail-ready packaging, POP/POS displays, and customised corrugated solutions?

PS: We see strong opportunities in eCommerce packaging, retail-ready packaging, POP/POS displays, and customised corrugated solutions due to growing demand for attractive, sustainable, and brand-focused packaging.

RK: Looking ahead, what technological developments do you believe will have the greatest impact on digital cutting and finishing over the next five years?

PS: Over the next five years, we believe advancements in AI-driven automation, smart workflow integration, robotics, and high-speed digital cutting technologies will have the greatest impact on the industry. These developments will improve productivity, precision, customisation capabilities, and overall production efficiency while supporting more sustainable manufacturing practices.

RK: If you could advise corrugators on one strategic investment, what would it be and why?

PS: If we could recommend one strategic investment, it would be in advanced digital cutting and automated workflow solutions. These technologies improve efficiency, reduce waste, increase production flexibility, and enable faster response to customer demands, helping corrugators remain competitive in a rapidly evolving market. ■

Digital cutting in one pa

This enables economical short-run productions and rapid prototyping, says Prasanna Venkatesh of Zund India, in an interview with **Rahul Kumar**

Brands are also focusing on reducing material usage and transportation costs, Prasanna Venkatesh says. Digital cutting helps minimise waste through efficient nesting. Plus, digital systems enable automated production processes and reduce dependency on manual operations.

Rahul Kumar (RK): How has the demand for digital cutting and finishing solutions evolved in the corrugation industry over the past few years, and what factors are driving this growth?

Prasanna Venkatesh (PV): Demand for digital cutting and finishing in the corrugated industry has grown significantly over the past few years, evolving from a niche prototyping tool into a mainstream, high-volume production necessity. This shift enables converters to offer intricate custom designs with minimum setup times and no physical tooling requirements.

Key factors driving this growth include the eCommerce boom, rising demand for short-runs, sustainability and lightweighting and automation and operator shortages.

With the eCommerce boom, there has been an increasing demand for efficient, right-sized packaging solutions. We have also noticed a growing need for packaging tailored to individual products. Also, digital finishing eliminates the need for costly and time-consuming steel-rule dies and setup plates. This enables economical short-run productions (like 500-unit customised campaigns) and rapid prototyping. Brands are also focusing on reducing material usage and transportation costs. Digital cutting helps minimise waste through efficient nesting. Plus, dig-



ital systems enable automated production processes and reduce dependency on manual operations.

RK: With shorter production runs, rapid prototyping, and increasing customisation becoming industry norms, how are digital cutting tables helping corrugators improve responsiveness and profitability?

PV: Digital cutting tables enable corrugators to significantly improve responsiveness and profitability. By eliminating the need for tooling and setup plates, they allow economical short-run production and fast turnaround times. The technology has evolved from conventional flatbed cutting to advanced multi-tool digital systems.

Higher productivity: Dual-beam configurations increase throughput.

Smart integration: Seamless alignment with digital printing enables efficient workflows and supports features such as metadata handling and track-and-trace.

Multi-tool capability: Automated tool changing allows processing of different

flute types (E-, B-, triple-wall) without manual intervention.

These capabilities help increase flexibility, reduce lead times, and improve overall equipment efficiency.

RK: What recent innovations has your company introduced to improve productivity, automation, precision, and workflow integration for corrugated packaging and display production?

PV: Zund has introduced advanced solutions to further improve productivity, automation, and precision in corrugated applications. With the launch of the Q-Line, Zund provides a high-performance digital cutting system designed for demanding corrugated production environments. The system combines high cutting speeds with acceleration performance and features such as dual-beam operation and automatic tool changing. In addition, the integrated board handling system, including undercam support, enables efficient and reliable material processing. These innovations contribute to higher throughput, consistent quality, and reduced operator dependency.

ss is the new mantra



RK: Sustainability has become a key focus across the packaging value chain. How do digital cutting technologies help reduce material waste, improve resource utilisation, and support sustainable manufacturing practices?

PV: Sustainability is also a key aspect at Zund. This is evident not only in the way we do things, but also in the modular design of our machines and the software solutions we offer. Software solutions such as the Zund Prime Center and Zund Precut Center efficiently nest cut files and incorporate metadata. This helps save material and enables easy tracking and tracing after the cutting process, which optimises resource utilisation. These features translate into significant savings for customers.

RK: What are the most common challenges faced by corrugators when adopting digital cutting and finishing technologies, and how can they maximise the return on their investment?

PV: Corrugators adopting digital cutting technologies often face challenges such as operator skill levels, availability of

service support, spare parts, and the initial investment. Zund addresses these challenges with a comprehensive support approach. Our Customer Experience Centre in Bengaluru allows customers to experience both hardware and software solutions in a real production environment. In addition, Zund provides trained and certified technicians, local spare parts availability, and high machine uptime. For investment considerations, structured financing options are available for qualified customers. With modular, productive, and Swiss-engineered solutions, combined with strong local support, Zund ensures a reliable and long-term value proposition.

RK: How important is workflow integration between design, pre-press, digital printing, and finishing operations, and what role does automation play in creating a seamless production environment?

PV: Seamless workflow integration is a key factor in optimising operational costs. By combining efficient nesting software with high-performance cutting

systems and automated material handling, Zund enables a connected production environment from prepress to finishing. This reduces manual intervention, improves process reliability, and supports consistent production quality.

RK: What opportunities do you see in emerging applications such as eCommerce packaging, retail-ready packaging, POP/POS displays, and customised corrugated solutions?

