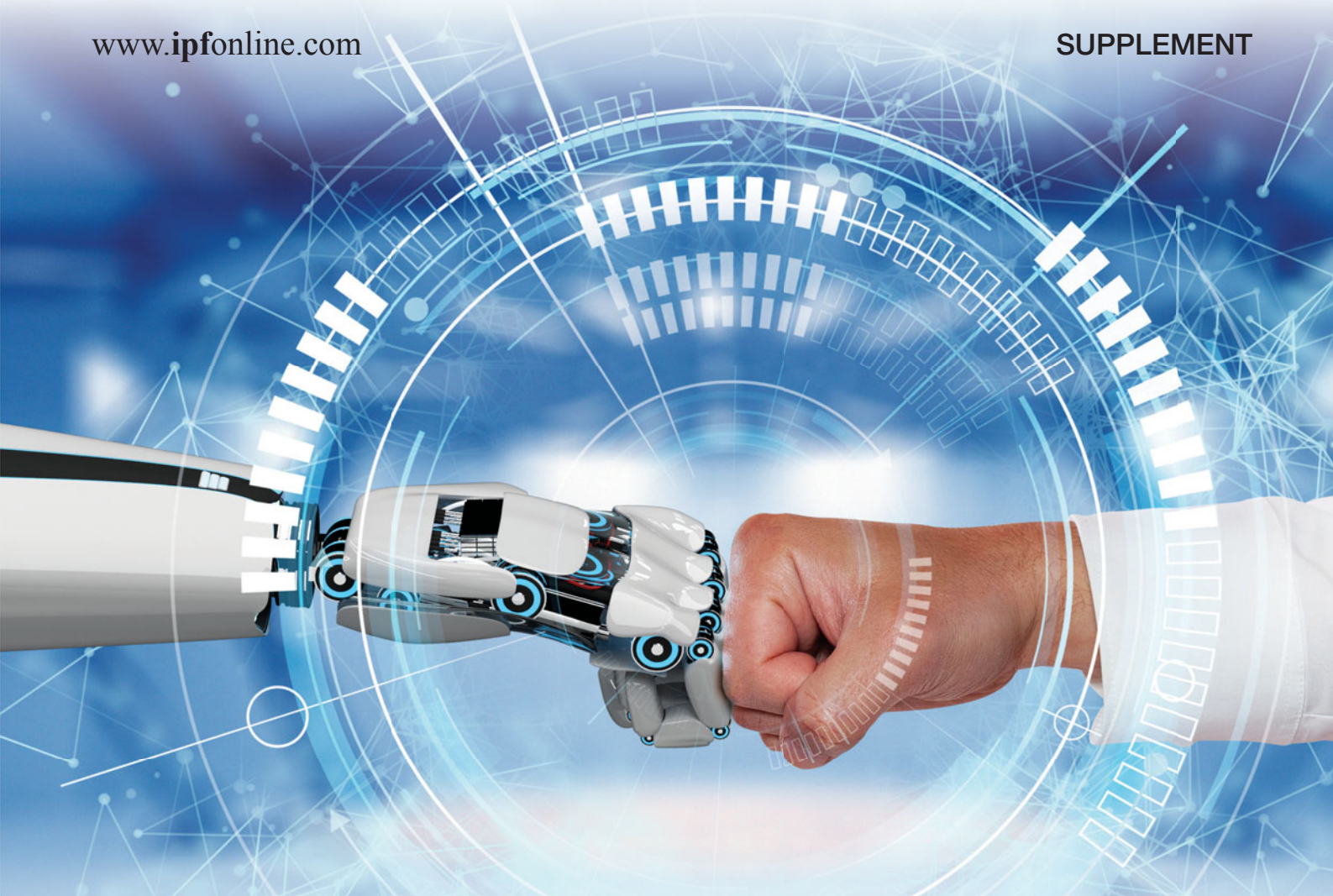


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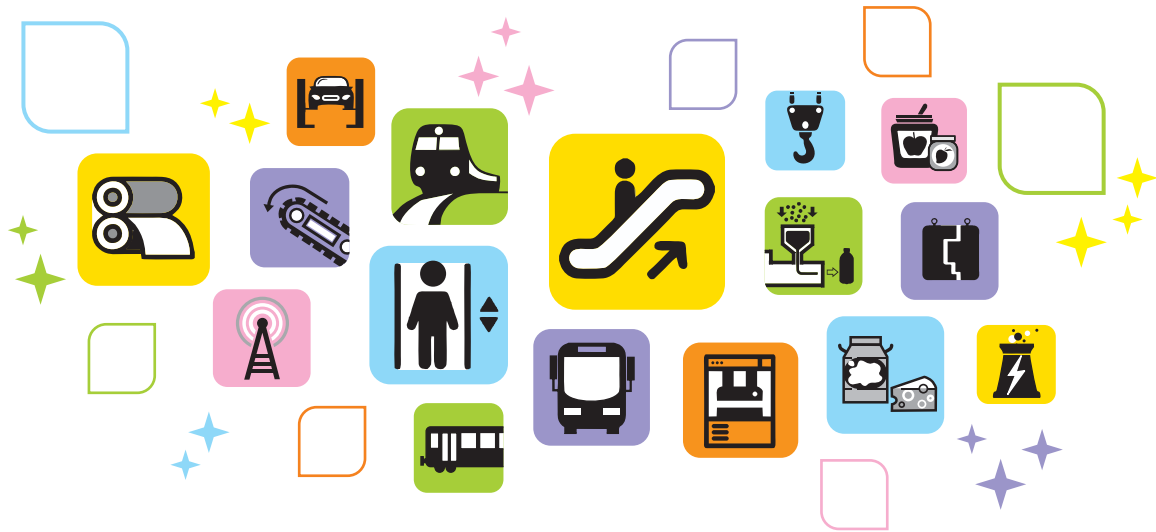


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CONTENTS

Editor's Note **196**

EXPERTS SPEAK

Transforming the shopfloor through digital manufacturing **198**
V Anbu, Director General & CEO, IMTMA

INTERVIEW

Kunal Banka, Managing Director, Sharda Mercandise Pvt Ltd **200**
"Adoption of right technology is the key for smart manufacturing"

Abhishek Bohra, Partner, Bohmen Industries **204**
"One has to be with the times to survive in any business"

Dr Umesh Mhatre, MD, Surface Modification Technologies Pvt Ltd **206**
"Smart manufacturing is expected to produce smart surfaces"

Akshay Singh, CEO, Big Zero Technology LLP **210**
"Without metrology manufacturing processes cannot be full proof"

Vikas Khanvelkar, MD, DesignTech Systems Ltd **214**
"Companies are now investing more in CAE solutions"

Sagar Bhosale, MD, Schmersal India Pvt Ltd **218**
"Industry 4.0 is inconceivable without functional machine safety"

STRAT-TALK

Integrated manufacturing is the essence of Industry 4.0 **222**
R Jayaraman, Professor of Operations and SCM at SP Jain Institute of Management and Research

Industry 4.0 is changing dynamics of manufacturing industry **226**
Utkarsh Bansal, Director (Business Strategies), Utkarsh India Ltd

Industry 4.0: A Challenge or opportunity for SMEs? **228**
Sunil Mehta, GM, Automotive Business Development, FAID, Mitsubishi Electric India Pvt Ltd

SKILL DEVELOPMENT

Need to upskill workforce for employability **230**
Dr Gayathri Vasudevan, CEO & Co-Founder, LabourNet Services India

SMART DESIGNING

Right design strategies in the age of smart manufacturing **234**
Karthik Shankaran, Chief Innovation Officer, Detroit Engineered Products

PROCESS AUTOMATION

A winning IIoT strategy: Avoid the common pitfalls **236**
Michael Brooks, Sr. Director, APM Consulting, Aspen Technology, Inc

VR-AR

How to leverage virtual and augmented reality in Industry 4.0

Divy Shrivastava, Co-Founder & CEO of Nineleaps

238

3D PRINTING

How additive manufacturing is changing industrial landscape

Anil Kumar, Lead Application Engineer, ANSYS

240

TECHNO-COMMERCIAL

SCHUNK's robot-guided palletising systems enable versatile production

242

Quickly enabling DCIM to optimise data center operation

244

CASE STUDY

Thermal imaging technology improve company's competitiveness

Courtesy: FLIR

246

TECHNOLOGY UPDATE

Bettinelli's high precision link conveyor: A range in constant evolution

237

EMAG showcases solutions on Industry 4.0 and electromobility at EMO 2019

248

Trikuta Enterprises' new machine vision system enables fast and accurate inspection

250

INDUSTRY UPDATE

Bhambra Engineering Works offers bar peeling

251

Balaji Switchgears: The one-stop-shop solution provider

251

Renishaw 2_Renishaw help Domin Fluid Power increase capability using AM

251

SCHUNK offers 3D printing service for engineering components

252

OTC DAIHEN India fostering growth of welding industry

253

COMMUNICATION FEATURE

Satronix making its mark on power electronics sector

254

Gloves For Protection

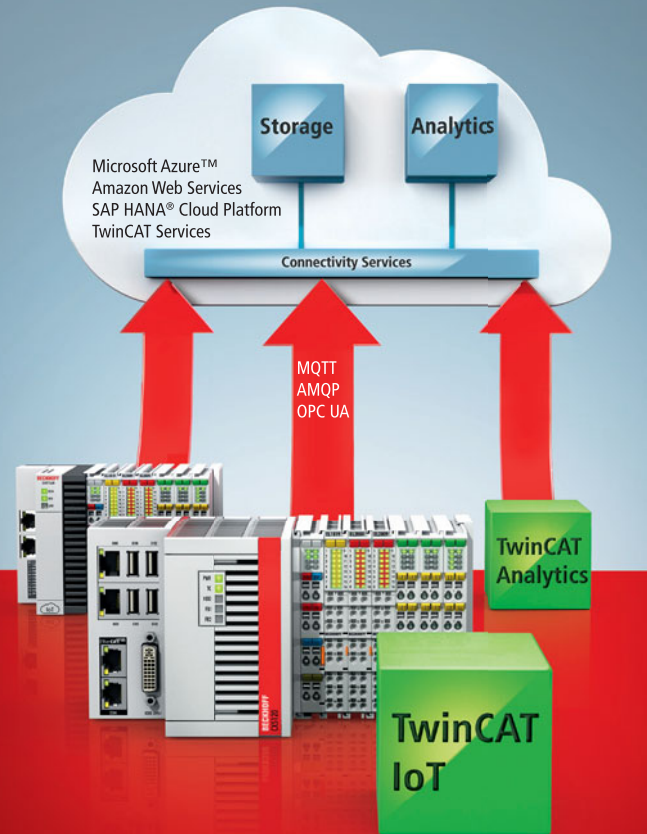
255

Advantages of becoming a Factory 4.0 with Lantek

256

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EDITOR'S NOTE

Need to become a smart manufacturing hub

Industrial Products Finder has mapped the industrial and manufacturing sector for last 47 years. Although the Internet revolution began at the beginning of the 21st century, its impact has begun to seep into industrial and manufacturing processes only in the last five years. As Indian companies begin their Industry 4.0 journey, IPF's "Smart Manufacturing" supplement aims to help them adapt to the new age of manufacturing by providing insightful information and practical tips for implementing smart, latest technologies.



The Government of India (GoI) intends to make the country a \$5-trillion economy by 2024-25 with manufacturing sector alone contributing \$1 trillion. To achieve this ambitious target as well as to remain highly competitive globally, Indian companies will need to adopt new-age solutions and technologies across the entire spectrum of manufacturing activities. With government focusing on Make in India campaign, encouraging FDI, introducing policies for ease-of-doing-business, and focusing on skill development, one can expect to see India to become a highly competitive destination for manufacturing.

Realising the importance to deliver cost-effective, quality products in shorter period of time, Indian factories are feeling the pressure to use advanced production optimisation tools. Industry 4.0 - characterised by digitization and interconnection of products, value chains and business models - can help manufacturers achieve this goal. Industry 4.0 is driven by an amalgamation of technologies such as Internet of Things (IoT), artificial intelligence (AI), business analytics, virtual & augmented reality (VR & AR), advanced robotics, simulation, additive manufacturing (3D printing), etc. These technologies have radically changed the way products are designed and developed. For example, additive manufacturing, which was earlier mainly used for prototyping, is today being applied as the alternative approach for manufacturing of small batch customised parts and/or for products development.

SMEs - which constitute around 80 percent of the total number of industries - are still stuck with legacy machines. To remain relevant even in India, they will have to adopt digital technologies and solutions in phases. However, connecting heterogeneous machines, systems, and devices seamlessly in shopfloor and interoperability is a daunting technical task for Industry 4.0 implementation. "Smart Manufacturing" intends to ease the process of implementation for SMEs.

India has already earned a reputation for being an IT hub of the world. The country will have to leverage on its strength in IT and expertise in manufacturing for adopting digital technologies. To sum up, Indian manufacturers will have to reposition themselves with smart manufacturing and make their mark on the global map.

We look forward to receiving your views/ comments on this special issue at Editor@IPFonline.com

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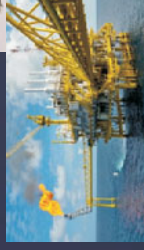
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Transforming the shopfloor through digital manufacturing

India's strength in IT and expertise in manufacturing must come together for the adoption of digital technologies, says **V Anbu**.

As the seventh-largest economy in the world, India is one of the few bright spots in the world economy. The country aspires to become a \$5 trillion economy by 2024-25 with manufacturing sector alone contributing \$1 trillion besides aiming to increase manufacturing contribution to GDP from the current 16 percent to 25 percent by 2025. In order to reach this goal, we need to adopt new-age solutions and technologies across the entire spectrum of manufacturing activities. Optimised resource utilisation, digitally connected and automated shop floor, real-time production asset tracking, data capture from machines, devices and processes, analytics, cloud computing, and changing traditional business processes are the transformational needs essential for achieving accelerated growth and competitiveness in manufacturing.

Smart or digital manufacturing, often synonymous with Industry 4.0, which first came to light in Hannover Messe fair in 2011, is spawning a global revolution in manufacturing. Industry 4.0 is an evolutionary development wherein humans, machines and processes are all linked through the Internet of Things (IoT). Technology, product/process management, and human resource are the three main dimensions for implementing smart manufacturing. Implementation of Industry 4.0 is mostly a top-down approach. Passion, zeal, and commitment are essential for top management

especially for brownfield implementation. Industries have started implementing energy management, subsystem monitoring, and OEE partially at shopfloor level. Supply chain management and customer relationship management is happening moderately in phases in industries as they perceive this as easy to implement and beneficial! Industry 4.0 product and solution providers should focus on developing easily deployable, packaged products – building blocks and local solutions which are of open source and adaptable to legacy systems in shopfloor as well.

To remain competitive locally and globally, it is binding on the part of industries, specifically SMEs' to adopt digital technologies and solutions in phases. Adaptation by SMEs which constitute around 80 percent of the total number of industries which are stuck with legacy machines needs capital investment, technical support, and hand-holding. Connecting heterogeneous machines, systems, and devices seamlessly in shopfloor and interoperability is another daunting technical task for I4.0 implementation. The SMEs need to be supported through creating awareness, hand-holding, training and favourable policies for the success of implementing Industry 4.0 in manufacturing.

Department of Heavy Industry, Government of India has initiated creating four centers of Industry 4.0 having a unique identity for spreading awareness and branding

under SAMARTH Udyog Bharat 4.0. These centers would have resource sharing, common platform of Industry 4.0 and network each other's resources so that the utilisation of resources is maximised.

Skilling, upskilling and reskilling of the labour force is crucial for meeting the requirements and supplementing smart manufacturing implementation in industries. Industries need to train and equip their existing workforce in new-age technologies such as artificial intelligence, machine learning, IoT, cloud computing, data analytics, and so on to adopt, implement and reap the benefits of Industry 4.0.

For adopting digital technologies, India's strength in information technology and expertise in manufacturing should come together creating products and solutions for local needs of the industries. India has a huge domestic market and large manpower with diverse skill-sets, English speaking technocrats, researchers and engineers, which is a plus. Government policies are seen as industry-friendly and enable ease of doing business. To conclude, the Indian manufacturing sector can reposition itself with smart manufacturing and make their mark on the global map.

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V Anbu is the Director General & CEO of IMTMA (Indian Machine Tool Manufacturers' Association) and UFI President elected for 2020-2021.

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“Adoption of right technology is the key for smart manufacturing”

High upfront cost of modern technologies is one of the biggest hurdles in their implementation in India. If the system is poorly designed, it will cut the profit margins, says **Kunal Banka**, Managing Director of Sharda Mercandise Pvt Ltd, who joined the family owned business 10 years back after graduating from Lancaster University UK. In this interview, he explains benefits of security seals for modern manufacturing units.

What kind of products and services are offered by your company?

We are leading and pioneer manufacturers of tamper evident, tamper resistant security seals for past three decades. We were primarily exporting our products as customers in India are price sensitive while procuring security seals. Recently, the domestic customers' perception has rapidly started to change and they are realising the importance of quality in security seals over price. For past 5 years we have started offering our security seals to domestic customers who are interested in quality security seals.

We are supplying these security seals worldwide to various industry sectors including the transport & cargo, electric, gas & water utilities, banks, couriers, petroleum, telecom, airlines, healthcare, hotels, chemicals & bulk drug, lubricants, agrochemicals, postal services, warehouses, shipping, customs etc.

How is Sharda Mercandise aiding customers in enhancing productivity?

We are manufacturing tamper evident/resistant security seals and our range of offerings is very low value products. Though we do not contribute directly to increase productivity for our customers but we are highly prevalent in saving revenue for them. We are constantly developing new range of technologically advanced security



seals that provide highest protection level and reduce the cost occurring due to pilferage, adulteration and theft during transit.

Why are seals important for ensuring product safety?

Our security seals are not directly used for manufacturing the customers' products but are used for safe transportation of their products. Our seals are used during transit to protect their products. Our customers use our security seals for securing their cargo in trucks, ships, airline, containers etc. Our security seals are used by government utilities like electricity distribution companies for protecting their electric meters from being tampered. We offer our customers global standard products since we only manufacture export quality seals.

How has security seals market evolved?

Since our inception (1989) we have placed our prime focus on innovation.

We started manufacturing security seals when nobody was aware what role exactly security seals play. Security seals were synonymous with the age old lead seals or lac seals used with the pliers. We offer a range of security seals which do not require any tool or pliers for locking. All our security seals are designed to lock by hand. Once locked, they need to be removed by cutting the seal. We are continuously upgrading our product range as well as our production process.

What types of modern technologies are you using for manufacturing?

We have modernised our manufacturing process of moulding, printing, quality checks and are utilising the technologies. For example, many of our new security seals are provided with barcode serial numbering which reduce the chances of any error while reading, recording and verifying the serial number of the seal. Our each security seals are customised with customer desired unique non-repeat security seal number. We are designing new security seals for future with complete automation using robotic production facilities. We are now using latest computerised laser machines for printing the customisations required as per customer need. Previously, traditional hot stamping foil machines were used for printing. In our manufacturing, use of new

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age technologies like robotics, 3D printing, IoT etc is technically not required and also affordability cost is not feasible. However, we are upgrading our manufacturing wherever there is scope and need.

Are Indian manufacturers opting for smart manufacturing?

In terms of smart manufacturing, India has fairly good chances in comparison to developing countries. But it may take some more time to adopt as initial investment is high for setting up such manufacturing facilities. Being very large manufacturing base, it will happen gradually. There are many governing factors that need to be adapted to, before upgradation of existing manufacturing takes place in our country.

