

Making your mark

Manufacturing & Logistics IT spoke with a number of leading spokespeople from the vendor and analyst communities about recent and possible future developments within the world of printing & labelling technology.

This special technology report will investigate a number of key current and ongoing areas of innovation and development with the printing & labelling

marketplace; one of the most critical and fast-changing technology environments within the manufacturing, logistics and retail sectors. Laurent Lassus, general manager marketing & product management at SATO Europe GmbH, opens the debate by making



Laurent Lassus,
general manager
marketing & product
management,
SATO

the point that current key talking points continue to be enhanced connectivity, traceability, integration and ease of use for end users. However, he added that developments are increasingly influenced by global trends such as sustainability and

digitalisation. "This has brought about the need for flexible, multi-functional devices that perform all the above 'and more'," he said. "Moving forward, it's important that we not only address functionality requirements for our customers but that we add value to make a significant contribution to their organisational needs."

In terms of drivers for change, Lassus considers that all of us, as consumers, now use connected devices and multiple apps on a daily basis. "We switch seamlessly between purchasing goods, tracking our health and controlling our home appliances in minutes, without thinking about it," he noted. "And it makes complete sense that we would expect this high-level device functionality and ease of use to extend to the workplace."

Lassus added that, at the same time, today's consumers have a heightened awareness of their impact on the environment. "The notable societal shift towards waste reduction, whether it is

related to wasted time or resources, has been a key driver in the development of multi-functional, intelligent devices and sustainable consumables," he said. "It's of increasing importance to our customers that we're able to integrate environmentally responsible features into our complete label printing solutions."

Laser marking

Kamran Farooq, sales manager – manufacturing, Datalogic, observes that while many companies in the logistics industry continue to deploy traditional printing and label systems to great effect, we are seeing an increased uptake of laser marking systems for marking directly on individual parts and components. "In many instances, customers have not marked components previously, or if they have, they've marked parts by hand which has led to inconsistent results," he said. "For a lot of small component parts, printed labels are just not small enough and even for larger parts, thermal transfer or inkjet printing methods are

not preferred as labels can easily become damaged or dirty rendering the content illegible. "Instead, laser marking systems use a focused laser beam across the surface of a part and can be used to produce text, barcodes, logos, barcodes, serial numbers and more at high speeds. Not only that but laser marking methods can be used to add a permanent mark to a range of materials including metals and metal alloys, glass, plastics, composites, even ceramics, fabrics and organic materials such as wood and rubber."

Farooq added that the marking speed has the potential to reach in excess of 1000 characters per second depending on the material. In addition, he explained that images, barcodes and logos can be imported and are quickly and easily replicated. "Due to the permanent nature of laser marking, the technology is ideal for applications where companies need to ensure traceability, provide protection against counterfeiting or compliance with regulatory standards," he pointed out.

Regarding drivers for change, Farooq believes that in the majority of instances industry regulations or standards are driving an increased demand for part or component traceability that can span the lifetime of a product. "For example, in healthcare, the Falsified Medicines Directive (FMD) which comes into force in February 2019 is a big driver," he said. "The directive requires a unique 2D data matrix barcode to be placed on medicines along with tamper evident features on the pack to ensure product integrity. Not only that, but the barcodes need to be scanned at fixed points along the supply chain for verification and authentication purposes. Manufacturers that are not equipped and ready by the deadline will no longer be able to distribute their products and risk losing market share. In addition to marking the outer packaging, some manufacturers might wish to assess the viability of using technologies including laser marking to add serial numbers and 2D data matrix codes to internal packaging such as glass or plastic bottles or vials."

Farooq considers that traceability is also a hot topic in a number of other industries; including automotive where it is becoming critically important to be able to accurately track and monitor every component part of a vehicle. Equally, he makes the point that laser marking can be put to good use in food and beverage manufacturing where there is a requirement to mark best before or use by dates directly to tins, bottles and more.