PV: Driven by eCommerce, there is a strong shift toward fit-to-product packaging that reduces void space and eliminates unnecessary filler materials. At the same time, direct-to-consumer brands increasingly use packaging as part of the customer experience. This requires frequent design changes and a high level of customisation. Digital cutting systems are ideally suited to these requirements, enabling flexible production of customised packaging, retail-ready solutions, and POP/POS displays.

RK: Looking ahead, what technological developments do you believe will have the greatest impact on digital cutting and finishing over the next five years?

PV: Zund digital cutting solutions are already IOT and Industry 4.0 compatible. We see that the trend is moving towards fully Automated digital cutters which could be seamlessly integrated with the customer's existing workflow right from the pre-press to post press operations. We, at Zund, have already embarked in this direction.

RK: If you could advise corrugators on one strategic investment to improve efficiency, flexibility, and competitiveness in the coming years, what would it be and why?

PV: With the growing importance of short-run production and increasing SKU complexity, corrugators should invest in the right digital cutting technology. A key factor is modularity—systems that can be expanded and adapted to meet future requirements. This ensures long-term flexibility, protects investment, and enables companies to respond efficiently to changing market demands. ■

Stop looking for cheaper products

Corrugators need to focus on the long-term return on investment and the actual running costs rather than just the initial price tag, says Kunal Gandhi of CGSASP, in an interview with **Rahul Kumar**

Buying cheap components might save you money on day one, but if they wear out quickly, cause paper waste, or force you to stop the machine for frequent repairs, they end up costing you much more in the long run, Kunal Gandhi says.

Rahul Kumar (RK): How do you assess the current state of the Indian corrugation industry, and what key trends are influencing customer investments in equipment, consumables, and technology?

Kunal Gandhi (KG): The industry is moving slowly, and the primary hindrance to the corrugation industry's growth is the ongoing fluctuation and discrepancy in GST rates, with an inverted duty structure. A trend influencing equipment investments is the adoption of European technology to achieve speeds, tolerances, and quality.

RK: What solutions has your company introduced recently to help corrugators improve productivity, reduce waste, enhance quality, and lower operating costs?

KG: We provide high-speed Friese corrugator rolls from Germany to the Indian market. In a slow economic climate where margins are tight, these rolls offer a direct path to optimising a plant's efficiency. The rolls reduce downtime, paper waste, and increase fluting quality. While conventional rolls wear out quickly, forcing frequent line stoppages for maintenance or replacement, Friese rolls are engineered with highly durable tungsten carbide coatings that maintain profile stability

over a long lifespan, cutting down on machine downtime. Friese's advanced roll geometry also ensures uniform heat transfer and pressure across the paper web. This prevents warping and start-up errors, reducing paper waste. In addition, Friese's precision-engineered rolls maintain exact flute heights and profiles at maximum production speeds, delivering superior fluting quality and crush resistance to the finished board.

RK: What are the major challenges facing technology providers in the Indian corrugation market today?

KG: Right now, the challenges have come down to global money issues and a total lack of government help. This includes the Indian rupee depreciation and the 13% gap in the GST system. In this context, government support is required.

RK: To what extent are automation, digitalisation, Industry 4.0, AI, and data-driven manufacturing influencing customer requirements?

KG: We believe that automation, digitalisation, AI, and data-driven manufacturing are the major defining trends of the industry, and whoever adopts this technology early is going to benefit greatly.

RK: How important is local manufacturing, technical support, and after-sales service in today's market, and what strategies are you adopting to strengthen customer relationships in India?

KG: Local technical support and after-sales service are vital in today's market, especially as transportation costs continue to rise. At our company, we train a dedicated team of local technicians who can be deployed to help and support adopters of the technology right on their factory floors. This on-the-ground support enhances long-term customer trust.

RK: What opportunities do you see for growth in the Indian corrugation sector over the next five years?

KG: Growth in the corrugation industry is set to increase as eCommerce and qCommerce platforms expand across India. Since online shopping and fast home deliveries require boxes that can

withstand more handling, transport, and quick turnarounds, packaging standards naturally have to go up. Our role as a company is to help corrugators meet this rising demand.

RK: If you could recommend one strategic investment that every corrugator should prioritise in the next three years?

KG: Corrugators should stop looking for cheaper products and start prioritising the cost-per-linear-metre. Whether you are investing in machinery, rolls, or daily consumables, corrugators need to focus on the long-term return on investment and the actual running costs rather than just the initial price tag. Buying cheap components might save you money on day one, but if they wear out quickly, cause paper waste, or force you to stop the machine for frequent repairs, they end up costing you much more in the long run. ■



Kunal Gandhi
of CGSASP

Short-runs are the next big thing

For short-run production of packaging solutions, digital cutting tables can facilitate the requirement, Brijesh Puri, founder, Packnology tells Rahul Kumar

Brijesh Puri says even three- to five-ply corrugated sheets are digitally printed and finished on digital cutters. This is the ongoing trend of corrugated short-run jobs, likely to be picked up soon in India.

Rahul Kumar (RK): How has the demand for digital cutting and finishing solutions evolved in the corrugation industry in India and what factors are driving it?

Brijesh Puri (BP): The demand is gaining momentum day by day. One of the key factors driving this demand for digital cutting and finishing solutions in India is that commercial and packaging printers these days are bound to show the actual samples of products to customers before going for final printing. It has become a norm. Customers mandatorily demand for the product samples and prototypes.

RK: With shorter production runs, rapid prototyping, and increasing customisation becoming industry norms, how are digital cutting tables helping corrugators improve responsiveness and profitability?