Is 'Smart Manufacturing' important for the success of Make in India?

I differ here, smart manufacturing is

not very important for success of 'Make in India'. In every production facility, 'smart manufacturing' is not possible and also not desired. In view of our population, we need to provide maximum jobs but when it comes to smart manufacturing it reduces the man power requirements. Yes, there are many products, where it is need of the hour to do smart manufacturing. In addition, adoption of right technology is the key criteria for implementing smart manufacturing.

Can SMEs also become "Smarter Manufacturing" unit?

Certainly and why not! But again it depends on the product, consumption, competition and adoption cost feasibility. Upfront cost of implementing smart manufacturing is the biggest challenge. Most of the SMEs will not be able to afford the initial technology cost. On long term, it will definitely provide savings but start

up costs need to be considered. Another hurdle is that smart manufacturing technology is complex. If the system is poorly designed, it will cut the profit margins.

Are you planning to launch any new product/solution?

We already have many products under development stage. Being innovative products, our activities all depends on market adaptability of new products. We will be soon launching RFID security seals for electric, gas and water meters. This will provide convenience to check the installed meters in customer premises. But it will primarily depend on the government policies. We are manufacturing barcoded electric meter security seals but still it has not been adopted by our electricity companies.

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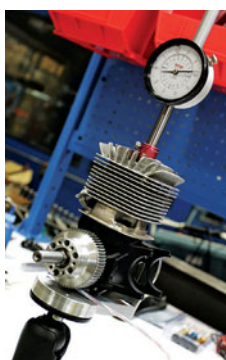
For more details on Sharda Mercandise, contact Kunal Banka on email: kunal@smplseals.com

NEWS SNIPPET

Optimising engine design with metal additive manufacturing

Renishaw, a leading provider of metal additive manufacturing systems, has worked with engine manufacturing company Cobra Aero, based in Michigan (USA), to optimise its design processes for aircraft and motorcycle engines. After working with Renishaw to develop new manufacturing processes, Cobra Aero invested in the AM 400 system to increase its additive manufacturing (AM) capabilities. To optimise the design of its engine cylinders, Cobra Aero worked with Renishaw to gain expertise in AM. The company visited a Renishaw Additive Manufacturing Solutions Centre, USA, and collaborated with Renishaw engineers to use AM to improve the design of a cylinder for an unmanned aerial vehicle (UAV).

Using AM technology allowed Cobra Aero to design a lattice structure to increase airflow, it also allowed them to produce one solid, lightweight part. "Staying at the cutting edge of manufacturing is important to Cobra Aero. Investing in AM allows us to develop tools and new



products for high value, small volume applications, speed up the manufacturing process and produce designs that would not be possible using conventional subtractive machining," explained Sean Hilbert, President of Cobra Aero.

Hilbert added, "We decided to redesign the cylinder because of its importance in an engine. Design changes to this part of the engine must happen rapidly and it is also a high value part, which is why we have chosen to additively manufacture this component.

Improving the performance of the cylinder will also improve the overall performance of the engine."

Stephen Anderson, AM Business Development Manager at Renishaw Inc, said, "By using metal additive manufacturing, Cobra Aero was able to design a part that was unique to the application. By using our laser powder bed fusion technology, Cobra Aero was able to produce a single part with complex lattice structures that performs better than conventional component manufacturing techniques."

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“One has to be with the times to survive in any business”

Manufacturers across industries are opting for modern technologies to compete internationally. Manufacturing by far is the most adoptive industry as the scope for application of modern technology is immense, observes **Abhishek Bohra**, Partner, Bohmen Industries. In this interview, he throws light on the present status of manufacturing and why it is imperative for Indian companies to be in sync with changing times.

Kindly brief us about your company...

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How is your company helping customers to reduce cost and increase productivity?

Manufacturers across the globe factor in fixed costs (acquisition and installations) as well as maintenance (breakdown repairs and downtime) while determining their inputs. This culture has slowly taken root in India as well. As a manufacturer, we focus on the role our products needs to fulfill on any machine and ensuring it does so reliably, and while doing so, making it as efficiently as possible so that the customer gets it at a very competitive price; thereby controlling the above factors for them.

In today's manufacturing scenario, we have to match with global standards to compete with other manufacturers for our share of the business. Most equipment manufacturers are exporting all over and they need a supply chain



confirming to their eventual standardised specifications. We have attained the globally accepted CE mark for our products and are in the process of confirming the same to UL and CSA ratings to satisfy these requirements.

How is manufacturing sector evolving?

One has to be with the times to survive in any business. Manufacturing by far is the most adoptive industry as the scope for application of modern technology is immense. However, one would invest in modernisation only when (1) there is assured demand, (2) statutory environment supportive of such planning, (3) available workforce to handle modern processes and (4) supporting services to maintain such infrastructure.

Post 1991, India and its entrepreneurs have grabbed every opportunity to step up their efforts. In the current regime, this seems to be even more visible. With a

positive approach, there seems no looking back for India.

What is the impact of new age technologies on manufacturing?

Every technological advancement has its own impact on the present practices. Robotics has simplified labour intensive processes, while 3D printing has reduced design flaws and eventual tooling and reworking costs. Cloud computing has helped decision making and problem solving for manufacturers in real time apart from improving sales and marketing efforts. Use of augmented reality and virtual reality media enables ease of knowledge sharing with partner manufacturers and vendors as well.

In terms of smart manufacturing where does India stand?

It is still a very long road ahead because there are pressing infrastructural requirements which are being attended to now. Once these are addressed by the concerned focus will shift to becoming the smart manufacturing hub.

Can SMEs also become “Smart Manufacturing” unit?

A lot of smart devices are able to assist SMEs in achieving efficiency in their processes. Software based tools are the primary means due to cost constraints. Smart hardware will involve higher capex and of course will depend on the company's objectives.



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Through unmatched knowledge of processes and technologies involved, SMT has thus emerging as one of the key players in the Indian Surface Engineering Industry. Our in-house R&D centre is always passionate and up-beat about undertaking challenges and as a direct result we are able to meet the specific requirements of upcoming markets.

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“Smart manufacturing is expected to produce smart surfaces”

Constant pressure of reducing cost and improving productivity is keeping manufacturers on their toes. To overcome this challenge, companies opting for innovations in tooling with higher processing speeds and new materials, geometries & techniques. Therefore, surface treatment of these tools and components has also become very much important to address this challenge, says **Dr Umesh Mhatre**, Managing Director, Surface Modification Technologies Pvt Ltd – which offers not just coatings, but provides total solution for engineering industry. In this interview with Rakesh Rao, Dr Mhatre explains importance of physical vapour deposition (PVD) for surface treatment.

Could you please with us Surface Modification Technologies’ business?

Surface Modification Technologies (SMT) is a leading surface engineering company which delivers surface enhancement solutions in the field of metal finishing and coating through the high-performance Physical Vapor Deposition (PVD) coating processes, at times even customised to individual requirements. The company has been engaged in delivering surface enhancement solutions to a wide spectrum of a variety of industries for over 14 years now, offering both standard as well as tailor-made coating solutions to augment the performance of various cutting tools, forming tools, dies, moulds as well as components, used in the engineering, pharmaceutical, textile, agriculture & aerospace industries. SMT’s dazzling bouquet of glittering decorative coatings blends with and thereby complement the needs of various segments of decorative industries. State-of-Art glittering colour coatings thus add a jewel to the SMT crown.

Why surface treatment is important for industries? Which end-user industries are major users of surface



enhancement solutions?

In modern engineering processes, production units are under tremendous pressure due to the continues expectation of reduce cost, improve productivity and higher quality demands. To satisfy these expectations, innovations in tooling are at its peak with new materials, new geometries, new techniques and higher processing speeds. But these innovations are restricted due to tribological challenges such as wear, friction and heat developed during machining. Therefore, along with these innovations, surface treatment of these tools and components has also become very much important factor to address these challenges.

Physical Vapour Deposition (PVD) is the leading technology that addresses these challenges very efficiently and effectively due to its capacity to tailor coating properties

as per the need. Although, this technology is not yet explored to its potential due to the complex nature, automotive, textile and aerospace industries have been benefited to the great extent. Decorative industry is also adopted these technology to produce long lasting glittering colour shades. Watch industry is one of the good examples.

What are the advantages of PVD coating processes?

PVD technology has ability to produce new coatings with desirable tribological performance as well as mechanical properties. PVD coating has gained popularity over time due to its eco-friendly nature, unique durability (tribological) features and wide range of industrial applications. It is fundamentally a broad class of various vaporisation coating technique, involving transfer of material on an atomic level along with reactive gases to form thin solid films (1 micron-5 microns). These thin solid films can be tailored with improved properties compared to the substrate material. Almost any type of inorganic material can be used as deposition source under vacuum conditions.

The flexibility of coating processes, high wear and corrosion resistance, an ability to maintain high hardness even at elevated

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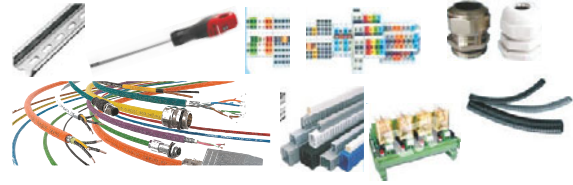
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operating temperatures (up to 1100oC) are the basic unique features of the coatings deposited by PVD technique. These coatings are extremely fine grained and dense. Being high temperature and ionic process, the coatings are diffused into the underlying metal, the adhesion bond is perfect. In the context of cutting tools, low thermal conductivity properties of these coatings also eliminate cold welding and chip building-up.

Could you please highlight some emerging trends in surface treatment? How is your company tapping these trends?

Smart manufacturing is expected to produce smart surfaces. Therefore tailoring the material surfaces to impart appropriate functionality under given working conditions is the important role of surface treatments. Designing of an appropriate coating composition, structure, related processes and equipment to enhance corrosion and wear protection, hydrophobicity, catalysis, high temperature oxidation resistance, self-cleaning surfaces, etc are the challenges in emerging markets.

PVD technologies are no long behind in the race. From single and multi-layered coating to recently commercialised nano-structured coatings has given tremendous boost to the manufacturing industry by addressing many of these challenges. SMT's research and development (R&D) group is continuously engaged understanding the needs of industry to design the coatings as per the need of industry. Our multi-layer and nano-structured coatings are working in the industry.

Along with the technology improvement, promotion of the potential of this technology in different industries is also important. Currently, automotive industry is the only industry enjoying the benefits of

this technology. But now various other industries such as medical, pharmaceutical, textile, agriculture also started using these technological benefits. Designing appropriate working surfaces is also emerging trend in surface treatment technologies. These are also potential emerging markets of PVD technology.

How is SMT helping customers in their journey towards modernisation?

As we all know, having best surface treatment does not guarantee best performance. A complete system of construction must be in line with expected results. Therefore right from material of construction, design, material core treatment and surface treatment are very important. At SMT, we do consider all these aspects before suggesting or designing any PVD coating for surface treatment. We are not just coating provider. We are total solution provider for engineering industry.

Although, PVD coating is our core expertise, we do have association with many local and international research organisations for understanding the engineering problems and addressing them with appropriate solutions. These solutions do include modifications of material, machine upgradation and sourcing of global quality standards and testing facilities as required.

What are your views on Government's Make in India initiative, which has completed 5 years this September?

Make in India is a great initiative. This is the process of demonstrating the capacity of Indian brain to the whole world. Of course this is helping us in many other ways as a country. This will create many entrepreneurs and more jobs in our country and make the economy strong. To achieve the dream of \$5-trillion economy, Make in India is

must. But, this initiative needs much more refining to meet industry's need as we see implementation is very week. We hope the government will pursue this initiative to the grass root level in near future.

'Smart Manufacturing' is not always about investing in new technologies & machines, but to optimally use the existing infrastructure and machines. Do you agree with this statement? Can you share your experience in this regard?

Yes, I agree. Smart manufacturing is set of various activities and practises used in industry. New technologies and machines are just one part of it. For an example, PVD coating industry do use high-end as well as conventional coating machine to produce similar coatings for different applications and vice versa. It all depends upon the market to whom you cater to. When we talk about the term 'Smart', we must know what to use where. Optimum resources for maximum quality output is must.

How do you intend to take your company to next level?

We are surface engineering company and wish to promote our technology on pan India platform. Being a technology company, we strive to inculcate the habit in us of constantly moving forward, innovating, developing technology and creating new business from innovation. SMT is a milestone in the journey to the future technologies and business. Currently, we have three coating centres and two manufacturing centres in India. We plan to cross many more such milestones. In future, we plan to develop more fertile applications and surface modification technologies that can benefit various sectors of Indian industry and support Industry 4.0 revolution.

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“Without metrology manufacturing processes cannot be full proof”

Companies across industries are looking at ways to save cost without compromising on quality. Metrology is a crucial tool to standardise processes with validation and for ensuring all quality standards are met by the manufacturer. In short, the company gets certified that it is manufacturing as per global standards, says **Akshay Singh**, CEO, Big Zero Technology LLP. In this interview with Rakesh Rao, he highlights trends in metrology and explains its importance for Indian manufacturers.

Kindly brief us about your company.

Big Zero Technology is primarily a metrology company. It was founded almost a year back with major focus on portable non-contact metrology, which we assume is going to be the future of metrology. We are in partnership with world renowned companies such as GOM GmbH for Blue light scanners, Kreon Technologies for portable arm CMM and laser scanners, Scantech for hand held laser scanners and Metronor for optical trackers which is being used for large part inspection. Besides, we provide locally assembled video measuring machines along with our own software. Very soon we will be entering into low cost automated solutions to support ever growing demand.

Metrology sector is primarily dominated by multinational companies. What prompted you to foray in this sector?

Being spent all my professional life since I came out of college, I know quite well this segment and major pain areas of customers. From start, we were very clear on what exactly to offer. Today, we are the only metrology company in India that focusses on camera, optical and laser based portable sensors. We cater to a focused market and down the line we want to be market leader in that. Started with manual



solutions, we are working hard to offer customised and automated solutions which are now in demand. At the same time, we are trying hard to maintain an affordable approach to post maintenance cost, which I guess is a differential for us.

What is driving demand for metrology in India?

Automotive is one sector which has huge demand considering their volume itself is huge. Aerospace, transportation, energy, defence etc are some of the known sectors where metrology processes have been defined and they invest regularly in such products. Now, the demand is changing, to survive and to grow, metrology products have to be a part of manufacturing processes, so that they can give real-time feedback for making the entire process error free. In nutshell, this is something what Industry 4.0 or smart manufacturing demands. Globally, all major metrology

companies are working on non-contact, easy-to-use sensors. Future is robotised, inline and custom-made sensors. We are going to see more of it in future.

Why metrology is crucial for companies during their journey towards modernisation to meet global standards for manufacturing quality products?

Without metrology manufacturing processes cannot be full proof. Gone are the days when one relies on conventional processes and wisdoms to validate their outcomes. Today customers demands digital over the cloud data to cross check the processes and results. You cannot achieve it without implementing high-end metrology processes which we deliver to our customers. There are some good references who uses our 3D scanners to validate and certify their products. Recently, we have been able to educate our customers about benefit of virtual assemblies, digital assemblies and lot of technical cross checks which actually validate the whole manufacturing processes which is well beyond dimensional inspections. Today, we help customers with such an enormous data that they can go back and see even tool path, excess materials, material thickness and lot more.

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In terms of level of adoption of metrology, how are today's manufacturing plants in India different from yesteryear?

It is a positive change. I still remember just 12 years back when I used to sell 2D height Masters, I had to face such a challenge to push and even with strong pitch sales were not that great, considering the volume we were expecting. Globalisation played a major role. All major companies now manufacture in places where they intend to save some cost but not compromise on any quality standards. This has brought much needed changes in our industry as well. From push to pull, we still need to cover a long way but transition has started and it is rapid. From customer's perspective, it matters a lot if product manufactured is of high quality. We have understood the essence and I am happy industry is moving in the right direction at a right speed as far as implementation is concerned. Still, we have lot of scope in in-line, automated and in-process products which are at a nascent stage at present.

Could you please share with us some of the latest product launches of BigZero?

We just launched our latest software GOM Inspect 2019, with a feature called Virtual Clamping which can turn out to be a game changer for industry, for the inspection of plastic and sheet metal parts.

Measuring with clamping fixtures is both challenging and expensive. Conventional forming processes such as injection molding and sheet metal forming result in deviations from the nominal component specifications. These deviations are commonly referred to as distortion or springback. In the past, components have had to be clamped in elaborate fixtures to compensate for these deviations while taking measurements and to simulate the assembly situation. But

with GOM's newly developed Virtual Clamping technology, this measuring process is set to become much more straightforward.

With the new module in the GOM software, it is now possible to calculate the clamped state of the real component in its unclamped state. This produces measuring data that is directly comparable to the clamped component. Furthermore, it is also possible to make statements about the real distortion or springback without needing to incorporate further measuring procedures. In combination with weight compensation, a new universal pneumatic device offers the crucial advantage that even non-rigid components can be measured independently of the real mounting position.

Computed tomography is increasingly used to measure small plastic parts with geometries which are difficult to access with standard measuring machines. As this measuring system is not suitable for incorporating a clamping fixture, Virtual Clamping offers a crucial solution in this regard.

It is said that for India to become a manufacturing hub (the key aim of "Make in India" initiative), it is important to focus on quality along with quantity. Do you believe in this statement?

I perfectly agree with this statement. To reach \$ 5 trillion economy, Indian manufacturing sector needs a solid boost. With export oriented focus, along with fulfilling local demand, we can certainly achieve this ambitious goal. We have domain knowledge, expertise and capabilities to achieve it. Quality products across the industry will bring us at par with global standards and it will help us attract more investments and more work. Metrology is a tool to standardise processes with validation of what you are manufacturing. In short, you get certified that you are manufacturing

as per global standards.

In terms of Smart Manufacturing where does India stand compared to other developing countries?

There is no doubt it has created a buzz in India on a positive note. We are not that far. In fact, we have taken the same flight which others have taken. Problems lie in implementation as there is so much confusion around its definition (since every segment defines it in their own way). Connected architecture with enormous data which can be used in intelligent manner is for me smart manufacturing. Slowly, we are indemnifying and I am happy to see everyone talking and trying to align their offerings in sync with that. We are not far away from seeing the real implementations.

How do you intend to take Big Zero Technology's growth story forward?

We want to become India's biggest metrology company in terms of most aligned offerings with industry. Besides products, we see some trends towards outsourcing of such processes. We want to tap that market as well where we get associated with industry for their complete processes irrespective of what equipments, software and expertise they need. This is something which can bring implementation cost down without compromising quality. We have started doing some pilot projects in this direction and after analyzing the results, we will roll out our plans in stages. We will be also adding few more partners to complete our missing links and will be in a better position to serve our customers.

Currently, we are serving our customers in Pune, Bengaluru and Chennai. In next one year, we will be opening our offices and technology centers in another 2-3 locations, out of this NCR is our first priority.

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“Companies are now investing more in CAE solutions”

Next-gen entrepreneurs are proactively trying new technologies as they understand the need and importance of changing with times. Digital transformation with IoT is a must to compete in the world of Industry 4.0, opines **Vikas Khanvelkar**, Managing Director, DesignTech Systems Ltd - a leading CAD/CAM/CAE, PLM solutions, additive manufacturing technologies and engineering services provider from India. DesignTech has strategic business partnership with global majors like PTC Inc, Stratasys, Solidscape 3D Printers, Altair Engineering, MathWorks, Synopsys, etc. In this interview with Rakesh Rao, Vikas Khanvelkar elaborates on how software tools can be used for achieving manufacturing excellence to increase competitiveness.