Digital transformation

Ken Moir, VP marketing, NiceLabel, observes that the topic of digital transformation is everywhere, but as the last 18 months has proven, it is more than industry buzz. "At NiceLabel, we have seen a rush of companies looking to modernise labelling systems and processes in an effort to keep pace with customer demands, regulatory requirements and shrinking budgets," he said. "We expect the digital transformation trend to continue. For labelling this means, modernising legacy systems to improve quality assurance processes, increase speed and drive efficiency. Digitally transforming labelling offers another benefit, one that many companies overlook. By digitising the labelling process, companies are able to turn both direct and indirect costs into visible savings. Going digital also allows companies to capitalise on otherwise missed opportunities to speed up time-to-market and sell more."

In terms of drivers for change, Moir makes the point that, for many companies, the costs associated with legacy labelling processes are driving the need for modernisation. "The longer companies continue with legacy labelling systems, the more the costs add up," he said. "Consider how often costly IT resources are needed for label design and maintenance or what happens when a label error results in product recalls and fines, quarantine, rework and scrappage. Then there is the cost of manual quality control processes and unplanned downtime. Together, these costs can reach millions."

Jörk Schübler marketing director EMEA Citizen Systems Europe, maintains that, in

printing, the level of real innovation has been quite low in the last years. "All are offering a proven technology and nothing new is in sight as thermal print is offered at a reasonable cost while being extremely reliable," he said. "So, the main talking points are integration in the existing environment and how easy that is by the tools offered by the manufacturer. For this, Citizen has improved the quality and service for SDKs for multiple platforms."

Concerning drivers for change, Schübler made the point that B2B customers are B2C customers at the same time as everybody has a private life. "So, everybody is expecting the ease of use or design language of the technology he is using at home in a work environment," he said. "Therefore, I see these changes driven by the B2C soul of every B2C user. For example, Citizen has launched a label printer in pure white which is mainly targeted at customers in high-end retail and healthcare. They expect a product which fits within their environment and doesn't come along in the typical black or greyish Auto-ID colours."

Richard Hughes-Rowlands, regional product manager for printer software and industrial print, Zebra Technologies, highlights three trends that are driving innovation at the moment. The first is the continuing adoption of printing as part of mainstream IT within companies; thereby making the traditional IT concerns of device management and security increasingly important to print. The second trend is usability. "With the growth in print, the increasing diversity of printer product types and the gig economy, it's important that printers are easy to use, keeping the need for training to a minimum," said Hughes-Rowlands. The third trend is the growth in alternative purchasing models, with more and more customers interested in exploring the pay-per-print model for their office copiers in a manufacturing environment.



Increased customer expectations

In terms of drivers for change, Hughes-Rowlands believes, ultimately, it comes down to businesses of all types responding to increased customer expectations. "I know that each year I spend more and more on-line, that sometimes my choices come down how quickly a product can be delivered or how easy it to return something," he said. "This is driving the adoption and growth of print in the supply chain. Print is part of the innovation that lets them deliver on customer expectations. We work closely with these end users to deliver this and that drives our R&D."

Graham Backhouse, general manager, BPIF Labels, reflects that there has always been consistent creative development within the pressure sensitive labelling market, and he believes this will undoubtedly continue way into the future. "There is a constant stream of more efficient, easier to operate iterations of existing equipment, but I see more and more attention being paid to streamlining the whole manufacturing process using communication technology to link manufacturing equipment, streamline order processing and communicate with the customer," he said.

Regarding drivers for change, Backhouse considers that, ultimately, the end user (demand) will always be the main driver. "Successful companies constantly work on cost, gaining competitive advantage, increasing sales and improving margin," he said. "As the industry has matured it has become more difficult to create truly revolutionary ideas, processes or equipment.

However there has been a significant change in how that equipment is used and combined to provide more creative, cost-effective solutions."

Bob Forshay, senior client manager, Panorama Consulting Solutions,

makes the point that labels are moving away from being a display mechanism for static, dated data. "Gone are the days where a label was printed two days' ago when a pallet was received (and may or not be correct at the current time) to a vessel that can give updated and changeable information based on transactional events and environmental factors," he said. "New labelling advances from companies like Thinfilm allow real-time temperature data to be produced accurately and timely based on the needs of the current user, not what was produced in the past based on stale information."