BP: If we talk about short-run production of packaging solutions, say mono cartons, our Iecho cutting tables are flawlessly facilitating this requirement, particularly when it comes to producing 100 to 400 pieces. No offset intervention. Even three- to five-ply corrugated sheets are digitally printed and finished on digital cutters. This is the ongoing trend of corrugated short-run jobs, likely to be picked up soon in India.

RK: What recent innovations have you introduced recently to improve productivity, automation, precision, and workflow integration for corrugated



Brijesh Puri, founder, Packnology

packaging and display production?

BP: We keep upgrading our machines and solutions which can operate as part of an integrated eco-system of stations. It would operate through an ERP with faster productivity and precision.

RK: Sustainability has become a key focus across the packaging value chain. How do digital cutting technologies help reduce material waste, improve resource utilisation, and support sustainable manufacturing practices?

BP: Digital printing drives sustainability by eliminating physical plates as well as toxic chemical baths usually used in traditional offset methods. Definitely, digital printing reduces waste of materials and corrugated materials are doubtlessly biodegradable. In the end, it all contributes to the move towards saving the environment.

RK: What are the most common challenges faced by corrugators when adopting digital cutting and finishing technologies, and how can they maximise the return on their investment?

BP: To my understanding, you look across India, everybody is confidently and comfortably investing in digital cutting and finishing technologies. Within two to three years, they add another unit or two. It shows that they get ROI right

away. In fact, ROIs for digital cutters are faster than any other conventional cutting systems.

RK: How important is workflow integration between design, pre-press, digital printing, and finishing operations, and what role does automation play in creating a seamless production environment?

BP: Look at the industry globally, we see people moving fast towards Industry 4.0. They wish to merge physical production with smart digital systems or technologies through an interconnected ecosystem of stations for pre-press, digital printing, and digital finishing. All are integrated, from your job card creation to pre-press and last station for folder-gluing and stapling.

RK: What opportunities do you see in emerging applications such as eCommerce packaging, retail-ready packaging, POP/POS displays, and customised corrugated solutions?

BP: When you talk about eCommerce, for example, a household brand, which requires only 50 boxes, this will not be entertained by big print houses. That's again a big market where dwelled customers looking for bespoke or customised end-products. It's seen in the label and mono carton segments. The same holds true even for the retail-ready packaging, POP/POS displays, and customised corrugated solutions.

RK: Looking ahead, what technological developments do you believe will have the greatest impact on digital cutting and finishing over the next five years?

BP: Digital cutting and finishing systems will feature more advanced auto feeder, scanner, and faster speed. Nowadays, many people still operate flatbed cutters without a conveyor to cut 50 sheets a day. It can be 1,000 sheets a day with an auto feeder. Expect more high-speed machines in the next five years.

RK: If you could advise corrugators on one strategic investment to improve efficiency, flexibility, and competitiveness in the coming years, what would it be and why?

BP: Accept the fact that the short-run packaging market is expanding—take it seriously; it's the next big thing! ■

The old methods are choking corrugation mindset in India

In Anupam Agarwal of Amity Paper & Board says the fundamental question facing the industry is whether it can transition from a volume-driven business to a value-driven ecosystem focused on performance, innovation, sustainability, and global competitiveness. The answer to this question will determine the future trajectory of the Indian corrugation industry



◀ Dr Anupam Agrawal, PhD in pulp and paper technology, is a senior paper technology consultant with over 35 years of experience in the paper, packaging, and corrugation industries. He is currently engaged in technical consulting, industry counselling, and paper trading, with a special focus on packaging-grade papers.

Packaging is no longer merely a support function in modern commerce; it has evolved and enabled supply chain efficiency, brand differentiation, sustainability, and customer experience. At the heart of this transformation lies the corrugated packaging industry, one of the most dynamic segments of India's manufacturing ecosystem.

India is among the fastest-growing economies in the world. The rapid expansion of manufacturing, eCommerce, pharmaceuticals, FMCG, electronics, food processing, retail, and exports is driving unprecedented demand for efficient and sustainable packaging solutions.

Today, the industry stands at a critical point. The challenge is no longer merely increasing production volumes; it is about creating value. The fundamental question facing the industry is whether it can successfully transition from a volume-driven business to a value-driven ecosystem focused on performance, innovation, sustainability, and global competitiveness. The answer to this question will determine the future trajectory of the Indian corrugation industry.

The current landscape

India currently has an estimated 10,000–12,000 corrugation units, with a majority operating in the MSME sector. Over the past decade, the industry has experienced steady growth, driven by organised retail, eCommerce expansion, rising exports, and increasing consumer demand.

The annual consumption of packaging-grade paper and board in India is estimated at approximately 18 to 20-million tonnes, including kraft paper, test liner, fluting media, and duplex board.

The country's corrugated box manufacturing capacity is estimated at approximately 15–18 million tonnes annually and continues to expand with new investments in automation and capacity enhancement.

One of India's greatest advantages is its relatively low per capita packaging consumption compared with developed economies such as the United States, Germany, Japan, and even China. This indicates significant untapped growth potential for the coming decade.

India's ambition to become a multi-trillion-dollar manufacturing economy

will inevitably create massive opportunities for the packaging sector.

Government initiatives such as Make in India, PM Gati Shakti, National Logistics Policy, Production Linked Incentive (PLI) Schemes, Export Promotion Programs, and Digital India are expected to generate substantial demand for high-performance corrugated packaging solutions.

