

# INDUSTRIAL AUTOMATION

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INDIA'S NO. 1  
TOMORROW'S  
GLOBAL  
LEADER

## SEMICONDUCTORS IN LIMELIGHT

VEGA EXPANDS RADAR PORTFOLIO

SEMICONDUCTOR INDUSTRIES IN INDIA

MANUFACTURING COMPANIES MUST GO DIGITAL - AVEVA



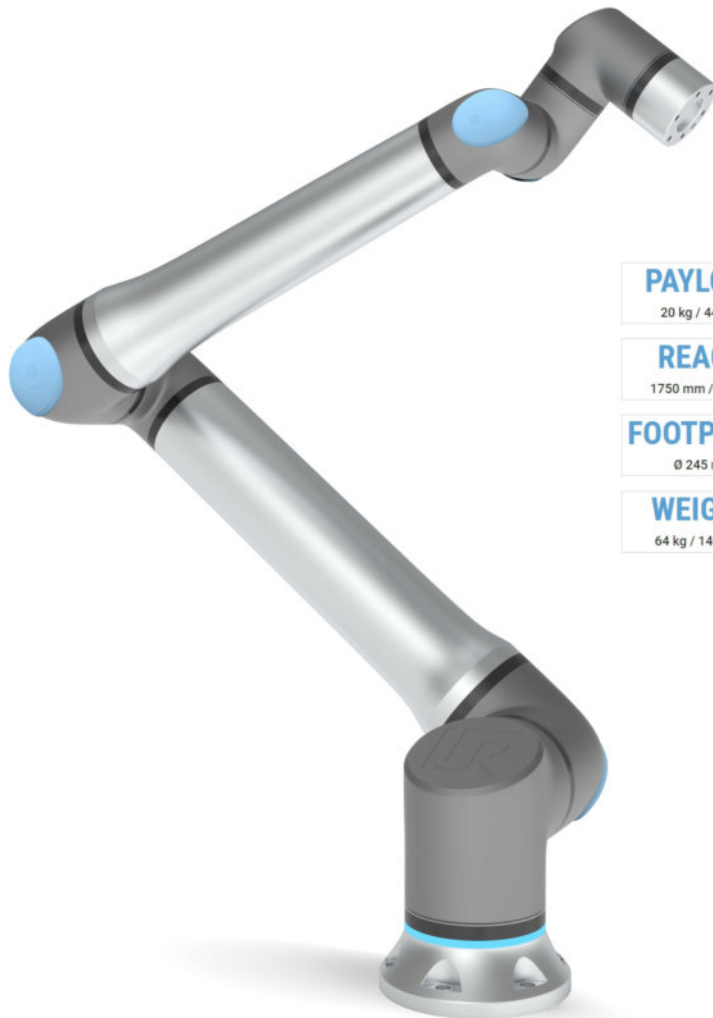
# INTRODUCING THE UR20

This is the cobot. Redefined.

✓ UP TO 65% INCREASE IN SPEED DEPENDING ON JOINT TYPE

✓ NEW JOINT ARCHITECTURE PUTS LESS STRESS ON ARM MECHANICS

✓ 25% INCREASE IN JOINT TORQUE CAPABILITY



#### PAYLOAD

20 kg / 44.1 lbs

#### REACH

1750 mm / 68.9 in

#### FOOTPRINT

Ø 245 mm

#### WEIGHT

64 kg / 141.1 lbs

## UR20

### The Cobot Redefined.

With a 1750 mm reach and 20 kg payload capacity, UR's next generation cobot handles more tasks, fits more applications, and assists in more environments than ever before.

The UR20 is the first in Universal Robots' next generation of industrial cobots designed to take performance to new heights, while embracing the UR hallmarks of versatility, usability and small footprints.