A related but separate point, according to Forshay, is the improved linkages to traceability. "Food safety and materials traceability data is more dynamic and real time as well," he said. "Systems now can track and label as product progresses tied to quality systems in addition to transactional systems."

Concerning drivers for change, Forshay believes the pervasiveness of technology into the day-to-day lives of consumers has significantly impacted the changes in the labelling and printing environments. "An end-user of a label mostly likely has a smartphone, has played a new video game, and/or interacted with a kiosk at the grocery store – maybe all within the last day," he noted. "This ease of technology understanding and adoption has driven advances to end user labelling and printing requirements."

Cost containment

Forshay added that a major driver of change in this space is cost containment. "Supply chains thrive on efficiencies, accuracy and timely data. Significant cost savings have been gained by having access to synchronised and current data real time across the supply chain partners," he said. "Much like block chain is showing us new ways to save transactional costs, labelling is now more tightly linked to real time data. Top 5% performing firms are enjoying 50% savings of the traditional cost of managing supply chains and a key factor in this is leveraging technology appropriately."

VDC Research points out that the market for thermal paper and labels experienced a production hiccup starting 2017 as Chinese authorities temporarily closed Connect Chemicals, the leading manufacturer of thermal paper solutions, to modify operations in compliance with environmental regulations and bring it up to standard. Michael Clarke, research associate, VDC Research, details the business impacts and outlook due to the leuco dye supply shortage on the printing market:

"As Connect Chemicals is the world's primary supplier of leuco dye, a vital ingredient to producing direct thermal paper, its decision to (indefinitely) close the production plant in China starting September 2017 has caused a short supply in the marketplace. Thermal paper mills have also slowed overall production, if not stopped them entirely, resulting in a global shortage. Connect Chemical owns an estimated 30 to 40% of the global dye demand for thermal coaters (and approximately 70% of demand in Europe and Asia, according to market estimates); therefore, a manufacturing shut down has significant direct implications for end users who rely on direct thermal paper. Appvion, the largest direct thermal paper mill in the USA that also filed for bankruptcy protection in Q4 2017, announced another round of price increases on their economy-grade POS thermal paper, raising prices by 29% since July 2017."

According to VDC, this supply constraint has caused several major players in the barcode labelling market to increase product prices that use leuco dye. Some announced priced increases in the range of 10-15% for end users (for POS receipt paper and barcode labels) that came into effect in February this year.



Clarke continued: "Apart from the leuco dye supply shortage, various other macroeconomic factors have affected the pricing and supply of thermal paper. Among the leading factors causing the price increases are a strong US economy, natural disasters, and a rise in the price of raw materials. The cost of freight has increased due to a strong US economy demanding transportation to ship goods and Hurricane Harvey further straining the trucking industry. The strength of the US economy has also affected profit margins for paper mills and converters due to increased wages and the devaluation of the US dollar, down 12% in 2017, has caused higher costs for imported raw materials. In addition, the cost of raw materials integral to the creation of thermal paper has increased, including pulp paper. Adhesive and polyester film increased as much as 40% due to the damage of the hurricanes.

"Ultimately, while the leuco dye shortage stands out as the most significant reason for these planned price increases, other factors have also come into play including price increase of raw materials, strain on the shipping industry, and other macroeconomic reasons. Even when Connect Chemicals is back up and running at its full capabilities, the thermal paper market will still face the price pressure of expensive raw materials and the effects of a strong US economy."

Flexibility in design and materials

According to Frost & Sullivan, flexibility in design and materials will fuel growth in the automotive 3D printing materials market. It adds that adoption of 3D printing in rapid prototyping, by far the largest application in this industry, is driven by reduced lead



Graham Backhouse,
general manager,
BPIF

time and costs for OEMs compared to conventional product development.

Frost & Sullivan anticipates that 3D printing technologies will lead to the development of specialised micro-factories to produce customised parts as the automotive industry shifts away from mass production towards mass customisation. Frost & Sullivan forecasts the global 3D printing materials market in automotive transportation to generate revenues of \$576.5 million by 2024, with an impressive compound annual growth rate (CAGR) of 17.8% between 2017 and 2024.