As India's manufacturing and logistics infrastructure continues to improve, the packaging industry must align itself with national growth objectives and global supply chain expectations.

The changing market

A decade ago, corrugated packaging was viewed primarily as a transportation and protective medium.

Today, customers demand far more than a strong box. They seek brand visibility, superior shelf appeal, better graphics and printing, eCommerce-friendly packaging, QR-enabled traceability, product authentication, sustainable packaging solutions and enhanced consumer experience. As a result, packaging has evolved from a cost centre into a powerful marketing and brand-building tool.

One of the most significant transformations in recent years has been the rapid growth of printed corrugated packaging. Industries such as FMCG, pharmaceuticals, food processing, consumer electronics, and e-commerce are increasingly demanding visually appealing packaging that enhances brand recognition.

Technologies gaining prominence include HD flexographic printing, multi-colour flexo printing, digital inkjet printing, pre-printed liners, variable data printing, QR and smart packaging solutions. In the coming years, corrugated boxes will increasingly function as marketing assets rather than merely transportation containers.

The global corrugated packaging industry is estimated to exceed USD 350-billion and continues to grow steadily. China remains the world's largest producer of corrugated packaging and packaging machinery. Germany, Japan, and the United States continue to lead in innovation, automation, and advanced packaging technologies. India is among the fastest-growing packaging markets globally. However, the country still has considerable ground to cover in high-performance paper manufacturing, advanced

machinery production, automation technologies, digital printing solutions, and global export competitiveness. This challenge simultaneously represents India's greatest opportunity.

Paper mills: The backbone of the value chain

A strong corrugation industry can only exist on the foundation of a strong paper industry. India has more than 850 paper mills, of which approximately 200–250 are engaged directly or indirectly in manufacturing packaging-grade kraft paper, test liner, fluting media, and duplex board.

Industry estimates indicate, the country has kraft paper capacity of 10 to 12-million tonnes annually. Duplex and packaging board capacity is six to eight-million tonnes annually. The total packaging paper and board capacity is 18 to 20-million tonnes annually. These products constitute the foundation of India's corrugated packaging ecosystem.

While the industry has achieved significant growth, paper manufacturers continue to face numerous challenges. These include dependence on recycled fibre, volatility in waste paper prices, energy cost escalation, water and environmental compliance requirements, logistics and freight costs, quality consistency challenges and demand for lower GSM and higher performance papers. To remain competitive, paper mills must increasingly focus on operational efficiency, quality control, sustainability, and product innovation.

The majority of packaging-grade paper produced in India is manufactured from recycled fibre. Although environmentally beneficial and economically attractive, recycled fibre presents inherent technical challenges, such as reduced fibre length after multiple recycling cycles, lower foldability, reduced tear resistance, variations in moisture behaviour, seasonal performance fluctuations and quality inconsistency. Consequently, the traditional practice of evaluating paper solely on gsm and BF has become inadequate.

Paper performance

For decades, BF (burst factor) has been regarded as the primary indicator of paper quality. Modern packaging science, however, increasingly emphasises performance-based metrics.

Customers ultimately require better box compression strength, improved

stackability, enhanced transit performance, material optimisation, and higher strength-to-weight ratio.

This has led to growing emphasis on RCT (ring crush test), ECT (edge crush test) and box compression testing.

A significant shift is occurring in the industry's understanding of paper performance.

Many papers exhibiting satisfactory BF and RCT values still experience cracking during folding and converting operations. Key reasons include low fold endurance, low tear factor, reduced fibre flexibility, excessive calendaring, and poor moisture balance.

As packaging designs become more sophisticated, flexibility parameters will become equally important as strength parameters.

Cracking remains one of the most persistent and costly issues faced by corrugators, particularly during periods of low humidity and high temperature. Major causes include low moisture content, poor fold endurance, low tear factor, improper creasing, excessive machine temperatures, and over-dried paper. Cracking is rarely caused by a single factor. It is typically the result of interactions between paper quality, adhesive formulation, machine settings, converting conditions, and ambient environment.

Practical solutions include humidification systems, online moisture control, improved adhesive formulation, optimised creasing geometry, better reel conditioning, balanced paper design and enhanced process control. A collaborative approach involving paper mills, converters, and machine manufacturers is essential to minimise cracking-related losses.

One of the most important global trends in packaging is down-gauging.

The objective is simple — less fibre more performance. The goal is to achieve equivalent or superior packaging performance using lower GSM papers.

Benefits include reduced raw material consumption, lower transportation costs, improved sustainability, reduced carbon footprint and enhanced profitability. The companies that successfully master optimised strength-to-weight ratios will gain significant competitive advantage.

The deal with paper dealers

The role of paper dealers and distributors in the corrugation ecosystem has evolved significantly →

over the past decade. Traditionally viewed as intermediaries between paper mills and corrugators, today's leading paper dealers are increasingly becoming technical and supply-chain partners.

Modern corrugators expect far more than timely delivery of paper reels. They seek guidance on paper selection, gsm optimisation, strength-to-weight ratios, machine compatibility, moisture management, and cost optimisation.

As a result, progressive paper dealers are now contributing through technical consultation on paper performance, assistance in paper grade selection, inventory planning and supply-chain management, market intelligence and price trend analysis, support in reducing cracking and converting issues, and coordination between mills and converters for product development.

In many cases, paper dealers serve as the first point of technical feedback from corrugators to paper mills, helping bridge the gap between manufacturing realities and customer expectations.