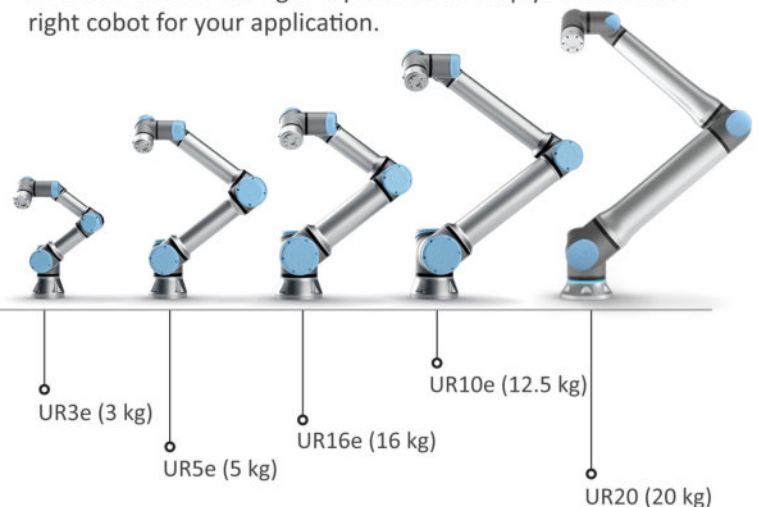
## ALSTRUT

### Leading Cobot Company in India.

Alstrut has been a partner of Universal Robots since 2016.

With the largest cobot install base across India, Alstrut is the only **'Gold Partner'** of Universal Robots in India, and has emerged to be the leading collaborative company in the region.

Successfully deployed applications ranging from machine tending, palletizing, welding, pick & place, glue dispensing, the Alstrut team has the right experience to help you select the right cobot for your application.



**Robust, space-saving and data-rich**

- Three models: 10 x 100 Mbit/s, 10 x 1000 Mbit/s, 2 x 1000 Mbit/s + 8 x 100 Mbit/s
- 4 or 5-pole L-coded M12 Power Connection
- IP67 rated metal housing
- Shock and vibration proof
- Managed or ProfiNet managed
- With / without functional ground (4/5-pole)
- “Power Out” socket for power forwarding
- Managed version can be used as a NAT switch
- Automatic neighborhood detection (LLDP)

# XELITY 10 TX IP67

## DECENTRALIZED NETWORKING MADE EASY!

The Xelity 10 TX IP67 switch from Murrelektronik opens up smart, decentralized data management for IIoT. With the IP67 rated Xelity 10 TX managed switch, fail-safe networks can be implemented under the most difficult conditions in the most diverse application scenarios – including fast data flow rates of up to 10 x Gigabit in one switch. The biggest benefit is the availability of 10 ports in an enormously small, but very robust, metal housing.



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# IEC

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## Automation Week 2023

### Opening New Doors to Digital Revolution



#### **I**EC AUTOMATION WEEK, an Exposition comprising Technical Seminars and Exhibition is scheduled on October 27th and 28th, 2023

The **Instrumentation Experts Club (IEC)**, founded in the year 2002, is a unique club and a leading, Indian non profit organisation that is setting the standard for industrial automation by helping Corporate Members and other Instrumentation professionals to remain at the forefront of knowledge in this highly competitive society while enhancing their leadership and personal career capabilities.

The club was started with the objective of bringing the notables of Industrial Instrumentation and Automation on a platform where they can continuously add value to the Indian instrumentation engineering domain.

The industry has opened up to new domains of engineering and operational excellence through digitalization in the post Covid industrial scenario. This new era of the Industrial Digital Revolution has opened up a tremendous potential of transforming the way business is done for most companies.

Advancements in Wireless Sensor and Analyzers, Cyber Secure Infrastructure, Cobots, Autonomous field devices are some of the few automation centric areas which have dynamically integrated concepts of Automation with Sustainability and Operational Excellence.

IEC, with an aim to become a trailblazing organisation in India for continuously updating and empowering Indian Instrumentation and

Automation Technology stakeholders is once again pleased to announce its flagship annual event:

**IEC AUTOMATION WEEK**, which will be an Exposition comprising Technical Seminars and Exhibition, on October 27th and 28th, 2023, at Ileaf Banquets, R Mall, Thane (Mumbai).