Sayan Mukherjee, visionary science senior research analyst, Frost & Sullivan, commented: "3D printing materials will play a crucial role in reshaping the global automotive business model by enabling decentralised and localised production of parts and solutions. This is expected to transform mega factories over the next two decades."

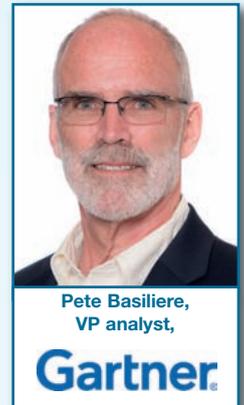
Global 3D Printing Materials Market in Automotive Transportation, Forecast to 2024 reveals growth opportunities, drivers, external challenges, forecasts and trends, and market revenues across segments such as plastic powders, plastic filaments, metal powders, and photopolymers. Competitive strategies of key players such as Stratasys, EOS, and 3D Systems are also provided.

According to Frost & Sullivan, ways to leverage growth opportunities in global 3D printing materials for the automotive transportation sector include:

- Focus research and development on the production of novel plastic formulations (resins, powders, and filaments) suited for real-life applications and move away from prototyping.
- Concentrate regional additive manufacturing strategies in Europe and North America – where key automotive technology pioneers are located.
- Collaborate with machinery manufacturers for product, business model, and marketing development as machinery manufacturers exert control over individual printer material compatibility.
- Strengthen distribution bases in late-

adopter and cost-sensitive markets such as China and India, among other Asian countries.

- Understand the market to address the dynamic future needs of the industry and prepare for disruptive trends.
- "The uncertain material supply scenario, lack of consistency in end-part production, and higher prices are big challenges facing the market," noted Mukherjee. "However, rationalisation of material prices is expected to boost wider adoption of 3D printing technology among OEMs."



Pete Basiliere,
VP analyst,
Gartner

Complex parts

Pete Basiliere, VP analyst, Gartner, comments that organisations are using 3D printing to change their business models. "It changes many of the calculations that have been made around specialty manufacturing. 3DP may never be as efficient as a three-story stamping press at banging out ribbons of metal into panels, but, in one shot, 3D printers can form complex – indeed impossible-to-make – parts that a press could never solve," he said.

Gartner's Predicts research highlights three industries – medical devices, aircraft and consumer goods – that are making significant strides in implementing advanced manufacturing practices enabled by 3D printing. To a significant extent, the experiences of these industries can be applied to all manufacturing industries.

Prediction: By 2021, 75% of new commercial and military aircraft will fly with 3D-printed engine, airframe and other components. "The aerospace industry was one of the first industries to adopt 3DP," explained Basiliere. "Plagued by long product design and development timelines, aerospace manufacturers in the commercial and military markets were early testbeds of aircraft models

and components. While prototyping remains the dominant use case for 3DP in all industries, aerospace has aggressively moved to also use 3D printed tools, jigs, fixtures and finished goods." For example:

- After 20 years of use, Boeing has additive manufacturing at 20 sites in four countries and more than 50,000 3D-printed parts are flying on both commercial and defense programs.
- GE Aviation's new Advanced Turboprop engine design converted 855 conventionally manufactured parts into 12 3D-printed parts, resulting in 10% more horsepower, 20% fuel savings, a shorter development cycle and lower design costs (Source: GE Aviation).
- Prediction: By 2021, 25% of surgeons will practice on 3D-printed models of the patient prior to surgery. "Hospitals and specialty laboratories have increased the level of investment in 3DP hardware, software and services that integrate medical imaging, CAD and 3DP workflow software," said Basiliere. Gartner estimates that nearly 3% of large hospitals and medical research institutions have 3DP capabilities on site (Source: Katherine C. Cohen/Boston Children's Hospital).