The future of the industry will increasingly depend on collaborative partnerships where paper dealers function not merely as suppliers, but as knowledge partners, technology facilitators, and value-chain integrators. Their ability to connect mills, converters, machine manufacturers, and end users will play a crucial role in improving efficiency, innovation, and competitiveness across the corrugation sector.

The digital corrugation factory of the future

The next wave of industry growth will be driven not only by machine speed but by data intelligence.

Future corrugation plants will increasingly adopt Industry 4.0 technologies, IoT-enabled equipment, predictive maintenance, AI-based quality control, automated production planning, digital twins, real-time energy monitoring, and integrated ERP and

MES systems. These technologies will improve productivity, reduce waste, and enhance customer responsiveness.

Although India has made remarkable progress in automation, a large percentage of advanced corrugation machinery continues to be imported. These include high-speed corrugators, auto splicers, flexo folder gluers, rotary die-cutters, automatic bundling systems, robotic material handling systems, and digital printing equipment. Most of these technologies are sourced from China, Taiwan, Germany, Italy, and Japan.

Make in India: A Strategic Imperative

If India aspires to become a global packaging powerhouse, it must achieve greater self-reliance in machinery manufacturing.

The industry should focus on indigenous machinery development, R&D investments, technology partnerships, Industry-academia collaboration, domestic automation solutions, and skill development programmes. India possesses the engineering talent required to become a global supplier of corrugation machinery and technology.

As multinational corporations diversify sourcing beyond China, India has a unique opportunity to emerge as a preferred packaging manufacturing hub.

To capitalise on this opportunity, the industry must focus on consistent paper quality, global certifications, process standardisation, automation, sustainability compliance, competitive logistics and innovation-driven manufacturing. India can become not only a major domestic supplier but also a significant exporter of value-added packaging solutions.

The future industry model cannot remain confined to traditional buyer-seller relationships.

Success will require joint product development, performance-based paper design, long-term supply agreements, data-driven quality management, waste

reduction initiatives, integrated supply chains and shared innovation platforms. Collaboration across the value chain will be critical for sustainable growth.

Sustainability and roadmap for 2030

As governments and consumers seek alternatives to plastic packaging, corrugated packaging is emerging as one of the most sustainable solutions available.

Its advantages include recyclability, biodegradability, renewable raw materials, circular economy compatibility, and lower environmental impact. Sustainability is becoming a business necessity.

Over the next five years, the Indian corrugation industry should focus on transitioning from BF-based thinking to ECT-based design, developing high-performance kraft papers, improving fold endurance and tear factor, advancing lightweight packaging, expanding AI-driven quality systems, accelerating digital printing adoption, enhancing export competitiveness, promoting indigenous machinery manufacturing, reducing carbon footprint, strengthening circular economy practices, and encouraging innovation-led growth.

The Indian corrugation industry is undergoing a structural transformation. The future will not be defined by the number of boxes produced but by the intelligence, sustainability, efficiency, and value delivered through those boxes. The winners of tomorrow will be organisations that invest today in technology, innovation, quality, people, automation, and sustainability.

If paper mills, traders, machine manufacturers, corrugators, policymakers, and technology providers work together with a shared vision, India can emerge by 2030 not only as one of the world's largest packaging markets but also as a global leader in packaging technology, machinery manufacturing, sustainable solutions, and innovation. ■

PrintWeek

Reader & Industry Survey



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Can the corrugation industry

The brown box, the workhorse of the global supply chain, is at a breaking point in India, and battle lines are drawn between old-guard manufacturers, nimble innovators, and a flood of Chinese kit.

WORDS: Prabhat Prakash

At a recent industry panel titled *Technology Upgradation and Reducing Production Cost at CorruPack*, the mood was one of both enormous opportunity—driven by the “China Plus One” manufacturing boom and a global push for paper-based sustainability—and existential crisis.

The core tension? Despite world-class technology being built at home, over 35 shipping containers of corrugated machinery arrive from China every single day, according to industry veteran Hitesh Nagpal of Natraj Industries. That’s tens of millions of dollars in foreign currency leaving the country, while Indian factories run at a fraction of their capacity. “We have better technology,” Nagpal insisted, “but people are not trusting Indian manufacturers.”

To survive this market pressure, Indian machine builders are moving beyond simple hardware to become solution architects. Raunak Bhurjee of Sun-Up India detailed a new strategy of phased automation: developing flexible “mini-plants” that take up less than 100-feet of space, cost less, and can operate with a skeleton crew of seven or eight workers. This disruption allows smaller corrugators to scale their production from 100-tonnes to 300-tonnes a month without the massive layouts of the past.

This innovation is essential because the market is demanding a paradigm shift. Satyajit Dwivedi of Hindustan



Varthan Mathias says that we need to start with, “What do you need to transport? not, “What is your box size?”

Unilever (HUL) confirmed that short-run, multi-pack, and promotional orders are now inevitable. The global industry, he noted, has already accepted that small, custom orders are the norm, not the exception.

The true cost of the brown box

But the biggest hurdle isn’t capacity—it’s cost.

Corrugators like Varthan Mathias of the Velvin Group argued that the current model, driven by cutthroat competition, does not account for the true complexity of modern packaging. He called for a radically transparent, industry-wide cost structure that factors in elements currently absorbed by the manufacturer: the cost of warehouse storage, damage during transit, surplus production, and even the cost of customer-mandated quality audits.