How can companies, looking to increase productivity, benefit from DesignTech services?

At DesignTech, ever since our inception in 1998, we have been working closely with the mechanical engineering industry in India, helping them make a transition from traditional processes of yesterday to adopting the latest technologies to match the global standards of engineering excellence.

Back in 1998, when 3D modelling software were not very popular in India and were considered an expensive investment, DesignTech worked on demonstrating the value proposition of adopting these software to the SME segment, thus playing a pioneering and vital role in popularising the new technology to the medium scale industries. Similarly, today, DesignTech is helping companies leverage advanced technologies such as PLM, CAE software, 3D printing, IIoT, and augmented reality (AR) for achieving their product design, development, manufacturing, and productivity goals. We work with our customers closely like a consultant, understand their working processes and challenges holistically and then suggest them solutions and/or services that would help them meet



their challenges while also enabling them generate highest possible ROI.

How are today's manufacturing plants different from yesteryear?

Ousting traditional manufacturing approaches and methodologies, companies in India are now embracing new ways and technologies for manufacturing. If the Indian companies have to remain relevant in the highly competitive global manufacturing segment, they will have to let go off the past ways and means of manufacturing and adopt the latest technologies and approaches to produce quality products at competitive prices.

Besides CAD technologies, companies are now investing more in CAE solutions that can help them

evaluate product design robustness, performance and identify weaknesses at the early stages of product design. 3D printing technologies are also seeing increasing adoption not just for product design and performance visualization and validation, but also are being used as production machines to produce customised parts for end use applications. CAM software are used for achieving manufacturing excellence through ideal tool path generation.

PLM solutions help companies manage their entire design data and resources including Man, money, machines and material, thus covering the entire product lifecycle processes to achieve greater efficiency. Today, companies use digital manufacturing solutions to design plant layout through ideal assembly line planning, robotics and human ergonomics analysis for seamless man and machine coordination, for augmenting the manufacturing productivity, and reducing the wastage of time and efforts, while also increasing the working safety and security of the work forces engaged in the manufacturing processes.

All these new technologies are helping companies achieve product design engineering and

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The new generation management that are now taking over the companies' operations are proactive to trying new technologies as they understand the need and importance of changing with times. They know that we cannot afford to be laggards and still expect to retain a leader's position in the market space. India already has earned a reputation for being an IT hub of the world, but manufacturing is the next alternative that will bring more foreign companies to India. With government focusing on Make in India campaigns, encouraging FDI, introducing policies for ease-of-doing-business, and focusing on skill development, we can see India gear up to go closer to becoming a highly competitive destination for manufacturing.

In terms of smart manufacturing where does India stand compared to other developing countries?

Smart manufacturing concept is a part of a larger Industry 4.0 idea. Digital transformation with IoT (Internet of Things) is a must to compete in the world of Industry 4.0.

Industry 4.0 is a revolutionary concept that will transform the way manufacturing has been carried out. IoT will be at the crux of it. Industry 4.0 basically is complete digitalization of processes, advanced automation and robotics, self-monitored and guided systems through artificial intelligence (AI) that would manage the day-to-day working of the factories. This is predicted to be the next big Industrial revolution. The human interface would be minimum as regular processes would be largely governed, managed, and executed through AI. The human interface component would be limited up to defining standards, providing logics and deciding the key boundaries and parameters within which the artificial Intelligence subsystems

would operate and would be allowed or given liberty to make independent decisions. There will also be complete digital integration with suppliers and vendors. The entire communication, management and review of processes and data would be conducted and shared digitally. It will be an 'All Connected' manufacturing platform

In today's competitive world, technology is seen as an enabler and the adoption curve is shorter. While technologies, such as AI, IoT and Industry 4.0 are at a nascent stage of adoption in India, as more and more use cases come to light, the adoption is bound to accelerate.

Currently, there is a demand for dashboard view as organisations want to gain insights into details, such as machine uptime, service dashboards, spares availability, to name a few. It's time that organisations will start exploring other applications areas and benefits of these technologies. Of course, lots of training and investments need to be done in the space.

What should be the role of government in encouraging companies to adopt latest manufacturing technologies?

Smart manufacturing is the future of manufacturing industry. Companies that do not reinvent themselves as per the changing times will perish and won't be able to sustain in this competitive segment. If Government of India has to make Make in India' campaign successful, then they have to help Indian manufacturing companies migrate from the ways of the past to adopting the new age technologies and approaches of manufacturing.

The government can do so by introducing initiatives such as spreading awareness of the changing industry trends and technologies; making these technologies available to the SMEs at reduced costs through services at institutional engineering clusters;

and developing skilling initiatives so that the manpower trained on these latest technologies is available. It should form committees to consult and work closely with the SMEs to help them perceive the advantages of adopting these technologies. Besides, the government should urge banks or other financial institutions to make the funds available at reasonable interests and lenient than usual payment options for the SMEs so that they can invest in these technologies.

Are you planning to launch any new product/solution for helping companies to become 'Smarter'?

DesignTech Systems Ltd has newly tied up with PTC as its value added reseller to promote and sale their Creo CAD, Windchill PLM, Thingworx Industrial IoT (Internet of Things), and Vuforia AR solution in India. We have also tied up with Open Mind Technologies AG for its hyperMILL CAM solutions that offers 2.5D, 3D, 5-axis milling and turning, as well as machining operations such as high-speed cutting and high performance cutting.

At DesignTech we have now expanded our presence to Singapore and Malaysia by signing as a value added reseller of Stratasys for its range of 3D printers and Altair Engineering for its CAE suite of solutions. DesignTech now is also the authorised partner in Singapore and Malaysia for Rosetta Stone which is a cloud-based Adaptive Blended Language Learning solution.

Besides that, DesignTech Engineering Services Division has also started their operations and now has a physical presence in the US and Germany. Through our Services Division, we are working very closely with companies from India and overseas helping them attain their objective of product design and engineering excellence.

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“Industry 4.0 is inconceivable without functional machine safety”

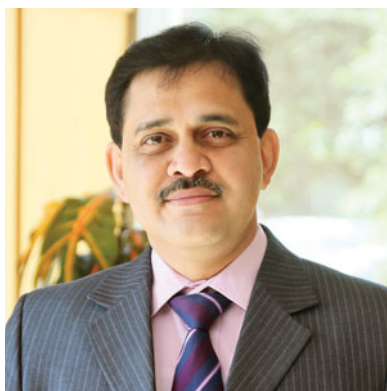
To compete globally, Indian companies, who are feeling the need of advanced production optimisation tools, have started investing in automation. But the digital transformation poses new challenges with regard to machine safety, says **Sagar Bhosale**, Managing Director, Schmersal India Pvt Ltd. In this interview with Rakesh Rao, he elaborates on relevance of machine safety and how Schmersal is helping companies to meet safety and efficiency goals.

Kindly brief us about your company and products & services offered it

The Schmersal Group is a global market leader in the field of functional machine safety with headquarters based in Germany. Our product range includes the latest generation of safety sensors and optoelectronic safety equipment to secure hazardous areas, as well as programmable safety and automation controllers, lift switchgear and switchgear for explosion protection. With our international subsidiaries and trading partners we are present in over 60 countries. And we are still on an expansion course, especially in the region Asia Pacific, Middle East. We have just opened new branches in Bangkok and Dubai.

Also, Schmersal has set up a safety services division named tec. nicum, which offers all machine manufacturers and operators a manufacturer-neutral consultancy on all statutory guidelines and supports them with the safe design of their machines. Our safety services division is a worldwide network with Functional Safety Engineers (FSE) certified by TÜV Rheinland. At Schmersal India, we have employed six certified FSE professionals. Schmersal India was established in the year 2007.

In 2013, we started manufacturing in Pune. Also, Schmersal has added more skilled manpower to enhance the local R&D team in the engineering



center in Pune and in the local product management to focus on developing even more products for the Indian market. To date, Schmersal is the only company producing safety switches directly in India – true to the motto ‘Make in India’. However, we have also started an export-oriented unit (EOU) in our factory to manufacture products and export to other parts of the world. So, India is a major hub, not only for the Indian market, but also the international market.

How can companies benefit from Schmersal as they strive to reduce cost and increase productivity?

Machine safety is of utmost importance to achieve these objectives. It is a prerequisite in any industry to improve efficiency. Well-planned safety solutions contribute to productivity because they prevent lost time accidents which cause production loss and economic damage. To achieve a

high-level machine safety, we, at Schmersal, recommend three steps of safety assessment. Firstly, we assess safety at the design stage, then we ensure to incorporate all safety measures during the production stage and lastly, we make sure all the safety standards are in place by actually monitoring the real-time performance of the machine when it gets deployed at the shop floor of the end user.

How are today's manufacturing plants different from yesteryear?

Flexibility is becoming an increasingly important characteristic of machines and systems. Batch sizes are becoming smaller, and it must be possible to adapt the machines to different products and market conditions both straightforwardly and quickly. This situation is due to shortening product life cycles, an increase in promotional items and special sizes, and both the trade and consumers want greater product and packaging variety. Therefore, machines are often of a modular design. This modularity makes it possible to react to market requirements more flexibly.

Packaging manufacturers, for example, also want quick format changes so that a very wide range of package sizes can be manufactured efficiently. These requirements have effects on machine safety. Greater flexibility can be best realised in relation to

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safety by using modern, safe control technology such as Schmersal's safety controller Protect PSC1. Programmable and configurable electronics permit the adaptation of the safety functions to the specific application. A major advantage is the modular design of the control technology.

In terms of Smart Manufacturing where does India stand compared to other developing countries?

Companies in India are showing an increasing readiness to adopt advanced technologies. An example is robotics: In 2017, robot installations in India increased by 30 per cent to a new peak. Hence, it is of utmost importance for companies to address safety issues with robots. They need to make sure that robots and humans are working together without endangering the human life and the process. Companies are getting more and more aware of the opportunities offered by state-of-the-art safety technology, especially in terms of productivity enhancement. The MSMEs have started incorporating simple electromechanical devices, non-contact type of sensors and simple safety relays in their plants, whereas the large-scale industries integrate high-end RFID products along with Safety PLCs making the most use of the technological advancement.

Why "Smart Manufacturing" is important for the success of "Make in India"?

Based on the fact that the company, which does not deliver price competitive quality products in shorter period of time is out of the race, Indian factories are feeling the need of advanced production optimisation tools. In order to be successful in the market the industry must continuously improve its competitiveness. Industry 4.0 concepts can help to achieve this goal. However, Industry 4.0 would

be inconceivable without functional machine safety.

International standards and global safety norms have propelled Indian companies to augment their safety initiatives. In today's connected age, safety and design engineers in Indian companies are constantly in touch with their global counterparts. They are updated on the safety practices and policies followed globally and feel necessary to have similar practices here in India. This is a great transformation as engineers now expect organisations to have machines conforming to relevant international standards. Therefore, Schmersal welcomes the decision of the BIS, the Bureau of Indian Standards, to adopt the ISO Standards. Not only because it will contribute to economic growth in India by facilitating immensely the import and export of machines to and from India. More important is, that employees in India will benefit from improved safety standards. And, last not least, our customers, too, will benefit from the introduction of the ISO standards. They should welcome this development even more because all Schmersal products already comply with the ISO standards.

Can SMEs also become "Smarter"?

Automation yields safer working conditions and better output rate. Slowly, small and medium-scale manufacturers understand this fact and have started investing in new technologies to increase the level of automation. But the digital transformation poses new challenges with regard to machine safety, too. However, many companies, and in particular SMEs, have constraints in terms of having expertise, skilled resources and labour capacity with regard to the complex issue of machine safety. So, with our safety services division tec.nicum we offer them either

selective support or the full-service package which includes comprehensive consultancy and project planning. In addition, we develop innovative safety technology that supports our customers in introducing digital production processes.

Especially smaller companies tend to neglect machine safety. Making them aware and convincing them to follow safety guidelines is a challenge. We at Schmersal conduct seminars especially in smaller cities targeted specifically at MSMEs and we offer them complete, easy-to-operate solutions. We also have a demonstration room at our factory, where customers can physically see the solution in use and experience the ease-of-using the device, its diagnostic capabilities and other useful features in person.

Are you planning to launch any new product/solution for helping companies to become 'Smarter'?

Just recently, the Schmersal Group presented a new Industry 4.0-compliant solution: the PROTECT PSC1 safety controller with integrated OPC UA server. Thanks to the integration of OPC UA into the PSC1, the data of our products can be made available for a manufacturer-independent exchange, be it from one machine to another or for cross-company communication. We consider OPC UA as a pioneer for Industry 4.0 as it standardises industrial communication and ensures interoperability between products from different manufacturers. Also, Schmersal recently presented a new "Safety to Cloud" solution, ie this solution enables the communication from the sensor right up to the cloud. These are all examples about how Schmersal is developing pioneering safety technologies to support our customers in the introduction of Industry 4.0 compliant production systems. 

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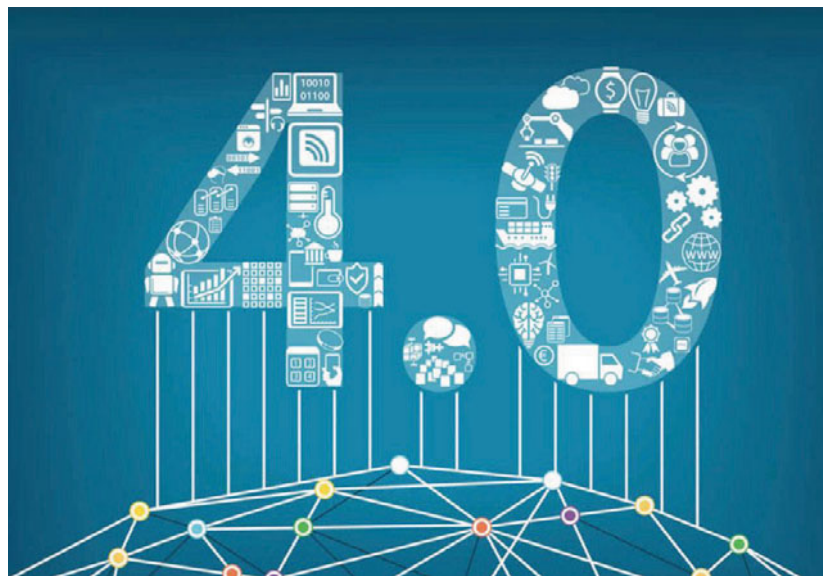


Integrated manufacturing is the essence of Industry 4.0

Advances in the industrial operations management technology today, are paving a way for faster, connected, efficient and data driven manufacturing processes. These processes have evolved into a computer-controlled process, taking care of regular day-to-day tasks more efficiently. In this article, **R Jayaraman**, takes a look at the factors that contributed to establish Industry 4.0.

Industry 4.0 is arriving soon in India and the initial signs are beginning to blossom. Global industry has moved from 1.0 to 3.0 in about 250 years, and now, from 3.0 to 4.0 is set to happen. While Industry 1.0 lasted for about 150 years, Industry 2.0 lasted 70 years, and Industry 3.0 has lasted all of 50 years, till date. However, Industry 3.0 has already become Industry 3.5 with the increasing role played by internet, cell phones, telecom interconnectivity, and data transmission and processing/analysis. Big data and data analytics have started to shake the foundations of Industry 3.0, to advance it to Industry 3.5.

Industry 3.0 was dominated by information technology (IT). While Industry 2.0 was the engineers delight, Industry 3.0 became the computer engineers fiefdom, with advancements in IT leading to growth, productivity, new products, improved market interactions, speedy feedbacks, all leading to the practice of closed loop manufacturing. Such an approach suited the plan - do - check - act (PDCA) methodology, which had come to dominate industrial thinking in this phase of industrial development. While PDCA became the backbone of competition, beginning 1950, after the solid foundational work done Dr Deming, Dr Juran, Dr Ishikawa, Dr Crosby,



Dr Shewhart and others, it was the advent of Industry 3.0 in 1970's which gave a great push to world class manufacturing.

World class manufacturing: World class manufacturing was a terminology coined after the declaration of the Malcolm Baldrige model in 1987. The idea was to create world class companies on a premise to practice 11 core values. These values were identified as: visionary leadership, customer -centered excellence, valuing people, organisational learning and agility, focus on success, managing for innovation, management by fact, societal contributions, ethics and transparency, systems perspective, delivering value and results.

Adopting these values, companies developed an integrated organisation over time, which led to all round, holistic, responsive and pro-active excellence. Knowledge management and information and analysis formed the foundation of the excellence model.

The measurement and analysis part was strengthened considerably with the advent of IT into the processes which governed the day-to-day management of companies. Mass IT usage, signifying the extensive use of IT in all areas of work in an organisation, led to speedy information transfer, quick analysis, more frequent, customised reports generation which then were used for decision making. The core value practice



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intensified due to the mass IT usage, in turn, led to the creation of integrated organisations. Such integrated organisations were responsive, efficient, pro-active and functioned on the basis of well defined methodologies as prescribed by ISO and other relevant systems standards. The pinnacle of the excellence movement was achieved through Industry 3.0 by around 2000.

Sometime in 1994, the triple bottom line (TBL) concept was enunciated. Whereas, earlier, the intention to create world class organisations was limited to their economic activities, the TBL concept called for the creation of a socially responsible and environmentally friendly organisation, in addition to their being successful in the economic marketplace. Addressing all three would lead to sustainability, both in economic and societal spheres. Thus, the TBL made possible truly holistic excellence in organisations, with the goal of sustainability being supreme. While organisations used operations strategies to achieve sustainable business competitiveness in the marketplace, the TBL put additional requirements on operations strategies to become holistic.

TBL, world class manufacturing and Industry 4.0:

While Industry 3.0 was adequate for creating economically successful organisations, the TBL demands put an additional strain on organisational profits and profitability. Costs incurred on CSR and environmental friendliness could not be recovered, partially or fully, from customers, who were already looking for better value propositions. Increasing prices was out of the question, and companies had to find new value propositions through other means. That's when Industry 4.0 was resorted to.

IT gained wide usage and

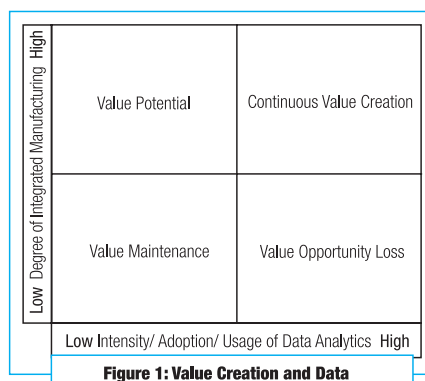


Figure 1: Value Creation and Data

experience, the next development was the learning of abilities to utilise the IT generated data, information and automation, to improve company operations, in a systematic way, on a huge scale never imagined before. One of the first few companies to benefit from Industry 4.0 were the eCommerce organisations like Amazon, Flipkart, Fedex, UPS, and others, who created a virtual marketplace. With this, many companies could do 24*7 work using telecom supported connectivity, software driven networks, and newly developed software programs to process voluminous point of sale (POS) data.