Gartner adds that, as 3DP technologies improve and the other technologies become more refined, 3DP as a COE will spread from teaching hospitals and specialty centres into the broader hospital system. One example is Boston Children's Hospital, where they take a team approach to training and surgical planning. Clinicians, industrial engineers,

designers, simulation experts, illustrators and patient care teams are all involved. As more 3DP capabilities come online, Gartner expects surgeons and medical staff to increase the demand for 3DP capabilities to be delivered in 'turnkey' fashion. 3DP will move from

obscure back-office labs more into the forefront as part of a strategy to improve surgical training and simulations.

Prediction: By 2021, 20% of the world's top 100 consumer goods companies will use 3D printing to create custom products. "Rapid product prototyping is the biggest and most expansive 3DP use case for consumer goods companies," noted Basiliere. "Companies as wide-ranging as Fishman (guitar amplification devices) and Unilever (household products) are already using 3DP to substantially reduce design to production times and to save money. But rapid prototyping is not the only relevant use case."

Basiliere added that 3DP is also likely to have a large impact on consumer goods company supply chains. "In categories where specific customisation is fundamental to the product delivery, inventories could be reduced, and costs and production could be shifted closer to the end customer," he said. "This shift to 'local production for local consumption' would enable consumer goods companies to rethink their business models. For example, a company named Raceware creates custom bike parts using 3DP."

According to Basiliere, it is unlikely that additive manufacturing or 3DP will ever completely supplant mass production in any consumer goods market subsector. "In fact, there are many product categories where we would expect its use to range from a very low-level penetration to no practical use cases of 3DP whatsoever," he pointed out. "Organisations must learn to make the cost-benefit trade-offs for where and when 3DP makes sense compared with conventional manufacturing technologies."

Prediction: By 2021, 20% of enterprises will establish internal startups to develop new 3D print-based products and services. "Business now moves at lightning speed, and technology moves even faster," said Basiliere. "Established companies constantly face competition from startups and emerging companies. To even the playing field with these fast-moving companies, organisations must set up an internal start-up to help fast-

track 3DP and other innovative technologies into the company's business."

Over the past few years, a handful of larger enterprise engineering organisations, such as Airbus, BASF and GE have established industrial-scale 3DP internal startups. "The companies are able to speed up the integration of 3DP into their own manufacturing processes for parts that are either too difficult or too costly to make using conventional manufacturing methods," said Basiliere. "The concept of an internal startup for 3DP is rapidly gaining traction and will become very common in the coming years. An internal startup enables companies to focus some of their brightest minds on 3DP innovation, while protecting their existing revenue streams from disruption."

Prediction: By 2021, 40% of manufacturing enterprises will establish 3D printing centers of excellence (COE). "Many Gartner clients in the enterprise manufacturing space have already implemented 3DP somewhere in their value chain," said Basiliere. "In most cases, the engineering functions within either R&D or manufacturing have made the larger internal 3DP capital investments while simultaneously improving their ability to leverage external on-demand service capabilities via their networks of partners."

Over the past few years, a handful of larger enterprise engineering organisations have established industrial-scale 3DP COEs (for example, Boeing, Johnson & Johnson, Rolls Royce and Siemens). "While doing so, they have integrated 3DP-related workflows into key business processes," explained Basiliere. "The benefit of a COE is to better refine existing 3DP methodologies and operationalise 3DP technologies while creating metrics to focus on improvements to design innovation, standardisation on key processes, and focus on improvement to quality and inspection processes. A 3D print COE also serves as a training facility or an experience centre for supply chain partners, as well as groups within the business."

Gartner points out that midsize enterprise manufacturers are beginning to follow suit in



Richard Hughes-Rowlands, regional product manager for printer software and industrial print,



COE establishment, but with smaller investments. "These companies tend to outsource 3DP services, as both the capital costs and specialised labour required are often too large a barrier to justify the program," said Basiliere.

He continued: "The long-term goal of a 3DP COE is to become a seamless part of the design and manufacturing process. When successful, the COE has broad implications on use of 3DP in the design, manufacturing and maintenance of products. 3D printing enables organisations to shift from designing for ideal manufacturing to manufacturing the ideal design. With the shift will come changes to your business model."