He said that it is important to know

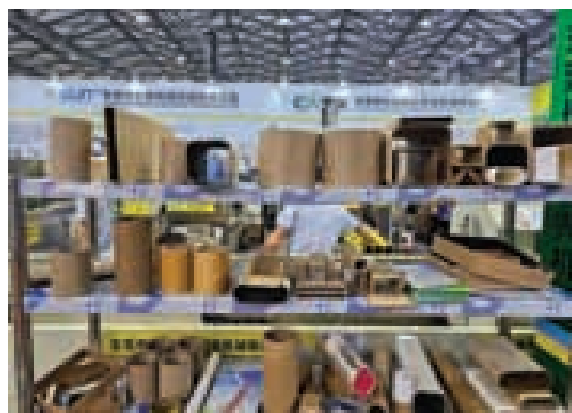
what is to be transported and not the box size. Mathias said, arguing that converters must transform into “solution providers” by building in-house R&D teams and offering supplementary products like edge protectors and custom fitments.

Deenu Shetty of Sunrise Packaging Industries said, “Corrugated boxes will remain the dominant packaging format.” He added, “Right-sizing initiatives can reduce shipment volumes.” Flexible packaging is emerging as the standout growth category, but corrugation is projected to outpace all other formats due to its efficiency and sustainability credentials.”

Innovation is also being applied to sustainability: Natraj is using high-pressure piping to cut steam consumption in board plants by 50% (from 4000kg to 2000kg/hour), directly lowering board cost for end-users. Bhurjee shared an innovative case study about how the



try beat Chinese imports?



group created an alternative solution with its S Fold innovation.

The final word came from the academic and regulatory side. Dr Subodh Juikar of the Indian Institute of Packaging (IIP) affirmed the industry is on the cusp of a “golden days” moment. The institute is focusing its research on the key failure points—moisture content in coastal climates that causes board cracking, and poor adhesion due to rushed production.

To close the loop on the circular economy, an incentive structure was proposed: give eCommerce giants—with their robust delivery and reverse logistics networks—carbon footprint credits for actively collecting post-consumer corrugated scrap. The consensus is clear among the panellists: the opportunity is massive, but it will require a conscious shift away from a low-cost, low-trust model to one built on domes-

tic innovation, transparent costing, and a shared commitment to building a durable, smarter brown box.

The panel concluded that the industry’s future success hinges on a commitment to the following key operational and strategic shifts. One thing that emerged was adopting appropriate technology focused on minimal waste and more automation to reduce variable cost with minimal labour by shifting from offline to inline converting. Also, product excellence was stressed. And how manufacturing better strength board with lighter gsm grades and offering value-added boxes with multicolour printing, die-cuts, and wrap-arounds. And finally, simple, practical ideas to improve supply chain efficiency and how to work on a JIT (Just-in-Time) supply chain with better scheduling of raw material inventory and minimal finished goods inventory. ■

TEN INDUSTRY MANTRAS FOR THE CORRUGATED PACKAGING SECTOR IN INDIA

- 1 Automation is a necessity, not a luxury. To combat rising labour and electricity costs, automation is essential for all box sizes.
- 2 Embrace the era of short runs and bespoke production. Optimise factory setup and processes to prepare for inevitable shorter run lengths and higher SKU variety.
- 3 Implement transparent costing that accounts for every value-added. Develop a comprehensive cost structure that includes warehousing, audits, damage, and surplus production to ensure fair pricing and recovery.
- 4 Evolve from a box converter to a holistic packaging solution provider. Shift focus from simply selling a box to offering complete, technically-driven design and R&D solutions.
- 5 Build faith and buy from capable Indian machine manufacturers. Trust and support local manufacturers who offer competitive technology, better maintenance, and long-lasting machines.
- 6 Enable SME growth through phased, step-by-step automation. Design scalable, minimal-investment automation solutions that allow smaller manufacturers to grow and recover faster.
- 7 Reduce carbon footprint by championing energy efficiency. Innovate to decrease resource consumption, such as reducing steam usage in manufacturing, to lower board cost and enhance sustainability.
- 8 Prioritise the reverse collection of post-consumer scrap. Establish mechanisms, potentially with incentives for e-commerce, to capture and recycle corrugated scrap from end consumers.
- 9 Harmonise paper specifications to simplify complexity and drive savings. Collaborate to standardise paper grades and reduce the number of existing specifications.
- 10 Design for durability: account for moisture, temperature, and logistics. Focus R&D on ensuring structural integrity by accounting for climatic culprits like moisture content, especially in coastal areas.

ME & MY...

Bobst FFG 8.20 Discovery

R Kumar, managing director of Tamil Nadu-based Sri Ramana Cartons shares the reasons why he decided to invest in the Bobst FFG 8.20, with Rahul Kumar

SUPPLIER'S RESPONSE

Suraj Sharma, national sales head, corrugated board, Bobst India, says, "At Bobst, our objective is to help corrugated converters move beyond conventional box manufacturing and embrace world-class productivity, automation, and print quality. We are delighted that Sri Ramana Cartons has chosen the Bobst FFG 8.20 Discovery as part of its growth journey. The investment reflects the company's commitment to delivering premium-quality corrugated packaging with faster turnaround, greater efficiency, and consistent performance. We sincerely thank R Kumar and his team for their trust in Bobst and look forward to supporting them in achieving new benchmarks in operational excellence, customer satisfaction, and sustainable business growth."

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Please describe your company.

From humble beginnings with a single semi-automatic corrugation plant, Sri Ramana Cartons has grown into a modern packaging manufacturer with advanced automated manufacturing capabilities. Today, we operate a state-of-the-art automated corrugation line alongside three semi-automatic plants, producing approximately 1,800 tonnes per month, with a target of reaching 2,500 tonnes during the current financial year. Our growth has been driven by continuous investments in technology and capacity, with a clear focus on delivering quality and responding to our customers' evolving needs.