The improvement is achieved in many ways. AI controls can be pre-programmed, using algorithms developed through experiences and theoretical frameworks, thus becoming intelligent controllers, many times replacing human interventions, makes error-free, never flag in performance rate, and make on-line, real-time corrections as needed, determined through feedback, to keep the output profiles constant. Such manufacturing systems make for low cost, high volume combinatories, very useful in competitive markets. AI enables connecting several machines to each other, thereby creating intelligent networks, which can become self-driven factories. Human interventions can shift to areas such as, AI design, maintenance, development, and

designing networked factories for Industry 4.0.

The other way is to go in for data driven operations, which is capturing data from various machines, from the marketplace, from vendors etc., and use data analytic tools to derive inferences and conclusions, and use them in the processes to obtain improvements and responsiveness. This method does not necessarily make use of networked machines, AI driven equipment, which, at least to begin with, can involve long efforts and high costs. However, closed loop efficiencies can be achieved through data analytics, establishing appropriate connectivity, and then reprogramming the IT driving the machines. In single machine instances, or self-controlled devices, closed looping can be done without resort to AI. A sensor-controller mechanism should do the job, as is already being done by many climate control devices, such as, air-conditioners.

In both of these alternatives, integrated manufacturing, which uses features from both the alternatives, AI driven machines, and POS and other data driven decisions, and algorithms to improve and integrate. Only such a combination will lead ultimately to a responsive and pro-active TBL sustainable business.

Big data analytics and Industry 4.0:

While data analytics was used in Industry 3.0, big data analytics has changed the scenario. Higher data processing speeds, advancements in hardware like clouds, high storage devices, high speed data transmission media like 4G, have enabled data crunchers to collect and analyse data like never before.

In the long term, high data analytics usage is the way forward, any other path will lead to death. The survive quadrant is valid only in the short term. This is mainly

because big data analytics takes a different view of business, as opposed to the current, Industry 3.0 view. The word integration acquires a new meaning in Industry 4.0. The combination of several data capture points, speedy transmission of all such data, collation and analysis using powerful algorithms developed specifically for the purpose, AI driven closed loop responsive machines, all make for a mass customisation reality, which has been missing in Industry 3.0. In fact, many companies have tried and failed in their mass customisation efforts using Industry 3.0 basis. Inadequate data collection, inadequacy of algorithms to analyse, lack of speedy transmission and, ultimately, a complete lack of a responsive networked machine structure to make use of the decisions from data analytic tools speedily and integrally, have made Industry 3.0 unsuitable for mass customisation. However, the future will surely be driven by mass customisation, and companies must respond to this demand.

Integrated manufacturing, big data analytics and Industry 4.0

The ultimate goal of excellence in holistic manufacturing is integrated manufacturing. Such manufacturing is take time driven, responsive, self-adjusting, and able to meet mass customisation needs. Figure 1 shows that integrated manufacturing and data analytics go hand in hand, and, in case any one of them is deficient, value creation is hampered. Here, value creation is used in the sense of an organisation delivering TBL compliant outputs.

Integrated manufacturing is the essence of Industry 4.0. TBL compliance can be achieved only through integrated manufacturing. Big data analytics (or data analytics) is a key piece in this scenario. It drives, and, in turn, is driven by the needs of integrated manufacturing. Already, considerable advancements have been made in both these areas. However, the gaps in AI, machine learning, IIOT, and development of new business models which can carry the load of the TBL requirements and still remain profitable, are evolving. The benefits due to the new developments in computer and related technologies will surely provide a channel for making Industry 4.0 happen.

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About the Author:



R. Jayaraman is working as a Professor, Operations and Supply Chain Management, SP Jain Institute of Management and Research. His areas of research interests are those of inventory management, supply chain, operations planning, lean management and operations strategy.

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Industry 4.0 is changing dynamics of manufacturing industry

Industry 4.0 is all about leveraging automation, data-driven manufacturing processes, the Internet of Things (IoT), emerging technologies, and intelligent tools to create products of the future. In this article, **Utkarsh Bansal**, analyse changing trends that will revolutionise in manufacturing industry.

The new era is marked by smart factories and intelligent manufacturing. In Industry 4.0, machinery is equipped to provide real-time data supported by advanced technologies, which enable higher production efficiency and assured quality. The following emerging trends in the manufacturing industry are believed to empower manufacturers in the upcoming years.

Automation: The new age automation is not the one where machines will replace human beings, on the contrary, the automation for manufacturers in Industry 4.0, is one where humans and machines will work in close collaboration. Smart factories are gaining popularity owing to its contribution to process optimisation and cost reduction. However, the rate of automation adoption in Indian manufacturing industry is still in the initial stages, where big players have already embraced the technology, few are just getting started and others are yet to explore the implications.

Personalisation: The trend in the industry is shifting from mass production to customisation and personalisation of the products. Today's digitally savvy customers expect highly personalised and contextualised experiences. In order to meet the expectations manufacturers are banking on new generation marketing tools and



data-enabled technologies. Real-time data collected from various sources and techniques are enabling manufacturers to understand their customers' needs. It is helping them in providing better customer experience and achieving higher retention through targeted production. To live up to the dynamic customers' expectations, organisation expands and launches new value-based products almost every year.

Digitisation: Digital transformation is entirely changing the manufacturing industry by taking it to the digital world. Consumer expectation is driving the digitisation of the industry leading to a growing need for innovative products, new production methods, advanced technologies, and improved production processes. The

digital manufacturing technologies have become crucial for development and sustainability of businesses in the industry.

Industrial IoT (IIoT): The IIoT is estimated to create \$ 15 trillion of global GDP by 2030 and is poised to have a significant impact on the manufacturing industry. The IIoT is a trend that is gaining traction steadily and is expected to have a deeper implementation in the years to come. It is revolutionising the industrial environment, changing consumer-focused capabilities, and making the industry more efficient. In the upcoming years, IIoT will help in unlocking new products and enabling an advanced level of integration and collaboration within the system.

Green manufacturing: With climate change being one of the

pressing issues of modern times, businesses are becoming more mindful of the effect their processes are creating on the environment. Manufacturers of Industry 4.0 are incorporating various eco-friendly initiatives for waste management, sustainability and reduction of carbon footprint. For instance, plants in West Bengal have been recognised as Zero Discharge Plant and they also get certified by the West Bengal Pollution Control Board. Such green initiatives within the manufacturing industry are becoming crucial for companies to position themselves as responsible corporate citizens in a market driven by environmentally conscious consumers.

Intelligent manufacturing: According to IDC's predictions 20 per cent of G2000 manufacturers will have transitioned to intelligent manufacturing by 2021, reducing the execution times by about 25 per cent. While McKinsey forecasts seven times higher annual improvements in efficiency for companies which have embraced intelligent manufacturing. Intelligent manufacturing uses the latest human-centered design built on leading-edge technologies to bring humans and machines closer. Intelligent manufacturing also provides a better approach to engage and improve value throughout the customer lifecycle.

Attracting and retaining right talent: Talent acquisition and retention has become one of the greatest challenges as the manufacturing industry enters the fourth revolution. According to Deloitte and The Manufacturing Institute skills gap and future of work study, 2018, there would be around 2.4 million unfilled jobs by the year 2028. The growing shortage of skilled workers in coming years is forcing companies to adopt new policies, provide flexibility and better work-life balance to their employees.

The new age technologies in the fourth industrial revolution are transforming manufacturing into a smart, integrated, and more productive industry. Intelligent manufacturing facilities with tech-savvy workers are replacing the man-powered shop floors of the past. To survive in the modern environment, present-day manufacturers must rely on technology to drive breakthrough innovations. At this era organisations, along with technology adoption, are also looking beyond digital to understand the needs of their customers, employees and the environment as progressing through the new era of Industry 4.0.

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About the Author:



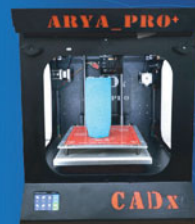
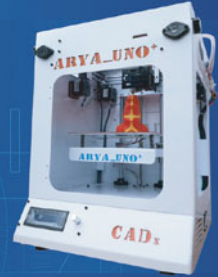
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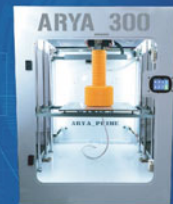


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Industry 4.0: A Challenge or opportunity for SMEs?

Emerging globally as a powerful force, Industry 4.0 is characterised by digitisation and interconnection of products, value chains and business models. In this article, **Sunil Mehta**, takes a look at the SME perspective on Industry 4.0.

Industry 4.0 is driven by an amalgamation of technologies such as internet of things (IoT), artificial intelligence, data volumes, business analytics, computational power, augmented reality, elemental design, advanced robotics, simulation, additive manufacturing, cyber-physical systems and sensor based technologies. It results in smart factory, which is characterised by resource efficiency in the factory processes along with higher reliability and a conspicuous improvement in the quality of the output as well.

Though India focuses on service sector for growth, the manufacturing sector needs to play a significant role in the Indian economy. Make in India program launched by Government of India is aimed at placing India on the world map as a manufacturing hub. SMEs play a pivotal role in building economy and provide a large share of employment.

Impact on workforce

With big-data-driven quality control, the number of workers required in quality control will be reduced but there will be an increase in demand for industrial data scientists.

- Robot-assisted production will reduce the manual labour in production operations but there will be demand for job-robot coordinator.
- Self-driving logistics vehicles that will be used by food and beverage manufacturers will

reduce the need for logistics personnel but then it will increase the demand for technical designers.

- Implementation of smart supply network will enable better supply decisions. This will reduce jobs in operations planning but on the same hand it will create demand for supply chain coordinators.
- Predictive maintenance will help in repairing equipment before breakdowns occur and this will result in jobs related to system design, IT, and data science.
- Additive manufacturing of complex parts will enable manufacturers to create complex parts in one step and will eliminate the need for assembly and inventories of individual parts. But there will be new jobs in 3-D computer-aided design and 3-D modelling.

No doubt, with Industry 4.0 the demand for highly skilled workers in IT, analytics, and R&D roles will increase, as well as new jobs will be created resulting from the types of revenue growth opportunities.

Role of SMEs

SMEs play an important role in smart manufacturing. SMEs should focus on quality, efficiency, traceability and collaboration. India is a dynamic and growing market with lots of opportunities and a few challenges. Challenges with Indian manufacturers are variable market demand; leverage flexibility in manufacturing and/ or sourcing;

management readiness; need discipline and cultural change; design standardisation; need to manufacture single quantity batch without reducing efficiency and compromise on quality; and need for complete supply chain to be automated.

One of the major contributors to smart manufacturing is IT, which is reckoned as backbone of the sector. Fortunately, India is a talent-rich country, especially in the IT sector which is full of opportunities. In the future, India can create its own path for smart factories. To strengthen India's manufacturing sector, the SMEs should be encouraged to become partners with larger organisations that can provide various customised solutions to Indian manufacturers.

Indian SME sector should look up to market leaders for technological assistance, which can enable Indian companies to explore markets in other Asian countries. Most of the SMEs in India have good technical capabilities, however, they need to implement and improve processes of design and quality measurement. This will help them to expand their horizons and help them explore markets in Asian countries other than India. Apart from helping them with technological assistance, market leaders can also help them in strategy formulation and quality assessment.

Mega trends those are transforming India economy is urbanisation: Now SMEs can see

opportunity by visualising city as a customer, infrastructure development, smart is the new green, innovating to zero: eg zero defects, zero debt.

Skill challenges

Presuming that complete automation is not the realistic view, it can be said that Industry 4.0 will increase productivity through a mix of physical and digital assistance systems. This will happen as the technological advancements brought by Industry 4.0 will mean that physically demanding or routine jobs will decrease, while the demand of jobs that require problem solving, flexible responses, and customisation will go up. The employees might have to combine the skills of know-how related to a job with IT competencies.

Manufacturing challenges

Some key challenges in manufacturing after realization of

industry 4.0 potential are lack of a clear digital vision, fostering a strong digital culture, data security, Level of digitisation, a lack of data analytical capabilities, lack of standardisation, prevalence of proprietary standards is going to be a key roadblock, and the major risk with recording, storage and analysis of large volumes of customer data is the inappropriate use of the said data.

Benefits of Industry 4.0

By adopting Industry 4.0 standards, SMEs or the manufacturing units reap rewards such as lower cost, optimised customer relationship, additional revenue, clarity on the status of production system in real-time, transparency in production processes, reduced inventories, improvements in the health and safety of workers, maintenance processes standardization, energy-efficient and environmentally sustainable

production and systems, Effective use of human and material resources, and 100 per cent traceability.

New opportunities will open up for SMEs with the industrial internet of things (IIoT) and e-commerce platforms where they can offer tailor-made services and products using digital platforms. It will also enable them to internationalise and become micro-multinationals, generating new jobs and revenues, fuelling innovation and increasing efficiency. SMEs can benefit from lead firms in global value chains, offering new products and services to SMEs.

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About the Author:



Sunil Mehta works as a General Manager - Automotive Business Development, Factory Automation & Industrial Division at Mitsubishi Electric India Pvt Ltd.

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Need to upskill workforce for employability

With Industry 4.0, breakthrough technologies such as artificial intelligence, robotics, data science, quantum computing, and internet-of-things (IoT) will help enable advanced applications such as social robots, autonomous vehicles, virtual assistants, 3D printing and desktop manufacturing. In this article, **Dr Gayathri Vasudevan**, talks about effect on employment due to advanced technology and challenges in skill development.

In an organisation, automation plays a crucial role for the tasks performed. Skills are required to perform the tasks efficiently. It is noted, jobs that require refined perception and physical agility, creative intelligence/ improvisation, or social intelligence, regardless of whether they are low-skilled, are less at risk of replacement.

Dynamic workflow

Industry 4.0 marks a paradigm shift from the past era of rigid, efficiency-focused and manual manufacturing to a dynamic, flexible, and automated manufacturing techniques. This clearly indicates a shift of focus from mass production to mass customisation.

Similarly, there is a transition among large-scale factories, product-specific processes to smart factories which can produce multiple products at a competitive cost with superior technology and automation. Ability to adapt will also facilitate to work remotely using technologies such as Augmented Reality.

However, a smart factory or factory 4.0 that leverages all fundamental doctrines – the internet of things, additive manufacturing, and big data, is not yet pervasive in India. Though there are few companies besides large global players that has done so, the full potential of Industry 4.0 is yet to be



leveraged particularly in emerging markets.

Effect on Jobs

Technology and automation is here to stay is given. It is, but logical to assume that productivity will be better with automation and technological advancements. At the same time, this brings to fore a moot question - the effect of technological advancements and automation on jobs. Two schools of thoughts have emerged in the expert analysis regarding the impact of automation on jobs.

Several experts believe that the adoption of Industry 4.0 will result in improved use of automation and robots on the work floor. Given that the robots are competent to perform repetitive tasks with high levels of accuracy and within shorter durations than humans, robots will act as an efficient replacement for human labour.

The other school of thought believes - the latest technologies will not result in job loss, instead

automation will increase the employment opportunities. The basis for this belief is the fact that Industry 4.0 will result in an increase in labour productivity and the quality of the products manufactured, resulting in an increased demand for quality products, presenting companies with no option but to build capacity to meet the demand.

There is no doubt that specific low-skilled jobs will be extinguished. While automation is here to stay and make deeper in-roads, a research paper by Asian Development Bank said, new jobs will appear, but those will require skills that workers do not possess. This squarely reinforces the need for a more robust and concerted skilling exercise.

Skill India for skill readiness

The success of any industry depends not only on the machines deployed for manufacturing the products but also on the labour force employed. The employees are required to have the necessary skill sets to operate machines efficiently and to guarantee that the processes as per standard operating procedures.

- Skill-readiness of the labour force. General education, as well as vocational education, has a critical role to play in making the labour force industry-ready.
- Challenges faced by companies



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in finding a skilled workforce with skills required for the jobs changing faster, companies across the world are facing challenges in finding skilled workforce at current skill levels. With technology's faster metamorphosis and displaced workforce, the talent pool through which employers have to select workers is shrinking.

To overcome the difficulties mentioned above, companies are resorting to building capabilities of their existing workforce, developing new recruitment channels and tapping into labour pools of different countries.

Skill related challenges companies face:

The companies will not only face trouble in finding skilled employees but also face other difficulties related to their exiting workforce and their skill development.

- Up-skilling: Companies have to up-skill their workforce via in-house or external training centers.
- Re-skilling: Companies will have to invest in re-skilling of the labour force in preparation of this expected shift.
- Continuous Learning: Technologies become obsolete at a faster rate. Continuous professional development strategies will be needed to adapt to the changes that technological advancement brings quickly.
- Mindset change: Companies require to plan for mindset change of its employees to facilitate them to adapt to some changes to a smooth transition to advanced manufacturing processes.

Challenges faced by skill development in India

India has realised the importance of skill development in boosting economic growth. From increasing education expenditure

to a growing network of vocational trainers by launching nation-wide programs, initiatives have been launched to make the labour force industry-ready. Here are some observations:

- Mismatched demand-supply: Today, vocational education and skill development in India are primarily supply-driven, resulting in a high mismatch between the skill sets of the workforce and the industry expectations. This resulted in low employability among the youth. To mitigate this issue, companies have been running in-house training to impart the essential skills, but this came at a cost.
- Access: India sees very little participation in vocational education due to the lack of access to vocational education as a sufficient number of vocational schools and training institutes across the country either do not exist or do not offer the relevant courses to make the work force industry 4.0 ready.
- Lack of industrial training: Students lack the practical exposure, which helps in a quick adaption of technical skills as apprenticeships are not included as a mandatory part of vocational education.
- Quality: India also faces challenges in terms of having inflexible and outdated curricula, shortage of qualified teachers and trainers and unavailability of sophisticated infrastructure.
- Prejudices: In India, the Vocational Education and Training (VET) suffers from a negative image, as it is considered as a career choice for students who are less qualified academically.

Government initiatives

The government of India has formulated a national policy on skill development to create a workforce empowered with

improved skills, knowledge and internationally recognised qualification to gain access to decent employment and confirm India's competence in the dynamic global labour market.

In line with the policy, the National Skills Development Corporation (NSDC) was established as one of its kind public, private partnership in India to fulfil the growing need for skilled workforce across the sectors and to narrow the existing gap between demand and supply of skills by focusing on the expansion of the vocational education network. NSDC has also facilitated the establishment of around 40 sector skill councils (SSC). SSCs play a vital role in bridging the demand-supply skill gap.

Government of India also launched National Apprenticeship Promotion Scheme to promote apprenticeship training in the country. As it is considered to be one of the most efficient ways to develop skilled manpower for the country. It provides for an industry led, practice oriented, effective and efficient mode of formal training.

To improve industrial training scenario, India has also launched the National Employability Enhancement Mission (NEEM). The objective of NEEM is to offer on-the-job training to enhance employability of a person pursuing his or her graduation/ diploma in any technical and non-technical stream.

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About the author:



Dr Gayathri Vasudevan, CEO & Co-Founder, LabourNet Services India Pvt Ltd has a doctorate in Development Studies with more than 23

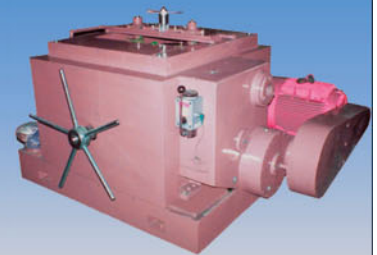
years of consistent work in national and international organisations, Gayathri has been extensively involved in policy issues and community mobilisations relating to labour and livelihoods.