Integration

In terms of the relationship between some state-of-the-art printing and labelling systems and back-office systems, what do our commentators consider to be some of the key recent changes? Schüßler reiterates his point regarding the offer of easy to integrate SDKs for all relevant platforms, which today also includes iOS.

Hughes-Rowlands explained that as print moves from the warehouse to the edge – the retailer or the delivery courier – then one size does not fit all. "When you combine that with the geographic scale needed by some customers it's important to ensure a common architecture across printer types; together with printers that work well in combination with mobile computers, scanners and the ERP systems that drive them," he said. "Over the last few years we've introduced mobile, desktop and industrial printers with a common software platform – Print DNA. That makes it much simpler to integrate any Zebra printer with the back office; they all work in the same way."

Lassus explained that research shows the use of (or lack of) connected technology can influence an organisation's market position. "Legacy or outdated technology can significantly impede a collaborative workforce and individual worker productivity," he said. "Therefore, Cloud-connected, touch-screen

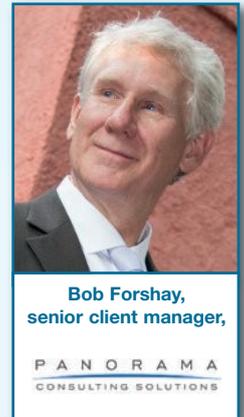
label printing solutions, operated without the need for a PC, have the ability to significantly boost productivity in the IoT era. In addition, helping our customers to develop agile systems by offering them greater autonomy through the use of flexible, customisable solutions and interfaces brings them closer to achieving 'smart systems' of the future."

Moir commented that when it comes to integrating labelling with business systems such as ERP, WMS, PLM and others, digital transformation enables a shift from time-consuming, complex coded connections to direct interfaces with master data sources that ensure accuracy and efficiency. "Modern integration allows IT teams to configure integrations and leverage pre-built connectors to leading business applications for rapid deployment," he said "Once deployed, the benefits of going digital multiply as capabilities like in-memory processing deliver speeds 100 times faster than the legacy approach of transmitting data between applications and servers. In the end, modern labelling system integration also reduces downtime and simplifies maintenance."

According to Forshay, one revolutionary change is the increasing incidence of data that originates outside of the 'system' (ERP/CRM/WMS, etc.) and ends up being printed via a label or other 'hard copy' means. "Data collection is no longer restricted to the four walls of a facility, instead, information can be obtained via any number of devices – whether a personal phone, an anchored RFID reader, or a camera attached to a traffic light," he said. "These different collection mechanisms are driving consistency and openness with the ERP/CRM/WMS vendors in order to allow their customers ease of integration and use."

Backhouse reflects that over recent years industry suppliers have increasingly seen the benefit of offering a complete solution or being part of a complete solution offer, resulting in increasing co-operation between suppliers aimed at streamlining the workflow and being able to offer a full end to end solution from design concept through post

press, linking of proofing, printing, converting and distribution processes. "We now live in a world where employees have grown up with the Internet of Things (IoT) and they naturally look to use the interconnectivity as a benefit that should be fully utilised," he said.



User benefits

What have been the subsequent benefit improvements for the user? Lassus pointed out that empowering the end-user to make on-the-spot, on-demand decisions – based on access to accurate, up-to-date data – reduces wasted time to virtually zero. "Take a large touch screen displaying multilingual training videos for example, or a device that caters for the loading of multiple consumable formats in a few easy steps; these are attributes that integrate the IoT into the modern workplace in a manner that's effortless for the user," he said.

According to Moir, one of the major problems with using hard-coded label templates or forms design software is that these legacy approaches require a significant investment in IT resources. "One of the key benefits of a digitised labelling system is that it empowers business users," he explained. "When business users take ownership of labelling, it eliminates the need for costly IT resources and speeds up the label change request and approval process."