When did you start using the Bobst FFG 8.20 Discovery?

We commissioned the Bobst FFG 8.20 Discovery in April 2026 as part of our strategic expansion and technology upgradation programme. The machine has quickly become an integral part of our production setup, enabling us to meet customer expectations for higher-quality printed corrugated boxes with faster turnaround times.

What are the properties of the machine that you like?

What impressed us the most was the combination of high productivity and exceptional print quality. The machine offers excellent registration accuracy, reliable colour consistency, quick job changeovers, and stable performance even at higher production speeds. Its integrated printing, slotting, die-cutting, and folding-gluing capabilities improve operational efficiency while reducing manual intervention.

Why did you decide to use the Bobst FFG 8.20?

Bobst combines proven global performance with a strong local presence in India. While several manufacturers offer comparable technology, Bobst's extensive service network, readily available spare parts, and responsive after-sales support, reduced setup times, minimised wastage, and enhanced print consistency across long production runs gave us greater confidence in our investment. For a machine of this scale, dependable long-term support is just as important as the machine's capabilities.

What were the features that tilted the favour towards this?

Several factors influenced our decision. These include excellent four-colour flexographic printing quality, high production speed with consistent output, fast job changeovers, robust automation and user-friendly controls, proven Bobst engineering and global reputation, strong after-sales service and technical support.

How much have these helped you in your production?

The machine has significantly reduced set up times and improved overall line efficiency. We can now switch between jobs much faster.



R Kumar, managing director and Arvind Kumar, executive director of Sri Ramana Cartons

For what applications is the Bobst FFG 8.20 used?

We use the machine for a wide range of corrugated packaging applications, including FMCG packaging, food and beverage cartons, consumer goods, industrial packaging, automotive components, pharmaceutical shippers, eCommerce packaging, and export packaging.

If there's a critical packaging job that comes your way, would you rely on this machine?

Absolutely. Whether it involves demanding print quality, tight delivery schedules, or large production volumes, we are confident in assigning the job to the Bobst FFG 8.20 Discovery.

What's the quality like?

The improvement in print registration, colour consistency, and finishing quality is clearly visible. Fine text, logos, barcodes, and graphics reproduce much more accurately than before. The boxes have a cleaner appearance, sharper print definition, and improved dimensional accuracy.

How easy is it to use and handle?

The machine has an intuitive operator interface, making it relatively easy to operate after proper training. Its user-friendly controls and logical workflow make day-to-day operation straightforward, while regular training helps operators use the machine efficiently and confidently.

Would you say that it offers value for money?

Certainly. While this is a premium investment, the long-term returns fully justify the decision. Higher productivity, reduced wastage, lower rejections, improved print quality, faster job changeovers, and enhanced customer satisfaction all contribute to a stronger return on investment. More importantly, the machine enables us to take on higher-value jobs that demand superior printing capabilities. ■

MADE IN INDIA

Momentum 110 FL from

The Momentum 110 FL represents one of the company's flagship folder-gluer, which has been developed to address the increasing demand for high-speed production of straight-line cartons, crash-lock bottom cartons, and four- and six-corner boxes on a single platform, says Veena Ajay Nayak, director, Boxtech Bangalore

Boxtech Bangalore was established with a clear vision of designing and manufacturing world-class post-press equipment for the folding carton industry. Over the years, the company has focused on understanding the practical challenges faced by Indian carton converters and developing solutions that combine productivity, reliability and affordability.

Today, Boxtech Bangalore machines are used by commercial printers, packaging companies and carton manufacturers across India and overseas.

According to Veena Ajay Nayak, director, Boxtech Bangalore, the Momentum 110 FL is a fully engineered automatic folder-gluer designed around modular construction. Every section of the machine from feeding to pre-folding, lock-bottom formation, gluing, folding and delivery works in complete synchronisation.

The machine incorporates aligner section, dedicated pre-folding section, dedicated crash-lock bottom section, four- and six-corner attachment, Boxtech InterActive touch screen controls, AC servo-controlled drives, motorised pressure delivery, four-nozzle programmable cold-glue system, pneumatic batch counter and kicker.

This modular architecture allows converters

to process a wide variety of carton styles without compromising productivity.

The machine performs multiple operations inline, including feeding, alignment, pre-folding, side gluing, crash-lock bottom formation, four- and six-corner folding, final folding, pressure delivery, and counting and batching.