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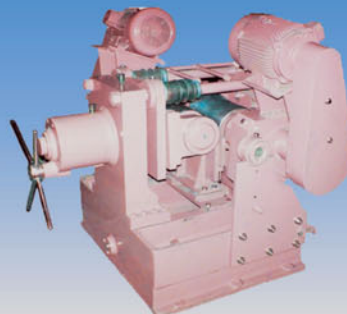
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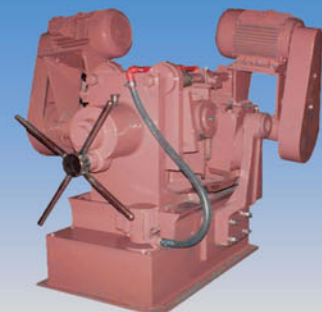
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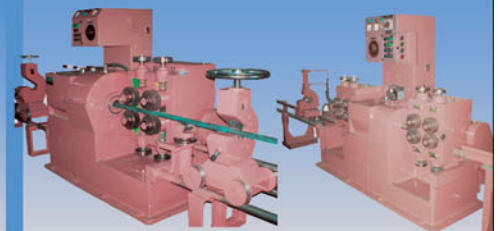
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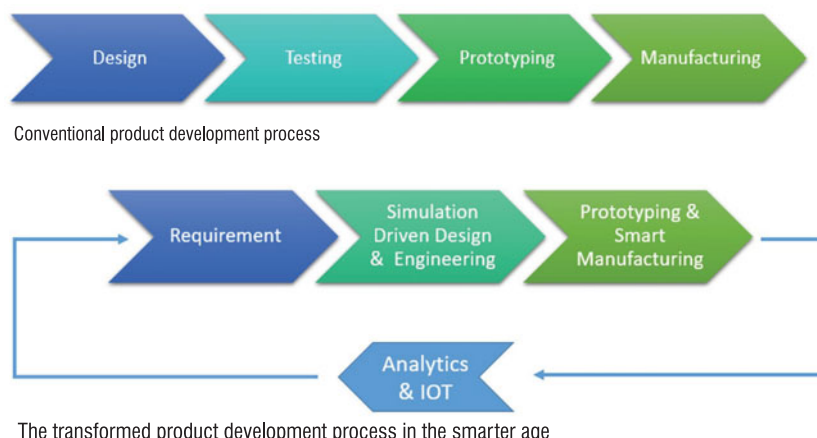
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Right design strategies in the age of smart manufacturing

Products from mass customisation segment in the age of Industry 4.0 pose different challenges to design and engineering teams. Smarter tools can make mass customisation possible using smart manufacturing methods in smart factory, says **Karthik Shankarane**.

In the digital age, automation, internet, data sciences and analytics are playing a critical role in manufacturing and keeping it smart. In Industry 4.0 and beyond, products that are of 'mass customisation' nature is spread across different industry verticals and have brought together IoT, different dimensions to product design and engineering besides defining the need for emergence of smart factory.

In today's highly competitive market, each company is trying to get their products to market, better than the previous version, and faster than their competitor. The mandate of fast to market would continue to be relevant not just for manufacturing, but also for design and engineering. This calls for transformation to product development process, from the traditional method, towards a more virtual process. The virtual product development process involves simulation driven engineering, and a model based systems engineering approach. In the age of smart manufacturing, where mass customisation also plays a significant role, time is of the essence. The scope for physical prototypes based product validation from design and engineering stand point would result in a highly condensed timeframe, which would enable products to get to market faster. Design, virtually validates the product performance and then manufacturing would be ideal work flow considering the data and



simulation driven approach in the age of "smart manufacturing".

Strategic designing

Generative design approach brings in manufacturing considerations upfront into the design exploration process besides the structural performance and mass optimisation considerations. The advantage is no different, while topology optimisation approach is adopted to come up with mass efficient concepts that consider manufacturing feasibilities. This way the design and engineering methodologies do factor in the downstream "smart" manufacturing methods. With additive manufacturing it is feasible to realise several efficient structural load paths/ topology arrived at by optimisers. The topology optimisation-based approach and connectivity to smart manufacturing method have been leveraged already in aerospace industry.

For instance, in the bio medical industry, methodologies like CAD

data morphing, automation of CAE/ Virtual validation process and connectivity to manufacturing method holds significant value. Patient specific hip implants, for example would immensely benefit from this tightly integrated design, engineering and additive manufacturing process. This advantage makes sense to patient specific dental implants and bridges as well. With advances in 3D model creation and morphing techniques it is possible to make patient specific or pathology specific pre operative rehearsal. This is yet another way how morphing tools are helping out realise appropriate product configurations and then with STL interface the morphed model could be used for 3D printing. Smart manufacturing is very much applicable to even 3D print Mitral Valve that could be used as a surgical training tool.

In the automotive industry, smart factory has agile and flexible robots. It is possible to accommodate

changes to the product with minimal intervention. Automotive and commercial vehicle manufacturers have plenty of welded assemblies. Design and engineering teams continue to look at optimisation from process stand point as well. Seam weld length and number of spot welds could be potential design variables from optimisation perspective. Spot weld count reduction without performance degradation could very well save money and time. These are some examples of possible value from tight integration of design and virtual validation tools with manufacturing process in the age of smart manufacturing.

Staying with mobility domain, custom interiors are a major need and smart manufacturing like 3D printing is already being leveraged. This is particularly true for several vehicle or product volumes that do not justify cost of tooling and

injection moulding. 3D printing is also being adopted for pre series tooling with reference to interior trims. 3D printing method along with math model morphing is used to fine tune and optimise the mold design before creating steel version of the final mold.

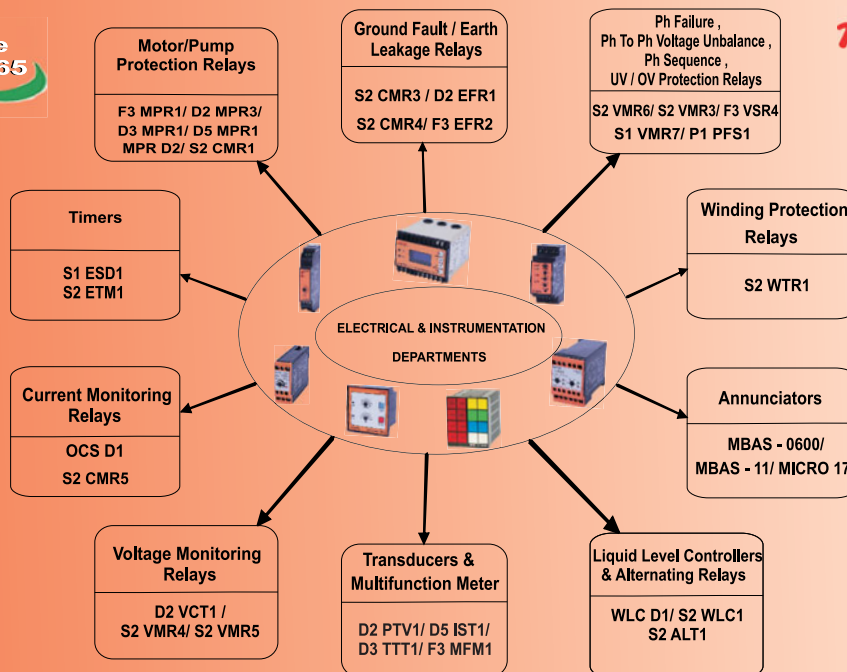
Products from mass customisation segment in the age of smart manufacturing pose different challenges to design and engineering teams. This is particularly true from electronics devices and consumer goods segments. It is almost concurrent engineering where virtual validation is very critical to check and ascertain product performance before it is made. Parametric technology applied to virtual validation models help realise the math model of the product configuration quickly so that performance can be evaluated before product is manufactured.

The application of smart manufacturing is not only transforming the way things are done in various industry verticals but also clearly illustrates the benefit that generative design, virtual validation, and math data morphing bring to smart manufacturing. Smarter tool sets and methods to design and engineer products would go a long way to make mass customisation possible using smart manufacturing methods in smart factory.

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About the Author:

Karthik Shankaran is the Chief Innovation Officer (CIO) of Detroit Engineered Products (DEP). In his role as CIO, he helps shape DEP's long-term innovation strategy, accelerating and supporting innovation throughout DEP and creating new businesses. Karthik has more than 20 years of experience across the industry including 10 years in the US working with industry leaders such as General Motors.



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A winning IIoT strategy: Avoid the common pitfalls

History shows that over 50 percent of those projects failed because the platforms were built without a solid understanding of what the user is going to do with them. Hence, start with a solid vision and business case of how IIoT will create competitive opportunity and profitability, says **Michael Brooks**.

The keys to getting started with IIoT should sound familiar: Be agile. Start small. Don't wait, start now. Work fast on a real project. Learn, toss out what does not work and seek real business value. Okay, but what are the impediments to success?.

IIoT projects can be today's version of efforts made 20 years ago. Remember the IT group saying, "We need a data warehouse," or "we need to be doing business intelligence?" My response remains the same today: "That's the answer, what's the question?"

History teaches us that over 50 percent of those projects failed because we built the platforms without a solid understanding of what we were going to do with them. You can see it happening again with IIoT, Industrie 4.0 and digitalization. So, don't get lost in the zeal and enthusiasm for the latest technology; pick the most important business problem first and then work towards the solution. Do not build a special mousetrap then start looking for special mice. Start with a solid vision and business case of how IIoT will create competitive opportunity and profitability.

Culture and money: TYour corporate culture decides if/how something can be achieved. Culture determines how your company will assess performance, allocate resources and propel intrinsic motivation. Is your leadership reaching past what was to achieve



what can be? Has the funding been approved, not just for a trial, but for the real project? Is the organization ready? Most importantly, do your leaders show urgency – are they really walking the walk and totally aligned to improve operational excellence, safety, environment, downtime, profitability and more? By selecting an important business issue in manufacturing or the supply chain you will do real work on a real problem. Clarity of vision and goals ensures you will avoid a science project where engineers and data scientists play technology games in the corporate sandbox looking for a problem. Drive a transformation from the executive suite implementing widely through P&L (profit-and-loss) business managers. Do not treat IIoT as an isolated IT implementation effort.

Avoid the competency gap You can attempt to close the capability gap by building the skills and the culture to sustain it. However, my advice is to use products/tools that do the job and fit the competence and skills of current

staff. The artisans on staff already understand the domain-specific issues needed for problem solving. Carefully assess your team's experience and skills.

Avoid making impulsive hires who may be highly-skilled data scientists. Project implementers must know and understand use cases. Data scientists bring complex data analysis skills such as machine learning, but rarely deliver experience from the problem domain. Machine learning will find all manner of data correlations where some are often meaningless. For example, data has shown that importing Mexican lemons has improved highway safety a great deal.

Understanding causation requires knowledge and experience. What time, skills and experience will you need to attempt a solution, how long will it take, and will it scale? Choose carefully.

Technology, methodology and work process: You may discover that analytics technology alone is never enough to move the needle and drive business. Fundamentally, any IIoT project always needs technology, methodology and work process foundations. The path you choose to deliver these elements will determine whether your project is easy or hard - does the product you have selected embed methodology and work process for you? If not, your work will be far more difficult.

Make sure the technology is solid, tested, referenceable and not

a science experiment. Then, if you have chosen wisely, your software application can also provide an implementation methodology that assures a solution is quick and easy to build with your team's current skills and that it scales readily to meet site and corporate needs. Such competence will assure you can run a program to execute small and grow rapidly to scale – learning as you go.

If the application does not provide implementation guidance, then you must manually develop your own methodology. Similarly, the work process determines how you will use the finished application. What does it take? How do you respond? Is the process cumbersome, taking excessive time and effort? Can you handle it all yourself without donating intellectual property or needing lifelines for third-party experts and services? Is it important to minimise cyber security concerns by implementing the application completely inside your firewalls?

You will benefit from the robust, proven application, its accompanying methodology and a work process that allows you to start small, execute and learn, and rapidly move and scale through your operations.

Data and software strategy: Avoid the trap of all dashboard, no improvement. Lagging indicators on dashboards cannot present the leading indicators of future performance that predictive and prescriptive analytics solutions provide. Avoid collecting ALL the data in case you might need it someday. Formulate your data requirements based on knowledge of the business and the problems you are trying to solve. We are talking about data-driven solutions. While you can always find opinions, no data means no solution. Make sure you understand what information you need for project success.

You are not doing banking, creating facial recognition, or

building driverless cars... your correlations of symptoms and causes are in industrial data: messy, missing, highly volatile, and often mis-labelled. What data do you (and the application) need, from which sources, and at what frequency? How will the data be gathered, amalgamated, validated, cleansed? You must know these answers in advance to scope and scale the project. Last, is the solution truly data-driven, with high accuracy, always telling the truth with no false alarms? Is it capable of tuning itself to keep up-to-date as conditions change?

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About the author:



Michael Brooks is the Senior Director, APM Consulting, at Aspen Technology. In a business development role, Brooks' role is to accelerate the introduction of APM software suite to the marketplace.

TECH BYTE

Bettinelli's high precision link conveyor: A range in constant evolution

Cam Driven Systems (CDS), a division of the Bettinelli S.p.A. group, offers the widest range of positioners, rotary tables and cam mechanisms for the automation processes. The precision link conveyor TL series has been designed to meet the requirements of high productivity and reliability of the modern automation, combined with excellent precision and speed, with a high degree of versatility to offer customers the most suitable solution.

The need of the market and customer orientation, added to the desire of CDS to want to expand and improve its product range has

brought new innovations to the TL series.

TSL 200: Based on its TL 200, the company has reduced the deep of the body, with the same stroke, with a consequent reduction of the gearwheel diameter and a better ratio with the driver unit and a better positional accuracy. The machine builders have now the advantage of a higher compactness of their projects.

Plastic protections: For all TL range, the plastic protections have been studied to be applied on pallets in order to guarantee an anti-intrusion covering for the components being processed. These covers are printed in 3D.



Special links chain: Together with the plastic protections a new links chain has been developed. The new links chain is equipped with special seals to reduce the accumulation of powders or abrasive material during the process and increase the protection of leads and bushes.

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For details, contact Rupesh Paparaju, Managing Director, Bettinelli Automation Components Pvt Ltd (subsidiary of Bettinelli F.Ili S.p.A.), Pune, on Tel: 020 6723 6484, Mob: 077740 06616, or email: rupesh.paparaju@bettinelli.in.

How to leverage virtual and augmented reality in Industry 4.0

Virtual (VR) and augmented reality (AR) - at present prevalent in gaming, entertainment and education sectors - can help solve many issues faced with Industry 4.0, making the best talent even more productive, says **Divy Shrivastava**.

Virtual and augmented reality is quite mainstream technology in the gaming and entertainment domains.

But now it can also be used to solve some critical cases in Industry 4.0. As we adopt Industry 4.0, there would be a high demand for a more specialised workforce and both Augmented Reality (AR) and Virtual Reality (VR) can help reduce costs, do more objective assessments, increase workplace safety and more. This is a use case that we should look at leveraging VR to skilling more youth, complement existing mechanism of training and support and increase overall productivity and safety of workplaces while minimise costs.

AR and VR technologies in manufacturing

There are several use cases for AR and VR technologies such as manpower maintenance and skill development, product design, workforce trainings and tutorials. Used effectively, both AR and VR can help solve many issues faced with Industry 4.0, making the best talent even more productive.

Let us first talk about the AR use case as this affects almost all industries, the use case for providing remote support and assistance. With IoT you know the pulse of what is going on, but you still need to fix the issue and for that you need someone to be physically present. Now these use cases are very prevalent when you are dealing



with transformers, boiler and other heavy machinery that requires physical presence. At present this is being met by having people on site and stationed, which is becoming difficult with more specialised equipment and a shortage of skilled staff. There are also use cases for the automotive industry when it comes to providing training and support to dealerships. Computer images, graphics and text information can be overlaid and displayed on mobile devices. They can then be used in trainings and providing support to the workforce through designed tutorials, improving everyday performance, increasing workplace safety and providing greater worker satisfaction.

In some industries like the automotive sector, AR is also being used to improve production designs that till sometime back were being done using clay models. Instead, AR today allows product designers to superimpose digital features into a physical prototype of an automobile, drastically reducing costs and time associated with creating clay models. Some companies have

already started using AR enabled headsets on their factory floors, empowering factory personnel with digital data from factory manuals and technical documents, aiding them in monitoring their manufacturing processes and troubleshooting.

Similarly, AR can be used to significantly improve or complement existing manufacturing systems, be it complex assembly of parts and quality assurance. In both cases workers need to follow a set of instructions. Using AR we can take those instructions and project them on to a screen within your field of view. That way the worker can stay stationary, keep their hands busy assembling without having to interrupt their work to get clarity on what needs to be done.

AR powered application can help improve this one by providing the required information on screen and also the assistance can be more meaningful and faster. Using AR is far more effective than a call or a video chat.

The use case in VR is sort of related. VR can be a powerful tool for training and development, cutting across the board for general equipment training, safety, simulating emergencies, and assessment of training. VR enabled technology can act as a substitute for a real-life expert, guiding the workforce at every step, preventing them from making mistakes, and helping them finish manufacturing tasks more quickly and efficiently.

Using VR we can simulate a real life production unit of a manufacturing plant by integrating computer generated images with the real world. Workers could then be provided with meaningful instructions in the simulated set-up leading to better overall productivity and performance. VR can be used to train employees and enable them to perfect certain specific skills like practising line changeovers or practising emergency drills. Used in this manner VR can potentially bring down unscheduled downtime, while cutting down risks of poor decision making.

In some sectors like aerospace, where products need to be created, tested and retested before they are deployed, VR has helped in significantly cutting down expenses. Before making full-scale models, engineers have been able to put together every piece of equipment involved in the design of a product

in the virtual world before constructing it in the real world, saving millions in the process.

With VR the potential benefits an organisation can reap, is reduced investments in case of heavy machinery, have a more skilled workforce, reduce dependencies on trainers, and have more accurate assessments (like rating on speed accuracy, reading instructions etc.). Within manufacturing this can be leveraged not just by plants with heavy machinery, but also with assembly lines.

How to get started?

Fortunately, AR and VR are relatively low hanging fruits in Industry 4.0. What is the base for any AR and VR project is the availability of designs in three dimensional format. This is very prevalent in most areas. Also with a large animation outsourcing industry, AR and VR skill-set is

readily available in India. The technology is quite matured and there is very little risk to the investment from a technology and execution stand-point. That said you should evaluate the business case well, to identify high impact areas.

The companies that make the investments early in these technologies seek to gain more than just cost savings you can push the reliability of the equipment higher and hence influence a lot of purchase decisions. **IPF**

About the author:



Divy Shrivastava is the Co-founder & CEO of Nineleaps, which helps companies in accelerating digital transformation through product development. Nineleaps' expertise lies in mobile, web development, big data engineering, machine learning/ artificial intelligence, automation and DevOps.

NEWS SNIPPET

Ravik Engineers provides competitive edge to Indian firms with global technology

Ravik Engineers - which represents some of the leading multinational companies like JIH-I Machinery, Kinkelder, Soco Machinery, Winton Machine Co, etc in India – aims to bolster the competitiveness of Indian machine tools industry by providing globally-renowned, high-quality machineries and equipment.

“We believe in quality and durable products with the adoption of newer technologies in the field. Our adherence to these principles has led to a phenomenal growth in sales and a strong base of satisfied customers in India. Our clients on the basis of excellent quality and longevity have appreciated our range of machineries and

equipment,” said Abhinav Singhal, Executive Director of Ravik Engineers Pvt Ltd.