Schüßler sees the biggest benefit in the fact that the time to market, as well as the time needed for the training, is shorter. Also, according to Schüßler, the acceptance by the people who use the systems every day is higher due to the fact that they work with something that they already know. Beside that, Schüßler believes decentral device management is a big plus. Hughes-Rowlands explained that Zebra has

developed Print DNA, its common printer software platform. "It was important that we adopted existing networks standards," he said. "That makes it easier for developers to build their applications and not worry about how the data gets to and from each and every type of printer."

Hughes-Rowlands added that the growth of device mobility and ubiquitous connectivity have also been large influences. "For example, all newer Zebra printers now offer Bluetooth," he explained. "For some mobile printers this will be the only way they communicate, for other printers it may just be a temporary connection that is used for set-up or fault finding." Hughes-Rowlands also made the point that Bluetooth is a great way of connecting other devices such as scanners directly to the printer.

Forshay considers that increased openness from an integration standpoint has been a significant improvement for end users, as the ability to consider additional hardware and software options is always a positive in terms of total cost of ownership. Another development he highlights is the improvement in 'out of the box' integration between the ERP/CRM/WMS, the data collection device, and the printing mechanism. "This integration simplicity allows for either fewer modifications or fewer points of failure due to the lack of necessity of employing additional integration software," he noted.

Backhouse reflects that in label production there have been many developments that impact in varying degrees on the efficiency, cost and employee hours. "End users increasingly benefit from linked systems and processes with increased communication and visibility at all stages," he remarked.

Convergence

With regard to technology convergence within the current printing & labelling systems and related equipment marketplace, do our commentators see this as a good or bad thing? Schüßler sees this as a positive area of development. "Everything which makes life

easier, operations leaner and customers happier is a good thing," he said.

Hughes-Rowlands commented that Zebra sees its printers built into many different systems. "Some products like the Zebra Print Engine are designed as OEM components for Print and Apply vendors. But open nature of the printers lets our partners build solutions for many types of applications for example ATEX where specialised enclosures are needed or printers with built in image verification capabilities. We are happy that there are many partners building innovative solutions on top of our printers using their own specialist knowledge and products."

Lassus commented that since SATO's business model relates to streamlining operations and empowering workforces, it sees technology convergence as a positive trend. "Our latest developments are multi-functional, user friendly and purposefully very simplistic for the user who is used to operating consumer-level devices," he remarked. "For example, in the healthcare sector, if we can enable label and patient ID wristband to print from the one device, rather than two separate devices, this saves a huge amount of time when collecting in-patient data. And if the data collected can be accessed across multiple locations and geographies, accuracy (and therefore patient safety) is increased across entire organisations. As technological convergence continues to evolve, we also value the collaborations that bring our technology together with that of our partners."

Moir made the point that we are starting to see companies make a shift toward managing all their supply chain/manufacturing printing with one solution; whether they are printing labels or marking items directly with a high-speed inkjet device. "We view this as a positive development in the market that will drive new levels of print productivity," he said. "NiceLabel is working with our customers to support this convergence of print management solutions. It simplifies user operations and is more cost effective than running multiple solutions for different print

technologies. This is a very positive development in the market which we fully support and encourage."

Forshay considers that convergence is a consequence of technological advancement; thus, it is a positive force for the end user and the marketplace. "End users are going to continue to demand increasing functionality from any technological device in the future," he said. "Technology that can only perform a single task is going to be seen as outdated when compared to other multi-function technologies. For example, the ability to take a picture via a smartphone is now commonplace, thus for many purchasing a camera to take pictures is now unthinkable. From a printing/labelling perspective, a movement towards multiple functions (with printing as one of the basket of functions) for a device will be seen as commonplace and necessary at a minimum."

Remaining concerns

Are there any remaining concerns regarding the use of Printing & Labelling systems? Moir commented that aside from the liabilities mentioned earlier, such as label errors and production shutdowns, a legacy labelling system can also introduce security risk. He added: "Some previous generation labelling systems require legacy plugins, such as Flash for their browser applications that create security risks for the business. Flash is being deprecated extremely fast and should be completely obsolete in the coming years."