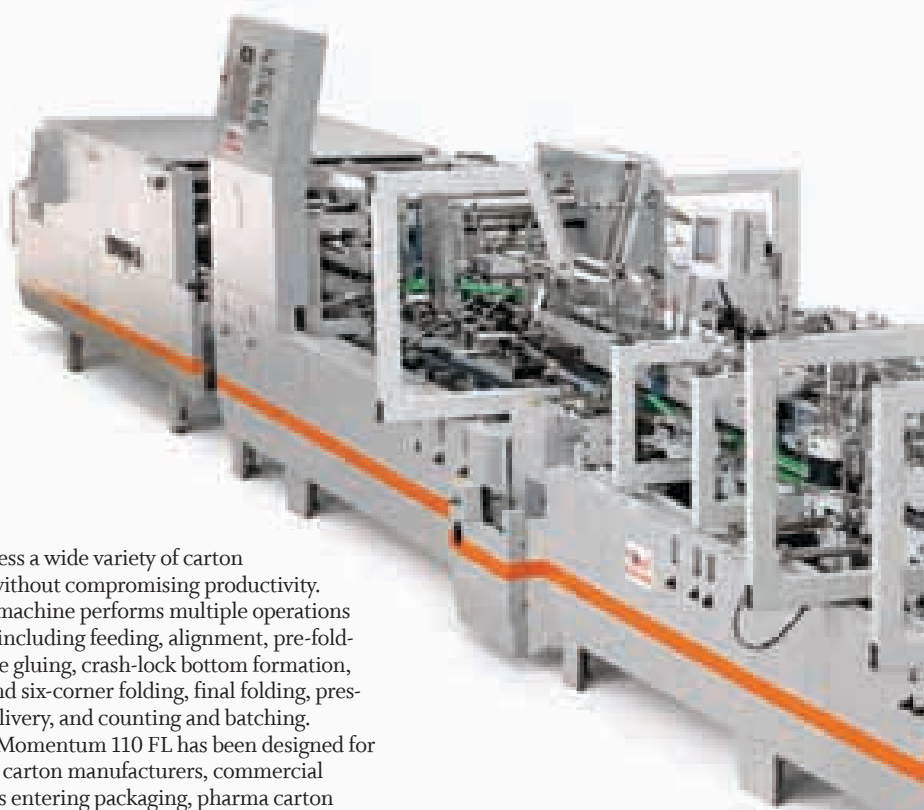
The Momentum 110 FL has been designed for folding carton manufacturers, commercial printers entering packaging, pharma carton manufacturers, FMCG packaging companies, food packaging converters, cosmetic packaging producers, and export carton manufacturers.

"It is equally suitable for medium-sized converters planning automation as well as large packaging companies seeking higher productivity," Nayak says.

The market

Nayak says converters today expect machines that provide international performance while delivering faster return on investment. The Momentum 110 FL has been developed precisely with this philosophy. Instead of focusing only on capital investment, the company helps customers reduce labour cost, setup time, rejections, glue consumption, and downtime.

"Higher machine utilisation translates directly into lower conversion cost per carton," Nayak says, "Because of its flexibility, customers can process multiple carton designs on one machine rather than investing in separate equipment."



According to Nayak, today's converters evaluate much more than speed. They typically consider machine stability, registration accuracy, ease of setup, fast changeovers, glue application precision, crash-lock performance, service support, availability of spare parts, energy efficiency, and long-term reliability. "After-sales service has become one of the most important purchasing parameters," Nayak adds.

The Momentum 110 FL processes a wide range of folding cartons, solid board up to 600-gsm and three-ply cartons, E, F, G and N-flutes, including pharmaceutical cartons, food cartons, FMCG packaging, cosmetic cartons, personal care products, consumer electronics packaging, liquor cartons, and retail packaging.

Nayak says, "Its ability to produce crash-lock bottom cartons as well as four- and six-corner boxes makes it highly versatile for premium packaging applications."

"The machine has been engineered specifically for Indian operating conditions while

n Boxtech Bangalore

maintaining international quality standards,” Nayak adds.

The USP

The Momentum 110 FL combines flexibility with automation. Some important characteristics include position indicators allowing repeat job settings, motorised pressure delivery, pneumatic batch counting, small-box folding attachment, servo-controlled application. A combination of friction and suction feeder and sealed bearings for longer service life. According to Nayak, these features improve productivity while reducing operator dependency.



▲ The Momentum 110 FL processes a wide range of folding cartons, solid board up to 600-gsm and three-ply cartons, E, F, G and N-flutes

Nayak says converters generally compare the Momentum 110 FL with imported folder-glues from Europe, China and Taiwan as well as other Indian manufacturers. The choice ultimately depends on production volume, carton complexity, service expectations and investment budget. “The Momentum 110 FL offers an attractive balance between performance, flexibility and operating economics,” Nayak says.

The productivity

With operating speeds of up to 350-m/min, the Momentum 110 FL enables converters to significantly increase throughput while maintaining consistent quality. More importantly, productivity is not only about speed. Quick job changeovers, accurate gluing and reduced wastage together improve overall equipment effectiveness.

The Momentum 110 FL incorporates several enhancements including better automation, improved HMI, faster setup, improved pressure delivery, better glue control, enhanced operator-friendliness, and higher reliability.

“The objective has been to reduce downtime while improving consistency,” Nayak says.

According to Nayak, ease of operation has been one of the design priorities. The intuitive HMI allows operators to monitor and control machine functions easily. Position indicators enable repeat jobs to be set up much faster, reducing dependence on operator experience.

Every installation includes machine commissioning, operator training, maintenance training, process optimisation and safety guidance. Customers also receive continued technical support whenever required.

Nayak says after-sales service is one of Boxtech's biggest strengths. The company provides installation support, preventive maintenance, spare parts, remote troubleshooting, operator assistance, and on-site technical visits. “Our objective is maximum machine uptime,” Nayak adds.

She shares a case study where one of customers supplying cartons to FMCG and pharmaceutical companies upgraded from a semi-automatic folder-gluer to the Momentum 110 FL. The results included higher production capacity, reduced labour dependency, faster delivery schedules, better glue consistency, lower rejection rates and improved profitability.

“The ability to process multiple carton styles on one machine also helped the customer expand into premium packaging,” she says.

Nayak says the company's current objective is to strengthen its leadership position in the Indian folder-gluer market while expanding exports. “We will continue investing in automation, product development and customer support,” she says, “Our focus remains on helping converters improve productivity, reduce operating costs and manufacture world-class folding cartons.” ■