The company offers a premium range of industrial equipment such as circular sawing machine for ferrous and non-ferrous materials; tube & rod end chamfering machine; tube benders; saw blade sharpening machine for circular saw blade; band sawing machines; different range of circular saw blade; HSS circular saw blades; band saw blades; TCT cold saw blades for ferrous & non-ferrous metal, etc.



Abhinav Singhal,
Executive Director, Ravik Engineers Pvt Ltd

Ravik Engineers, established in 1989, has acquired tremendous technical skills and specialisation in this field due to experience in the machine and tool industry for over decades. The company aims to provide finest quality

machineries and equipments. Additionally, innovation, flexibility and performance are the key areas of focus in the design and development of its equipment. Providing quality is the top most priority for Ravik Engineers' production unit. **IPF**

How additive manufacturing is changing industrial landscape

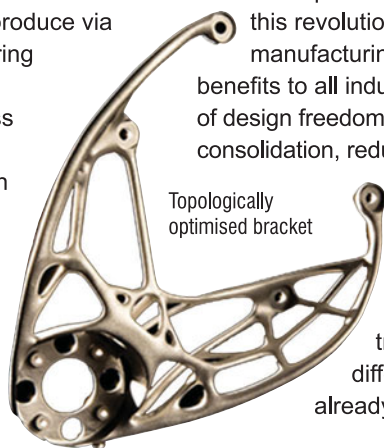
With the inherent attributes, AM is a natural fit for advanced manufacturing and an enabler for Industry 4.0. However, AM technology still has a long way to go to reach the maturity and confidence level of conventional processes, says **Anil Kumar**.

Additive Manufacturing, commonly known as 3D printing, enables the production of complex parts, which were otherwise difficult to produce via traditional manufacturing methods. Additive manufacturing process basically refers to layer-by-layer creation of 3D objects using metal, polymer or composite materials. Though 3D printing has been used for a long time now for polymer materials for rapid prototyping, with advances in laser technology, robotics, material science, imaging and engineering simulation, it is steadily making inroads into metal additive manufacturing. There has been a recent spurt of activity in metal additive manufacturing in the past 4-5 years with new, powerful, faster and reliable printers coming into market, inception of new companies and acquisitions providing solution around additive.

The global additive manufacturing market is expected to reach \$ 23.33 billion by 2026, growing at a high rate of 14.4 per cent, according to a new report by Reports and Data.

Nearly all industries have initiatives in the area of creating cleaner, lighter, and safer products. With shorter lead times and lower costs, Additive Manufacturing makes a compelling case. Industry

4.0 focuses on automated factories, increased use of robotics, AI and digitized manufacturing. Additive Manufacturing (AM) technology is an indispensable component of this revolution. Additive manufacturing gives immense benefits to all industries in the areas of design freedom, part consolidation, reduced product development costs, among a few. Let's explore how additive manufacturing is transforming different industries already.



Transforming the medical industry

Medical field is one of the early adopters of additive manufacturing and is getting hugely impacted by it. Additive's inherent design customization leads to patient specific implants. We are witnessing complete digitalization of process to produce the 3D printed hearing aids from companies like Sonova mass producing custom 3D printed hearing aids in millions per year. Dental is another medical application that has already adopted metal and ceramic 3D printing in mass production way. Patient specific implants in maxillo-facial prosthesis, hip, spine, etc. are other emerging applications.

3D printing is also helping in increasing precision in surgeries by creating prototype medical models and surgical guides. 3D printing of

prototypes is very popular as accurate models can be produced in lesser time and lower costs. Creation of physical model gives a better idea to doctors before performing procedures and helps surgeons in reduction of operating time, providing pre-surgical planning and thus help medical students and surgeons. 3D printed implants, even the ones of complex designs, can be easily light weighted. Such implants with lattice structures lead to improved osseointegration and more successful acceptance by patients.

Transforming the tooling industry

Continuous technological breakthroughs in Additive manufacturing are increasing its quality and making it more cost effective. This is increasing the applicability of additive manufacturing in more and more applications in the tooling industry even with traditional manufacturing still dominates this space. Tooling by nature, is required in low volumes and can be very complex in shapes depending on the application. This is leading to very high adoption of additive manufacturing techniques in tooling applications. Also, if tooling is made from additive, then there is enormous design freedom to change it as many times as required. This accelerates the overall product design process multiple times.

According to Wohlers report, AM equipment OEMs claim that their systems can be used to reduce lead

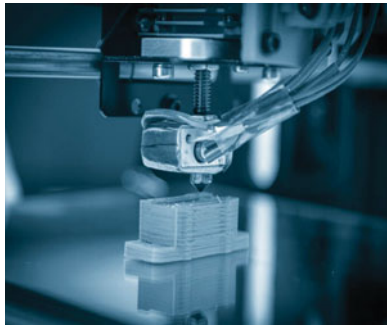
times for the tooling fabrication by upwards of 40 per cent. The general thumb rule is that if tooling requires material removal of 75 per cent or more in its fabrications, then its cost would be less if produced by additive processes. Conformally cooled tools can be manufactured using AM with physics based cooling holes and features that can provide more efficient and homogeneous heat transfer from tool, yielding improved performance and finally resulting in better part quality.

Transforming the aerospace industry

The Aerospace industry undergoes a lot of new-design testing. New designs or ideas need to be tested and validated. This generates huge prototyping activity. Additive manufacturing that started as a rapid prototyping model thus becomes a natural choice. It enables rapid design reviews and validations. One can completely skip the tooling process and directly manufacture the parts with Additive processes. This helps design engineers to validate multiple designs to reach the most efficient one in the least amount of time and cost. According to a study done by Stratasys, if additive processes are adopted over conventional methods, one can get time benefits ranging from 43 percent to 75 percent in prototyping.

Additive manufacturing allows design freedom to manufacture very complex parts in a single piece. This eliminates the steps of joining multiple parts to make a complex part that require resolving the issues of assembly like compatibility, testing, leakages, etc. In-fact, part consolidation leads to increased reliability and durability of components as the number of parts to assemble goes down. Leap engine fuel nozzles from GE that last year printed its 30000th part, is reduced to a single part from what was earlier 20 different parts. This

also comes with 5x increased durability and 15 percent better fuel efficiency. Aerospace utilizes superalloys like that of titanium, Inconel, extensively. These are hard to machine using traditionally available processes but are readily made using additive manufacturing processes. Further, high “buy-to-fly” ratio in additive manufacturing leads much less material wastage and it compensates for the expensive



powder form for these super materials. Bionic designs from topologically optimized designs that can readily be made with AM are leading to extremely lightweight functional parts in aerospace industry that is quite sensitive to the weight aspects of the parts.

Transforming automotive industry

Sports auto segment has been an early adopter and is extensively utilizing Additive Manufacturing in their design iterations for exploring the most efficient design in the shortest possible time. With the tightening regulatory and environmental norms, all automakers are constantly seeking ways to lightweight in order to improve the fuel efficiency of vehicles to meet standards and to also deliver greater value to the end users. Additive manufacturing is transforming the tooling for automotive industry in a big way. Few automakers have already started reporting its immense cost and lead time benefits in tool making that is directly affecting their time to market and overall design costs.

Transforming supply chains

An important effect of AM is the shortening and simplifying of the enormous automotive supply chains that are currently under operation. Using AM, maintenance and repairs of automobile parts can be done in an on-demand basis. More and more suppliers are now realizing AM as complementing the traditional processes like casting and forging, and not as a threat to replace them. Traditional metal manufacturing like forming, milling, etc. need large amounts of energy and create lot of waste. As AM enables components to be printed on the fly, have little or no material waste and can be manufactured on-site, it is significantly reducing the carbon and energy footprint.

Going ahead

With the inherent attributes, AM is a natural fit for advanced manufacturing and an enabler for Industry 4.0. However, AM technology still has a long way to go to reach the maturity and confidence level of conventional processes. Especially metal AM has some peculiar challenges that need to be overcome before it becomes common place. Further advancements in material science, process understanding and engineering simulations that mimic entire AM process will usher required reliability and effectiveness into it and make it another regular manufacturing method on the lines of traditional manufacturing processes. **IPF**

About the Author:



Anil Kumar is the Lead Application Engineer of ANSYS - a leading provider of engineering simulation software solution. For over 45 years, ANSYS has pioneered

the development and application of simulation methods to solve the most challenging engineering problems.

Robot-guided palletising systems enable versatile production

Robot-guided palletising systems help minimise machine downtime during the production of individual pieces and small series and enable reduced-manning production in three-shift operation. In this process, precise interaction between the individual gripping system and the clamping technology components is crucial.

The rapidly growing range in size and product variants as well as an increasing cost pressure are requiring automated process design in production more and more. The maximisation of main times and minimisation of personnel costs, which in the past only applied to large quantities, has now become possible for small and very small lot sizes. Using robots in particular is considered to be an especially flexible way of increasing efficiency, provided that their peripherals are precisely aligned with the respective requirements.

Quick-change pallet system as a basis

A basic distinction can be made between two types of automated machine loading:

- For large series and long processing times, workpieces are generally loaded directly into stationary clamping devices, such as power-operated multi-jaw chucks or power lathe chucks, for example in the compact, high-performance SCHUNK TANDEM plus clamping force blocks. The one-piece rigid base body, wedge hook kinematics and long, ground jaw guidances provide for concentrated clamping forces of up to 55 kN. At the same time, they ensure an excellent repeat accuracy of up to 0.01 mm. Therefore the clamping force blocks are also



The four clamping rings rest flush on the outer diameter of the quick-change pallet module. This ensures ideal support for transmitting high torques

ideally suitable for milling operations with a high stock removal, high number of cycles, and minimum tolerances. Their optimised external contour and minimal gap size prevent the accumulation of chips or dust in the vise.

- For medium-sized and small series, more and more users decide for an automated clamping solution. This is described in detail below: When clamping devices are automatically changed, the entire clamping device, including the workpieces that have been clamped manually, are handled on workpiece pallets. Robot-supported palletising systems make this possible in conjunction with an especially fast, highly flexible yet process-stable change of clamping devices. For this process, workpieces and clamping devices are installed on the pallets, arranged in storage racks and successively

transferred to the machining center by each robot from the pallet storage rack. The central element in the machine is a quick-change pallet system. In a matter of seconds, this element helps to fix, position and clamp the workpiece carrier pallets on the machine table automatically and precisely according to a reference value. The actual set-up operation takes place outside of the machine during the processing time, making it especially economical.

Automated interface cleaning

The bottom of each individual pallet is equipped with an interface to the quick-change pallet system, through which they are connected to the machine. Special components, such as the SCHUNK VERO-S NSA plus palletising module, have been developed specifically for robot-supported machine loading. They are extremely flat and can be integrated directly into the machine table, and leave plenty of space in the machine room for the workpiece and for axis movements. With the patented dual stroke system, they can achieve pull-down forces of up to 20,000 N and holding forces of over 100,000 N. The robust modules even ensure a precise hold under the challenging demands of volume machining.

To prevent chips and dirt from endangering the pallet changing process, a positively driven air flow cleans the flat surfaces and the

short taper. This ensures a chip-free flat work surface for the pallet. Entry radii on the clamping module enable quick and secure joining, even with eccentricity or slightly inclined position of the pallet. This way, tolerances of the handling system can be optimally compensated. Afterwards, centering rings apply precise positioning according to a reference value, before the clamping slides ultimately ensure form-fitting, self-locking clamping with a repeat accuracy <0.005 mm.



The four clamping rings rest flush on the outer diameter of the quick-change pallet module. This ensures ideal support for transmitting high torques

Lifting pins facilitate automated removal

In order to change the workpiece, a lifting pin raises the pallet by up to 5 mm after machining, thus facilitating the changing process. All process steps, ie, the “module open”, “module closed” and “pallet present” states are monitored using dynamic pressure monitoring. In contrast to other clamping systems, the SCHUNK VERO-S NSA plus palletising module does not consume any energy when processing. The workpieces remain safely clamped even if the pressure in the air system were to drop suddenly. For opening the module, a pneumatic system pressure of 6 bar is enough. This saves the use of expensive hydraulic systems and elaborate piping. In order to ensure a long service life, all functional components, such as base body, clamping slide, and clamping rings are made of hardened stainless steel, making them absolutely corrosion resistant.

Special handling systems

In order to ensure a process-stable pallet change in fully automated operation, using special handling modules is recommended, such as the slim SCHUNK VERO-S NSR lightweight coupling with minimal interfering contour. This can be used even in confined spaces and allows for pallet loading extremely close to the machine table. It allows for very

flat attachments consisting of a clamping station and pallet. Weighing only 1,600 g (NSR 160), the module allows high maximum moments of up to 1,600 Nm (Mz) or 600 Nm (Mx). In addition, there is also the VERO-S NSR mini miniature coupling with a robot-friendly weight of only 400 g (Mx max 75 Nm, Mz max 200 Nm).

At the opposite end of the weight scale, the VERO-S NSR maxi heavy-duty robot coupling for heavy pallets and tombstones (Mx max 4,000 Nm, My max 4,000 Nm). To ensure process reliable function in challenging environments, the couplings are completely sealed to keep out chips and coolant. In addition, a standard cleaning function ensures a chip-free flat work surface between the pallet and the robot coupling. Besides, steel inlays on the contact points make the couplings extremely wear-resistant.

Modular clamping technology system enables efficient pallet solutions

The clamping pallets can be equipped with a wide variety of clamping devices from the world's largest modular system for stationary workpiece clamping from SCHUNK, including 1,000 possible combinations. For example, the manually operated SCHUNK KONTEC KSC basic clamping vises are particularly efficient all-rounders for machining raw and finished parts

on pallet systems. They combine high clamping forces, convenient operation, and short set-up times. With comparably low torques, they can achieve high clamping forces of 50 kN (size 160), meaning that a separate stamping station for form-fit clamping is no longer needed.

As the clamping takes place under tension, the bending load on the base body and thereby the lifting up of the clamping device are minimized, which adds to the accuracy and rigidity of the clamping. A pre-tensioned center bearing without spindle reverse clearance and specially adjusted slides guarantee an excellent repeat accuracy of ± 0.015 mm. The fully encapsulated drive and an integrated chip outlet ensure particularly high process stability and minimum wear. The basic clamping vises are available as centric clamping vises or as single-acting vises with a fixed jaw. They offer fast adjustment of the clamping range, a flat design, and low weight – the perfect conditions for unmanned workpiece handling.

When several workpieces are to be clamped next to each other in confined spaces, SCHUNK KONTEC multi clamping vises are the ideal solution. These require a single spanner wrench to clamp parts, remove chuck jaws completely by means of quick change or quickly and flexibly convert the clamping system to different workpieces. Spring-loaded SCHUNK TANDEM clamping force blocks, on the other hand, enable particularly compact structures. For clamping cylindrical parts, the SCHUNK ROTA-S plus 2.0 three-jaw chuck can be used. Tombstones with interfaces to the SCHUNK VERO-S quick-change pallet system can now be handled by robots as well.

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For details, contact Satish Sadasivan (SCHUNK Intec India Pvt Ltd, Bangalore) on Tel: 080 4053 8999 or Email: info@in.schunk.com

Quickly enabling DCIM to optimise data center operation

Beyond minimising data center operating expenses, DCIM helps companies to achieve their operating objectives and strategic plans for the future.

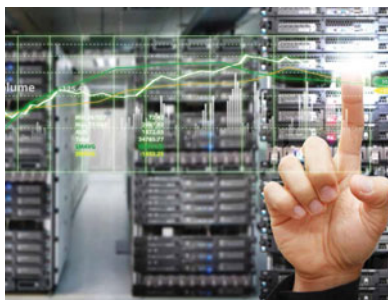
At many enterprises the data center has long been the organisation's most valuable asset. Demand for computing and storage resources is increasing, and so are electricity rates, which is why the benefit of optimising data center infrastructure operations is obvious - it's a way to reduce costs. Beyond minimising data center operating expenses, the transformative impact of DCIM lies within its ability help a business achieve its operating objectives and strategic plans for the future.

What does DCIM start with?

Generally speaking, there are many reasons to implement DCIM at a data center - better capacity management, detecting problems that can limit availability, reducing energy consumption, increasing asset utilisation, and reducing staffing needs are all advantages that can be gained from a successful DCIM implementation.

However, faced with different types of hurdles, it often makes sense to start with the highest priority first and then go from there. This can be the most critical pain point or the highest value opportunity that a DCIM solution can address. Modular DCIM solutions make this type of phased implementation possible. After the first module has been rolled out, subsequent modules can be taken on step-by-step.

Partner with an experienced DCIM vendor



It can be a challenge to assess the veracity of a software vendor's claims. With such a critical element determining a business's success, the choice of vendor must be carefully considered. It's best to trust a vendor that is on solid financial footing and has a long track record of supporting its products.

Delta InfraSuite Manager belongs among the ranks of the truly comprehensive DCIM solutions that are designed to cover all of the enterprise's infrastructure management needs. InfraSuite Manager was designed with a modular structure, including seven modules, to ease implementation and simplify later upgrades. Below you'll find three companies from different verticals that have placed their trust in Delta.

Case Studies

Given below are three examples which highlight the benefits of DCIM solutions:

- Fabless semiconductor company optimises data center operation: A typical use case for a fully-fledged DCIM solution: One of the leading fabless semiconductor companies in Taiwan that manufactures

system-on-chip products for wireless communications, HDTV, DVD devices, and Blu-ray required a solution that would allow it to monitor all assets in its new mid-sized enterprise datacenter. That included power, cooling, door access, environmental measurements, logic controllers, and IT equipment. The data center's PUE was also identified as a critical metric the company needed to monitor. In addition to these power and environmental aspects, asset information was also required within the same platform. With its needs, the Operation Platform, PUE Energy, and Asset modules of Delta's InfraSuite Manager were installed, uniting the traditionally separate domains of Facilities and IT to create a central repository of information for a holistic view of the entire data center. A virtual power meter was created to calculate chiller water energy in kWh. Mean time to repair (MTTR) was shortened considerably as a result of the new DCIM implementation, while the availability and sustainability of the datacenter were increased.

- Tata Communications monitors energy consumption: Tata is a global colocation center operator with eight sites, each consisting of four floors with two rooms each and 200 racks per room. Consequently, having a central repository for asset data and comprehensive real-time

dashboards to monitor power facility devices in the data center is mission critical. Tata also needed to calculate energy consumption (kWh) and real-time power (kW) for each rack. The global telecommunications provider chose to install the Operation Platform, PUE Energy, and Asset modules of the InfraSuite Manager at its datacenters. With this comprehensive DCIM solution from Delta installed, Tata was able to calculate energy consumption based on which racks its customers are renting. The system is now capable of generating individual power usage reports for each customer by rack, power source, and in aggregate. Tata now possesses the granular reporting and monitoring capabilities it was looking for.

- Bytesnet data center acts with PUE calculation: Bytesnet is a regional provider of state-of-the-art data center solutions including network services, housing and co-location, and cloud services based in Groningen and Rotterdam. Bytesnet started on its path to data center infrastructure management by first focusing on

its power infrastructure. The provider sought to gain the ability to calculate PUE for its entire data center and use that data to improve energy efficiency and reduce costs. With the InfraSuite Manager and its Operation Platform and PUE Energy modules installed, Bytesnet was able to successfully integrate a number of different devices (vendor-agnostic) into its real-time data center management. With the system's flexible and ergonomic interface, staff now enjoys outstanding usability when monitoring the data center's day-to-day operations. PUE data provides actionable information that Bytesnet uses to optimise efficiency and lower operating costs. With real-time information on critical loads for the cooling system and data from UPS systems, power meters, and more, the provider is now able to safeguard availability as well.