Lassus doesn't see any remaining concerns; simply the positive challenge of developing solutions that stay ahead of the rapid pace of change in retail, manufacturing and logistics, food and healthcare environments. "It's increasingly important that we routinely offer our customers the option of a customisable application



programming interface," he said. "Whilst all industries are shaped to some extent by the same global trends, we can't expect a 'one application fits all' approach to work across what are unique and very complex operations."

Schübler reflected that while a few years everybody was investigating if BYOD ('bring your own device') could be a solution most end users understood that this can cause massive security problems. "At the same time, many recognised that an end user mobile device cannot be compared with a professional tool in many regards such as durability or availability over a project life time of several years," he added.

Forshay made the point that data collected externally could be compromised in a number of ways (incorrect formatting, pauses in the string of data being collected, etc.) – making printing using a disciplined process difficult. "Printing using such data requires internal system intelligence to rationalise or clean any anomalies in order to produce a clean print or label," he said.

Another recent change highlighted by Forshay is the ability to produce the actual label or hard document via a printer that is not directly tethered or otherwise electronically connected to the ERP/CRM/WMS system. "While this is offered a convenience to customers and/or end users, this adds an additional layer of complexity to an already intricate process," he said.

The road ahead

What might be the next innovations/developments to look out for over the next year or two within the printing & labelling space? Lassus considers that, rather than a dramatic rise in new technologies, he expects to see existing technologies being better utilised in line with consumer trends allowing them to work 'smarter'. "Our core data collection systems and labelling solutions will become increasingly important as the changing face of retail drives change across the whole supply chain," he said.

"Track and trace technology, particularly RFID, has an important role to play in helping suppliers and retailers deliver on increasing consumer demands to locate stock anywhere in the chain and to efficiently process both instore and online returns and exchanges. As a result, we predict that effective data management will be absolutely critical to success and future 'consumer experience' driven innovations."

With this in mind, Lassus pointed out that SATO will continue to develop user-friendly features and customisable technology for ease of integration and ensure that its devices are compatible with environmentally responsible solutions, such as SATO's linerless labels, as demand increases for sustainable options. "To date, omni-channel strategies and tech have often worked against each other and we see a coming together of the two as we work with our customers to understand end-user challenges," he added.

Moir commented that NiceLabel expects a Cloud-first approach to be rapidly adopted in the supply chain labelling workflows, just as it has been in many other industries. "A Cloud approach will simplify the digitisation of labelling for small businesses who don't always have the IT resource required," he said. "For larger enterprises, a Cloud solution can make the expansion of a centrally managed labelling workflow much easier as minimal IT involvement is needed."

Schübler considers that we could see more compact solutions that give customers benefits with regard to space at their points of print; especially if they have the need to print several different things.

Outside of industries where certain marks and serial numbers are required for compliance purposes, Farooq believes there is a possibility that product printing and labelling may be superseded by different technologies. He added that printed barcodes are commonly the most reliable way to identify products on the production or distribution line. However emerging and evolving machine vision technologies, including sophisticated image recognition software, are able to

accurately identify objects by their size, shape and visual features such as branding on the packaging. "This could be particularly game changing in logistics and offers to opportunities to further automate pick, pack and fulfilment processes," he remarked.



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Forshay foresees the continued development of the ability for a printed document or label to give 'real-time' information in a proactive instead of a reactive manner. "Instead of a label 'waiting' to be accessed by a user, the label will utilise rules and data to determine when to inform due to changes in the entity that is labelled," he said.

Forshay added that another development is to continue to allow for a user outside of a closed system to access data via a label or printed document. "This will allow organisations to market better transparency between themselves and the end customer due to the end user's ability to access data via labels or printed material," he explained.

Greater expectations

Hughes-Rowlands explained that, although not new, Zebra sees sustained strong growth and adoption of RFID technology, and is continuing to invest in RFID printers, readers and other innovative products in this space. "Overall, I think that expectations of the printer will move from the 'dumb' device that prints, to a more capable connected device," he added. "You'll see continued growth in the importance of printer management and more concerns and questions asked about printer security as a device connected to the corporate network. Printers will continue their move from being an operational cost, to an enabler in meeting increased customer expectations." ●