Summary of DCIM benefits

Data centers that use DCIM to gain visibility and understand their actual capacity needs will be able to significantly limit this costly downtime. DCIM can also help a company that is approaching

the limits of its datacenter's capacity to get the most from the power available and potentially defer large capital expenditures on new facilities.

From the examples above, they show that InfraSuite Manager can handle the infrastructure management requirements of any organisation - from small hosting providers to global collocation and telecommunications market leaders. Moreover, Delta's DCIM solution is capable of solving data center problems and delivering ROI quickly in a multitude of other scenarios and industries.

Outlook

The synergy of a DCIM implementation can only be achieved once a holistic view of the entire data center, including environmental, power, and capacity information, is available. At that point, companies gain the ability to plan their capacity. That's crucial to the success of any business. At the same time, unnecessary capital investments in new datacenters represent a financial risk. As the majority of datacenter operators have discovered, the reasons to deploy a DCIM solution have already become too numerous to ignore.

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TECH BYTE

InnoVista offers Crouzet brushless motor

InnoVista Sensors supplies Crouzet brushless motors that can integrate electronic controls allowing regulation of the torque, current consumption, emergency stop and brake, maintain of position and speed regulation by analogue entry (0-10V) or PWM. Crouzet brushless motors can be coupled to 90° gearbox (designed for applications where the space and noise is critical) and planetary gearbox (up to 120 Nm nominal, high efficiency,



InnoVista Crouzet brushless DC motor

high reduction ratios, available in 1,2 and 3 stages, a compact design with diameters of 52, 62 and 81 mm). In addition, Crouzet has developed the Motomate concept which incorporates: a brushless motor, an electronic control card and a logic controller (Millenium) to

create programs dedicated to an application. Brushless motor has features such as range from 30W to 150W in 3 phases, 4poles; integrated temperature sensor; ball bearings for improved mechanical efficiency; protection IP54; lifetime exceeding 20,000 hours and rated speed between 2000 and 4000 rpm.

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For details, contact InnoVista Sensors India Pvt Ltd, Bangalore, on Tel: 080 6762 4516, 6762 4501, Email: india@crouzet.com, india@innovistasensors.com

Thermal imaging technology improve company's competitiveness

The FLIR T640 thermal imaging camera and FLIR Test & Measurement Tools, in combination with METERLiNK technology, prove to be invaluable tools for an Italian consultant service.

Thermal imaging can be decisive in many fields and, as Corrado Ciuti, the owner of the professional practice Termogramma, says, its application is only limited by the imagination. The level of technology available also makes the difference: to provide consultancy services and inspections with the utmost authoritativeness, Termogramma relies on a full range of featurerich tools. From the FLIR T640 thermal imaging camera, to high-tech clamp meters and moisture meters, the tools Ciuti employs are compatible with FLIR Tools+ software so he can provide the highest quality services.

measure. Based in Monterubbiano, near Fermo, Termogramma is an EN ISO 9712 certified company and has been performing inspections for civil, electrical, mechanical, and industrial customers since 2012. Corrado Ciuti is a demanding professional who finds FLIR's solutions to offer the best balance between the abundance of features and actual product performance.

A broad range of useful features

Termogramma's customers are in several fields, starting with construction. "The inspections I am asked to perform are commissioned by private individuals and

Photovoltaics is a rapidly growing field for Termogramma. "My services are requested both to comply with statutory certifications requirements and to assess existing installations," added Ciuti. Thanks to the thermal imaging cameras, Ciuti can check the panels and other components for defects and malfunctions, starting with transformers and disconnectors.

Always used FLIR

Ciuti's profession is validly supported by FLIR's thermal imaging solutions. "I started out in my profession with a FLIR E6 thermal imaging camera and as my working complexity increased, I



FLIR T640
FLIR T640 thermal imaging camera



It is simplistic to use thermal imaging only to confirm that a problem exists. Indeed, it is a predictive technique that helps prevent problems from arising and remedy their consequences before they occur, thus saving time and money. It is no coincidence that Corrado Ciuti, dba Termogramma, is increasingly offering consultancy services that provide thermal measurements as a proactive

professional firms who need immediate answers to problems that affect housing units or residential complexes," explained Ciuti.

"Using the thermal imaging tools I have, I can identify the source of water leaks, pinpoint problems in the thermal insulation systems or threats to the safety of the buildings. I collaborate with architects and engineers also by carrying out inspections for legal disputes," he said.

added the model T640, which is currently the spearhead of my equipment range," explained Ciuti. The T640 is equipped with METERLiNK technology, which allows Ciuti to append inspection data to thermal images or send it directly to the FLIR Tools App on a mobile device. With this added technology, Termogramma can further specialise in predictive analysis in the electrical and



Thermal image in the electrical field for diagnosing a contactor with defective contacts

photovoltaic fields to support requests for tax benefits.

The data collected using the FLIR CM85 clamp meter and the FLIR MR77 moisture meter can be sent directly to the camera via the METERLiNK Bluetooth connection, eliminating the risk of human error and saving valuable time. "With the same equipment, in buildings and homes, we can measure humidity and temperatures so as to block the source and spread of mold and condensation," said Ciuti. By choosing the FLIR T640 Termogramma achieved a higher level of thermal imaging investigation and unparalleled advantages. "The T640 combines high resolution with high sensitivity, factors that make a difference in my work," he said.

In addition to these services, the company is also equipped with a range of accessories and features that help improve Termogramma's work also during particularly complex investigations.

Features such as the touch screen or the possibility of adding information and voice annotations raise the T640's efficiency to the highest level. "It takes a lot of time to carry out checks and take notes during measurements. Having such an efficient machine that integrates several functions into a single

device amounts to a real quality leap," explained Ciuti.

Towards thermal imaging 4.0

To complete their instrumentation, Termogramma has chosen to upgrade to the plus version of FLIR Tools, the software that provides thermal imaging professionals with a complete set of controls, all in an effective platform that can generate highly detailed reports on the work done.

While the standard version can be downloaded from the website, FLIR Tools+ adds value to FLIR products with presets and templates to produce the documentation required. Ciuti explained, "FLIR Tools+ interfaces with the Microsoft Office suite, to enrich and accompany reports. The plus version also makes it possible to create dynamic radiometric videos and, with its panorama functionality, can show a single scan of large surfaces such as the façade of a building, which is a very useful feature in the construction industry."



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FLIR is also certification

Termogramma confirmed its professionalism by achieving second level UNI EN ISO 9712 certification, after Ciuti attended a course offered by the Infrared

Training Center (ITC). As the infrared training arm of FLIR Systems, the ITC provides practitioners with the qualification required by European regulations and needed to offer services in this field.

Through ITC, FLIR offers one- and two-day introductory courses or first, second and third level certification courses. Ciuti concluded, "The ITC training course enabled me to certify my professional background to do my job better. Thanks to the training offered by FLIR and the collaboration of Roberto Rinaldi, the Italian coordinator of the ITC courses, I was able to enhance my knowledge of thermal imaging and of all the best practices to make the best use of FLIR's solutions." **IPF**

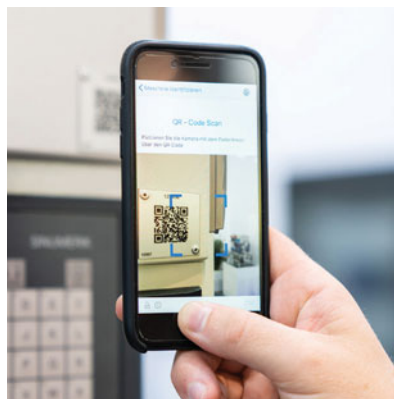
For details about FLIR Systems and its products visit www.flir.eu

EMAG showcases solutions on Industry 4.0 and EV at EMO 2019

Problems solving requires right tools and the corresponding know-how. Both go hand-in-hand with each other. Thus, EMAG booth at the EMO 2019 – held in September in Germany – featured the latest machine tools and automation solutions.

The know-how required to combine these machines and the technologies of the group's companies into efficient manufacturing solutions, in the 'themed areas,' were entirely dedicated to the production of specific groups of components. Visitors got answers to their questions and they also found the matching manufacturing solution. The offer ranged from single-machine solutions to fully automatic manufacturing lines that are delivered to customers turnkey ready for operation, including the entire development process.

One of the significant topics at the EMAG Group's technology forum, held in May 2019, was electromobility and its implications for manufacturers and suppliers. There are lots of questions pertaining to manufacturing solutions, components, etc about electric vehicles (EV). EMO visitors found answers to these questions at the EMAG Group's booth. Visitors



EMAG's Service Plus app, which enables the user to reach the right service technician simply by scanning a QR code

came across new components, things such as differentials or brake discs that would be still required regardless of the drive technology implemented. For all these components and many more, EMAG showed

the matching solutions and, beyond that, revealed major insights from the 2019 Technology Forum.

True to the EMO motto: Smart technologies driving tomorrow's production networking was another major topic for the EMAG Group at the EMO. It was considered from different perspectives. The ServicePlus app ensures optimal networking between customers and the EMAG service department. Simply scan a QR code on the machine using the app and the user will be able to directly communicate with the service department, request a service callback or directly initiate a spare parts inquiry. The benefits are obvious: On the one hand, EMAG service technicians immediately know which machine is concerned and its exact configuration. On the other hand, users automatically speak to the right contact. The entire communication of the EMAG ServicePlus app takes place on an EMAG-owned server and thus guarantees the highest security standards.

Ongoing developments of the



The machining of blanks on a VL 1 TWIN of EMAG

EMAG Group's Industry 4.0 applications are intended to manage the networking between EMAG machines. In this context, EMAG showed among others how data can be visualised. Using a model, visitors were able to gain their own impression of how the data flows.

An entirely different type of networking, namely between 17 project partners and the German machine tool builders' association VDW has led to the development of UMTI (universal machine tool interface), which was introduced for the first time at the EMO. A demonstration of the interface standard was shown at EMO and professional visitors were able to get first-hand information about the project.

The EMAG Group showed a whole array of solutions for the most diverse applications at EMO. The corresponding processes stretch from raw parts all the way to final high-precision fine machining – a fact that not least owes to the group's broad range of technologies.

Igus' RBTX online platform brings robotics users and suppliers together

In conjunction with 16 other industrial partners, igus has developed RBTX.com – a new platform that brings together users and suppliers of low-cost robotics components quickly and easily. The idea: to enable customers to find their own robot solution with just a few clicks of the mouse. The basic electro-mechanical structure is the starting point for a “rohbot” from igus, such robots including articulated-arm robots, delta robots and Cartesian robots. In the next step, the user supplements this basic structure by adding individual components of different manufacturers such as grippers, cameras and control systems. The advantage of this is

the certainty that the components are compatible with each other.

The purpose of the online platform is to enable manufacturers to open up new sales channels for their low-cost automation products and reach new target groups, new components can be added to the platform continually. In future, users will always have up-to-date and clear access to a rapidly developing market segment. “The RBTX.com concept intended for companies, start-ups, research institutes and mechanical engineering companies offers fast, customised robot solutions at low



starting costs of just a few thousand euros and with short amortisation times. What we are talking about here is a low-risk way of entering the era of automation and investing in the competitiveness of tomorrow,” explained Christian Batz, Head of igus digiTal. **IPF**

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3 - 3.5 kVA



HIB-02
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Trikuta Enterprises' new machine vision system enables fast and accurate inspection

Trikuta Enterprises Pvt Ltd, a system integrator & distributor for the Taiwan-based Axiomtek Ltd, offers a feature-rich, highly expandable machine vision system, IPS962-512-PoE, with real-time vision I/O and PoE LANs for fast and accurate inspection. The new system meets the increasing requirements for maximum quality and flexibility in modern production plants. It features flexible expansion capacity, camera communication interfaces, real-time vision-specific I/O with microsecond-scale and LED lighting control. This machine vision controller is powered by the LGA1151 socket 7th/6th generation Intel Core and Celeron processors (up to 65W) with the Intel Q170 chipset.

IPS962-512-PoE comes with a full range of isolated I/O interfaces and real-time controls essential to machine vision applications, including trigger input, LED lighting controller, camera trigger, as well as an encoder input for conveyor tracking. If the random position of the object on the production line has to be adjusted, the vision controller is able to delay the acquisition for a



Trikuta Machine vision system IPS962-512-PoE

programmable time period. When using the vision I/O function, an incremental encoder can also be used to delay the acquisition by a number of encoder ticks corresponding to the position offset of the detector. Furthermore, the lighting control will be configured during the camera exposure time. The duration and dimming control are programmable and it can identify object characteristics for different inspection.

The real-time vision system IPS962-512-PoE enables a fast and high accurate inspection to ensure that the desired quality is achieved with no manufacturing defects. It

supports four IEEE802.3at PoE LAN ports and four USB 3.0 ports for connection with industrial cameras. Operating over a wide temperature range from -10°C to +55°C, the IPS962-512-PoE provides reliable and stable performance within severe environments. Its easy setup and compact design are ideal for space constrained environments. Moreover, one PCIe x16 and one PCIe x4 expansion slots allow quick installation of I/O cards and graphics cards. Two easy-swappable 2.5" HDDs are available for extensive storage needs.

In addition to the features mentioned above, the IPS962-512-PoE comes with rich front-accessible I/O connectors, including one real-time vision I/O, four PoE ports, four USB 3.0, two Gigabit LAN ports, one VGA, one HDMI, 3-pin terminal block, and one audio (Mic-in/Line-out). It supports dual DDR4-2133/2400 un-buffered SO-DIMM sockets for up to 32GB of system memory.

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For details, contact Trikuta Enterprises, Faridabad, on Mob: 097188 11666, email: sales@trikuta.in or visit www.trikuta.in

Cole-Parmer launches Jenway's new split-beam spectrophotometer

Experience an easier way to perform spectrophotometry with IoT in the lab. Cole-Parmer – a leading global source of fluid handling, test and measurement instruments - has introduced the new Jenway 76 Series Visible and UV/Visible

Scanning Spectrophotometer featuring split-beam optics and CPLive connectivity. Split-beam technology offers improved accuracy and repeatability when determining samples. CPLive connectivity gives users the ability to safely and securely upload and archive data to the cloud, manage multiple devices

at one time with the CPLive App, share data with colleagues and access complimentary unlimited data storage. The spectrophotometer provides fast and reliable results ideal for a variety of applications from teaching, to R&D, to routine sample analysis in quality control environments.

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Bhambra Engineering Works offers bar peeling machines



Bhambra Engineering Works, one of the largest producers of bright bar machinery in India, has come up with bar peeling machines. The bar to be peeled is supported between an entry guide and steady rollers. The cutting tool is mounted in a cutter head which in turn is fixed on a revolving spindle. The bar is moved by feed rollers against the revolving cutter head.

Head stock is a rigid casting containing a revolving main spindle driven through 'V' belts and shifting gears from the main motor. A cutter head is fixed to the main spindle. The head is designed to hold a cutting tool and also rollers for polishing the work. The spindle speeds can be varied by means of changed gears.

The feed gear box is also a rigid casting. The feed rollers are operated by a motor through 'V' belts and worm gear. The rollers feed the bar against the revolving cutter head. The feed rate of the bar is varied through dimmer stat. All the shafts are mounted on bearings.

The bed is a cast iron base on which the feed gear box and head stock assemblies are mounted. The main motor is fixed on the left rear wall and feed gear box motor on the right rear side of the bed.

The cutter head is a cast steel part. To thiffs, three polishing rollers (HCHCr) and one carbide tool are fixed. The entire assembly is bolted to a face plate which in turn is threaded (clockwise) to the main spindle. The cutter head will rotate with the main spindle while the bar is fed longitudinally.



Balaji Switchgears: The one-stop-shop solution provider

Established in 1990 by Bajrang Garg, Balaji Switchgears Pvt Ltd (BSPL) in its initial days was involved in trading & distribution of electrical goods and later emerged as an one-stop solution provider for complete industrial

automation & low voltage switchgear products. In 1996, the company joined hands with Schneider Electric as one of their first partner in India & had revamped its business model. Sooner, BSPL took on board many international reputed brands in low voltage switchgears & automation to have a complete kitty for all its customers. After 2005, Balaji Switchgears increased its geographical location to strength the company's logistics & to maximise its customer portal. Today, in its 29th year of operation, BSPL is known for its services in this fast moving energy goods (FMEG) sector.

"Our vision is to satisfy our customers and to grow with this rapid & competitive power and energy sector, contributing in the growth of economy and society. Our speciality lies in providing best in class LV products with on time delivery, in house commissioning & service support. Our focus customer segment includes OEM, panel builders, electrical contractors, public sector utilities & industry end users etc," stated Balaji Switchgears.

Schneider Electric, Omron, Socomec, Lapp, Connectwell and Rittal are some of the Principal Partners of BSPL. Balaji Switchgears offers products & services such as air circuit breaker (ACB); automatic transfer switches; cable glands & accessories; change over switches; contactor & overload relay; Din rails & PVC cable ducts; enclosure, junction boxes & DBs; energy meters; flexible conduit pipes; HMI's; limit switches; miniature circuit breaker (MCB); miniature relays; motorised changeovers; motor protection circuit breakers (MPCB); plug and socket; PLCs; pressure switches; push buttons & indicating lights; safety relay/switches; SCADA systems; sensors; servo motors & servo drive; SMPS (power supplies); soft starters; SSR; switch fuse units (SFU); temperature controllers; terminal blocks; thimbles; timers; VFDs; and wires & cables.

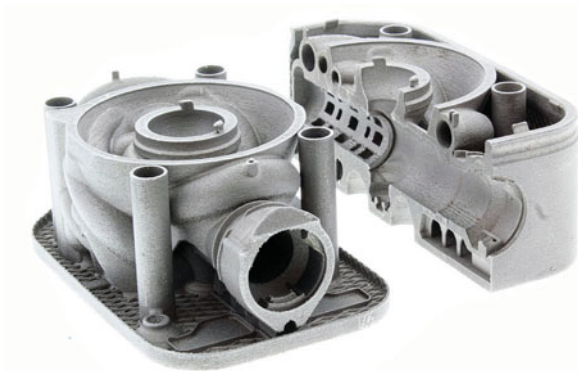
Balaji Switchgears also offers customised solutions like ACDB/DCDB; distribution boxes; distribution feeder panels; and feeder pillars.

*For details, contact Balaji Switchgears on
Tel: 011 2591 0803, 2591 0804; or
email: mktg@balajiswitchgears.com*



Renishaw helps Domin Fluid Power increase capability using AM

Global engineering technologies company Renishaw recently collaborated with Domin Fluid Power to help the company maximise productivity when designing and manufacturing direct drive valves. Using metal additive manufacturing (AM) techniques, the company can now



Domin Fluid direct drive servo valve manufactured using AM.

manufacture smaller, more efficient drives and reduce cycle times from five and a half hours to just one. Domin collaborated with Renishaw to develop a new, stable, state-of-the-art technology suite for the fluid power sector. The company visited Renishaw's AM Solutions Centre in Stone, Staffordshire, UK, to develop their understanding of AM and understand how the technology could help them to produce highly efficient drives for customers.

"Metal AM allows you to stretch the art of what is possible in the fluid power sector. After spending years on testing different prototypes and designs we have developed our knowledge in AM that will enable us to produce efficient parts for customers. For example, we have designed one of our drives that is 25 per cent of the original size, 25 per cent more powerful and produced at a third of the cost," explained Marcus Pont, General Manager of Domin Fluid Power.

"At Renishaw we are always looking for opportunities to be involved with developing emerging technologies that make positive changes in the industrial world. We've worked with Domin throughout the whole process, from investigating material properties, to exploring the advantages of using the latest technologies, such as the RenAM 500Q, in production," said Martin McMahon, AM Lead Technical Consultant at Renishaw.

McMahon added, "Additive manufacturing is a key technology for Domin. It gives the company the ability to build complex parts, free of tooling and with minimal operations and assembly. Trying to integrate such complex functionality into such a small design would not be possible using conventional manufacturing techniques."

Manufacturers in a wide variety of sectors can use AM technology to improve productivity in high value, small volume production. Renishaw's latest system, the RenAM 500Q, is currently broadening the market appeal of AM into applications that were previously uneconomical due to its efficiency. The compact system features four 500 W lasers to speed up the printing

process by up to four times, improving productivity and lowering cost per part.



SCHUNK offers 3D printing service for engineering components

Upload data, select material and quantity, send order – like with an online photo service, designers and systems planners at the SCHUNK 3D-Printservice can quickly and easily commission gripping system and clamping technology components for additive production. Whether it is adapter plates, devices, protective covers or function-integrated components: All parts are made of polyamide (PA 2201), aluminum (AlSi10Mg) or stainless steel (1.4404) in an excellent and precise quality. Following on from the success of the SCHUNK eGRIP, a 3D design tool for additively manufactured gripper fingers, the innovative family-owned company is further expanding its portfolio in the area of additively manufactured components with the 3D-Printservice. Now, components for gripping systems and clamping technology designed by the customer can be ordered online.



With the SCHUNK 3D-Printservice, high-quality mechanical engineering components can be uploaded in no time at all as CAD data. Within around ten working days, the parts are ready for dispatch.

The browser-based SCHUNK 3D-Printservice grants users direct access to the world of 3D printing, without having to invest into such systems or expertise themselves. Within the briefest of periods, all conventional CAD formats can be uploaded, displayed in the 3D viewer and checked fully automatically for their printability. Areas that for instance are critical for additive production due to the material thickness are automatically marked as such. This means components can be purposefully optimised for production and the data uploaded. Suitable for the selected material, the system specifies the delivery date and the price of the component. This is determined on the basis of volume,

ie small parts are less expensive than bigger ones.

When placing orders, the data can be replaced at any time by new uploads or the material selection changed. All projects can be saved in order to be adjusted at a later time, or reordered. By means of an integrated approval and comment function, it is also possible to forward projects for instance to colleagues or purchasers for coordination for or ordering. The intuitively operated, HTML-based and browser-independent 3D-Printservice is useable on all PCs, smartphones, tablets, and other end devices that are connected to the internet. It is suitable for maximum dimensions of 160 mm x 120 mm x 100 mm. In case of any questions, trained 3D printing experts from the SCHUNK team can be consulted.

For details, contact Satish Sadasivan (SCHUNK Intech India Pvt Ltd, Bangalore) on Tel: 080 4053 8999 or Email: info@in.schunk.com



OTC DAIHEN India fostering growth of welding industry



In 1919, DAIHEN Corporation Japan developed, for the first time, new technologies for the mass production of transformers for energy distribution. The know-how gained from there soon led to the expansion of the business segments: OTC DAIHEN Japan began developing and manufacturing high-performance welding machines and industrial robots for a wide range of applications in industrial automation, and has since been producing advanced equipment for the automotive, semiconductor industry in the rapidly developing electronics industry. OTC DAIHEN products are now used successfully in various industrial sectors worldwide.

Founded in 2011 in Gurgaon, OTC DAIHEN India Pvt Ltd (OTCDI), a fully owned subsidiary of Daihen Corporation Japan, is the Indian centre for service and marketing, in which all types for robotics, welding and

cutting power sources, accessories etc are combined. Dedicated and highly experienced team of employees are responsible for all sales and customer services, and supporting Indian industrial automation and welding market.

The company is one of the world's largest manufacturers of robots, arc welding and cutting machines, as well as components for the automation of welding technology and material handling. OTC DAIHEN India supports turnkey automation solutions providers, integrators and customers and thus an indispensable link as single source to fabrication industry's welding requirements.

The OTCDI, Gurgaon, has a fully equipped F A Centre, where demonstration, training and service go hand in hand. Latest technologies from DAIHEN like Synchro feed GMA, D-ARC, etc are available for demonstration at the centre. OTCDI has distributor network in all major industrial centres of India.

For details, contact OTC DAIHEN India, Gurgaon (Haryana), on Tel: 0124 4239 368, 4239 364, Email: info@otcdi.co.in or visit www.otcdaihenindia.com



Weidmüller offers process-wide solutions for panel building

Panel building still requires the hands and eyes of experts, both at the workstations and on the installation site. It has been proven that even wiring and marking contact points – tasks that have



been carried out for decades – can be improved, thereby not only speeding up the work, but also making it more comfortable and less prone to errors. With its Workplace Solutions, Weidmüller has examined and optimised every work step. The project planning and circuit diagram design work steps tie up more than 50 per cent of the working time during the planning stage. The reason for this is inconsistent engineering processes and increasingly complex requirements as a result of the growing project business. Many manual tasks for mechanical assembly and wiring during the installation stage account for more than 70 per cent of the working time. This is where the process-wide solutions from Weidmüller are advantageous.

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Satronix making its mark on power electronics sector

The company is the leader in power electronics product and is known for constantly moving on to the next level in circuit design.

Satronix, which introduced solid state relays (SSRs) in India almost 39 years ago in 1980, is planning to focus on exports for growth in the coming years. The company is one of the leading manufacturers of widest range of SSRs, solid state interface modules, digital SCR power controller modules, digital capacitor switching modules, digital soft starters cum digital energy savers worldwide. Be it the simple SSR to the most complex ones, it has been a journey filled with firsts for all the products that Satronix manufactures. It also introduced the digital SCR/proportional control modules or even the short circuit protected SSR and the non-heat hybrid solid state contactor in the 90s.

Products at par with industry standards and at times the R&D team takes it even further and making it the best and world class. "We are the leaders in power electronics product manufacturing for years now and are known for constantly moving on to the next level in circuit design and latest component selection is continually incorporated into the new design giving it that edge in terms of quality and performance. The thyristor chips that we use are made using DCB technology (direct copper chip bonded on ceramic substrates) procured from Germany. Satronix has been catering to switching needs of the most demanding



Rupali Jadhav Menon, CEO, Satronix India Pvt Ltd

applications," said Rupali Jadhav Menon, CEO, Satronix India Pvt Ltd.

Manufacturing process

Every process from concept to product design, development and manufacturing is accomplished under one roof. This makes the process virtually defect free and smooth allowing faster lead times while making it highly competent, not only does for regular production but also the custom-built models too, reach the customer at a very fast pace. Also, the quality control process is a continual one with every batch of component from very known companies is tested for its specifications to see that the standard parameters have been met and complied with. All Satronix products are CE marked and tested under the LVD (Low Voltage Directives) and EMC (Electromagnetic

Compliance) signifying conformance with European directives. They also comply with the latest environmental directives like the RoHS. They are currently undergoing the UL agency approval.

Satronix SSR come in many variants like the single and three phase DC input AC output up to 205 A, AC input AC output up to 205 A and higher current and voltage ratings in thyristor casing (250 A, 300 A, 400 A, 500 A). In the single phase DC input DC output also the range is extensive right from Plug-in PCB types of 3A to hockey puck models in high voltage and high current models too available. A very wide range of PCB mount SSRs and relay boards in varied combinations are made by the company. Satronix also has the DUAL series wherein two SSRs are encapsulated in one hockey puck model. Then there are the inexpensive phase control relays used with a potentiometer input. For forwarding and reversing of DC and AC induction motors, Satronix has the DC reversing SSRs and the AC reversing SSRs models from 2 to 7.5KW.

"We then come to the star among all the products which we can claim its performance to be the best in the world. The digital analog solid state relays and digital SCR or power controllers used for linearly controlling heating loads like ovens, heating coils, furnaces etc. They deliver 100 per cent linearity," said a company official.

Solid state relays cater to a range of applications street lights, HVAC, heat pumps, compressors, space applications, defence, communications, building automation, plastic machinery,



packaging equipment, machine tools, renewable energy, medical equipment, mining equipment, industrial OEM, material handling, access control, electrical control panels, food and beverages, IoT, etc.

All switching solutions come under one roof with the capacitor switching SSRs and the digital capacitor switching modules used for switching capacitor loads for

power factor correction.

Satronix manufactures a fit and forget range of virtually maintenance-free range of digital soft starters cum digital energy savers cum optimisers. The company has successfully installed these products from 7.5 HP to 150 HP range in applications like air conditioning systems (at malls & office complexes), industrial

presses, die casting machines, injection moulding machines, conveyors, quarries/ mines crushers, tooling and many more.

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For details, contact Rupali Jadhav Menon, CEO, Satronix India Pvt Ltd, on Mob: 098204 81824, and email: rupali@satronixindia.com, satronix@gmail.com

(Communication provided by the management of the company)

Gloves For Protection

Marvel Group is creating awareness among Indian workers and industries for use of safety gloves.

There are risks associated with every workplace, in varying degrees. In some industries, the outcome of a typical incident may be relatively low like a worker slipping on a wet floor; while in other industries a typical incident can have far more severe consequences, such as a building worker hurt in a fall, or a factory worker caught up in machinery or trapped in some equipment. But at the very basic level, it is the hands that need protection and that's where gloves fit in neatly.

Marvel Gloves Industries, founded in 1980 by Farooq Abdullah, Managing Partner, established its first seamless knitted gloves manufacturing unit at Ankleshwar in Gujarat. That was the time when providing gloves to shopfloor personnel was something unheard of, thanks to lack of awareness in general, but also for the simple reason of keeping costs down to minimum. In the initial days the venture was not a success but gradually the promoter's dedication, team efforts, customer support, and above all quality products created high confidence in the buyers. Marvel Group has since won two National Awards for Quality Products, which were presented by the Presidents of India that won the company recognition and fame in



Farooq Abdullah, Managing Partner, Marvel Gloves Industries

the safety gloves market in India and abroad. Today the company's infrastructure is strong enough to handle the increasing demand from domestic and international markets. The company is customer friendly and guides customers in selecting the right gloves for right application.

Marvel Group is therefore creating awareness among Indian workers and industries for the selection of right type of safety gloves as per their applications to avoid injuries and accidents and to work efficiently, safely and without restriction of movement. The company strongly recommends selecting the right glove for particular task for

optimisation of work safety, maximisation of productivity and minimisation of workplace accidents.

India is the world's second largest country in terms of population and has millions of workers. The demand and use for safety gloves and personal protective equipment is increasing day by day. Considering this rising demand, Marvel is regularly importing a wide range of gloves and personal protective equipment from other countries to meet the growing demand from

customers. The company ensures that the products sourced from such suppliers are of high quality and suitable for use in Indian conditions.

Marvel Group is an exclusive agent for India of Rubberex – Malaysia, which is a globally acclaimed industrial and household nitrile and rubber gloves manufacturer. The group is rightly proud of its association with the Malaysian company since 1985. Besides, it is also an Indian agent for the entire range of industrial gloves from some other global manufacturers.

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(Communication provided by the management of the company)



Advantages of becoming a Factory 4.0 with Lantek

No fewer than 90 per cent of companies lack a digital strategy. According to a report by the renowned German strategic consulting firm, Roland Berger, today however, these barriers can and should be saved, especially now that the fourth industrial revolution is here. It is unstoppable and there is no turning back. If you resist change you will be out of the market.

So, reducing that gap is everyone's job and implies gaining in competitiveness and productivity, and therefore in income and growth capacity. Let's work together to ensure Spain is less dependent on services and transform the industry to underpin the country's development.

Before the advantages of this process in any industrial plant are detailed, do you know what this digital transformation is all about? It is the comprehensive connection of machinery, parts and processes with other players and with the customer. This connectivity will show the demand and the needs of production and power in real time, so that decisions can be made faster. Companies can get better performance from their plants and, consequently, save.

Having said that, these are the benefits of applying disruptive innovations in your factory:

- **Optimise production:** Through sensorization, advanced analytics and data management, artificial intelligence and the Internet of Things, connection of processes can be taken to another level. A software program processes data in real time and provides information about orders, stock and machine availability with a predictive capability that reduces errors,



shortens deadlines and facilitates decision making. This is synonymous with cost reduction. A saving - that the aforementioned Roland Berger report (sponsored by Siemens) - quantifies at between 10 per cent and 20 per cent.

- **Loyalty:** Beyond production, digitalization has a double positive impact on your audience. On the one hand, it facilitates communication with customers, order customisation and fast delivery; on the other, it improves your company's image and increases visibility.
- **Talent:** Today's workers are no longer loyal to a company. They do not mind moving. They want new experiences that allow them to grow professionally. They are also digital natives. They value well-being, labor flexibility and training possibilities. Because this fourth industrial revolution demands continuous learning to adapt to the new positions that arise with digitalization that acts as a magnet to retain and attract talent.

As mentioned at the beginning, if the added value generated by all these disruptive changes is added, your company will grow. According to the CEOE, digitised companies are 10 per cent more productive, export double and double the creation of employment.

Although access to technology is

now democratised and its cost is no longer high, it is increasingly important to seek reliable partners to offer a more comprehensive and complete service. Regardless of the size of your company, you need collaborators to develop and implement the technology needed to tackle digital transformation. Knowing how to choose the right partner or partners is crucial. This is one of the great challenges, which also demands a cultural and organisational change.

Do not therefore let the Industry 4.0 train escape - get help from those who have already climbed aboard and have the experience to make sure your plant is not out of the game. In a world where tourism, telecommunications and banking are already experiencing a real digital revolution, and where only those who adapt will win, it is now up to the industry to take a step forward. If you want to achieve it, one can contact Lantek.

Any factory can become a Smart Factory

Smart Manufacturing, Digital Manufacturing, Advanced Manufacturing or Industry 4.0; whichever term you have heard it called, we can agree it is the talk of the town. The catchy terms and constant spotlight may make it seem out of reach for smaller shops. That could not be further from the truth.

Rapid advancements in technology have led to a decrease in prices across the board. These advancements have helped drive initiatives that all manufacturers can adopt to become more digital – regardless of size. Many of the case studies published are from large manufacturers which make these technologies seem out of reach for smaller shops.

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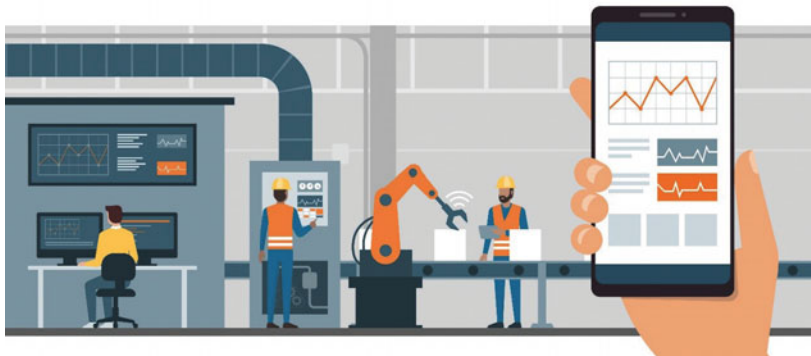
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Case studies written about successful Industry 4.0 implementation in large companies showcase the expansive scope these initiatives have when it comes to cost savings and profit gains. While these big numbers make large companies feel warm and fuzzy inside, it may taint the view from smaller companies. Those looking into new technologies may think these advanced solutions are out of their budget. That is the furthest thing from the truth.

Using BI to boost profits

By taking the proper steps and thoroughly planning the best implementation schedule, any size shop can afford solutions for more efficient operation. After all, the purpose of business intelligence (BI) solutions are to save money while boosting profits.

It's hard not to look at the initial price tag and think it is costly. However, this as an investment in the future of your company. Not only will these solutions help win more contracts and increase profits, they provide manufacturing analytics for continual improvement. Like buying a



house, purchasing software to become a Smart Factory is a long-term investment that will save you money and build equity in your company.

Tax reform for manufacturing can give you an edge

Lastly, the recent tax reform offers manufacturers higher deductions for investing in new technologies, from software to machines. With a higher deduction threshold than years past, it is worth exploring how you can leverage the recent changes to the tax law to expand operations.

Next time you hear or read about the digital transformation for manufacturers, don't count yourself down and out. There are always

new and affordable opportunities for shops to digitise and thrive in today's marketplace.

How to begin the smart factory process

Lantek has worked with manufacturers of all sizes on the path to digital transformation. We know how to help you plan and begin the process - one step at a time. With over 30 years of experience in sheet metal solutions, we are ready for you to contact us today.

IPF

Article by Kevin Must, Marketing Lantek USA

(Communication provided by the management of the company)

TECH BYTE

Maxon motors help a start-up to develop compact robot arm

Swiss high-precision drive systems manufacturer maxon Group has helped Mecademic - a start-up established by Jonathan Coulombe and Ilian Bonev in 2013 - to develop Meca500, a robot arm with six degrees of freedom and only half the size of a regular industrial robot. Meca500 weighs only five kilograms, with a base about the size of a palm. Nevertheless, it has a load capacity of 500 gm. The controller is integrated, which saves even more space and drastically simplifies operation. It only takes a 24 V power supply, a computer, and an



Ethernet cable to program and operate the Meca500.

Ilian Bonev is proud of his development: "It was quite a challenge to fit all the components into such a small space." The drives also needed to be sufficiently small, while still being powerful and

compliant with high quality standards. "They simply have to be the best in terms of precision and long service life. After all, they must run for several years in continuous operation." That's why Mecademic decided to use brushless flat motors from maxon. These DC motors are renowned for their compact design and high torque. In the Meca500, they are combined with zero-backlash gearheads and high-resolution encoders for precise movements. The robot arm has a repeatability of 0.005 millimeters. That is twenty times less than the thickness of a sheet of printing paper.

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Client	Page No.	Client	Page No.
A		M	
Arhan Technologies Pvt Ltd	201	Marvel Gloves Industries	203
B		Minilec (India) Pvt Ltd	235
Balaji Switchgears Pvt Ltd	207	N	
Beckhoff Automation Pvt Ltd	194 & 195	Nord Drivesystems Pvt Ltd	209
Bettinelli Automation Components Pvt Ltd	213	O	
Bhambra Engineering Works	233	OTC Daihen India Pvt Ltd	221
Bohmen Industries	193	R	
C		Renishaw Metrology Systems Ltd	219
CADx Tools and Technologies Private Limited	227	S	
Cenlub Industries Ltd	215	Safcon Seals Pvt Ltd	211
D		Satronix	197
Delta Electronics (India) Pvt. Ltd.	Cover - II	Schmersal India Pvt Ltd	223
E		Schunk Intec India Pvt Ltd	Cover - IV
Electronic Relays (India) Pvt Ltd	217	Surface Modification Technologies Pvt Ltd	205
Emag India Pvt Ltd	231	T	
F		The Jaws Mfg Co	199
Fab Industries	203	TRANSLANTEK Nesting &	
FLIR Systems Pvt Ltd	Cover - III	Automation (I) Pvt Ltd	229
I		Trikuta Enterprises Pvt Ltd	225
Inventum Engineering Company Pvt Ltd	249		



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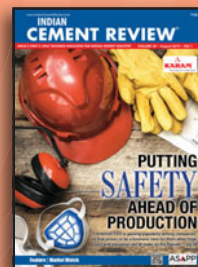
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