With a gathering of corporate and individual members together, IEC has become a platform of meaningful interaction and information exchange where the professionals from around the globe come closer to introduce innovations in the field of Automation, Controls and Instrumentation and at the same time share the much needed experience in this dynamically growing domain.

IEC is the brainchild of, and headed by one of India's most dynamic icons in Instrumentation and Controls – Dr B R Mehta, Retired Sr VP of Reliance Industries Limited and Chief Executive Event Coordinator (ECU).

Under his supervision, many like minded and equally experienced professionals in this dominion joined together to happily contribute in the activities of this prestigious organisation to create value within the Industry as well as Professionals in the field of Instrumentation, Automation and Information Technology with the objective of getting countrywide recognition to this unique platform of Institutions, Industry and Individuals in India.

***Please register your participation in advance as the seats are limited. For more information on fees and corporate bulk discount, contact Mr Zaid at +91-8082086638 (also WhatsApp) or by Email: [iec@iec-india.co.in](mailto:iec@iec-india.co.in)***



# Featured Industry Special Issue - Semiconductor

## Building a Resilient Fab Manufacturing through Facility Monitoring Solutions

**ADVANTECH**

Enabling an Intelligent Planet



### Urgent Challenges Facing the Fab Plant

Fab plants are built with expensive precision equipment to ensure quality and yield efficiency of manufacturing. Avoiding downtime and chip abnormalities is uppermost in the minds of owners and administrators.

So what actions should be taken to avoid abnormalities and advance production?



Vibration Influence



Downtime Maintenance



Data Acquisition for Legacy



Environmental Factors

### How We Do It?

#### Predictive Maintenance in Fab Plant

According to research, implementing predictive maintenance solutions in the plant will increase machine productivity by up to 20% and decrease maintenance costs by 25% to 30%.

##### Benefits

- Visualize various sensing data
- Detect abnormal events in real-time
- Predict and manage maintenance schedules
- Provide accurate life-cycle management of all facilities

##### Solutions

- iFactory/ Maintenance Solution
- iFactory/ PHM Solution
- Wireless Vibration Sensing
- Intelligent Vibration Sensing
- Condition Monitoring
- Abnormal Detection



PHM Solution



Compressed/Clean Dry Air (CDA) System Solution



Prevent Downtime for Manufacturing Facilities

#### Data Acquisition & Monitoring for Legacy & Siloed Systems

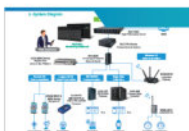
Legacy semiconductor equipment more than 10 years old are still very productive but are lacking the capability for real-time data collection, automatic detection, data analysis and alarms.

##### Benefits

- Track time and cost for manual work
- Increase semiconductor traceability
- Monitor equipment and trouble shoot in real-time
- Eliminate data opacity and speed up decision making

##### Solutions

- iFactory/ RTM (Real-time Management) Solution
- Wireless I/O Data Acquisition
- Remote I/O Data Acquisition
- Legacy Serial Asset Connection
- Edge Data Collection



Data Acquisition & Monitoring Solution



Remote I/O for Robots and CVD/PVD Equipment



Digitalized and Centralized Management for Fab Plants

### Product Selection

#### Manufacturing Solution



Equipment Maintenance Solution

An easy-to-use tool to speed up the visualization of all machine status and health conditions.



Real-Time Monitoring Solution

Real-time Monitoring and management production equipment, process control, and energy consumption in plants.



Predictive Maintenance Solution

Maximizing assist reliability and preventing downtime by handling historical, real-time and future machine data.

#### Edge SRP



Edge Data Collector

Edge Solution-Ready Platform (Edge SRP) is equipped with different edge computing, edge analytics ability and numerous services.

#### Data Computing



Intelligent Systems

Provides various form factors and designs with high performance CPU and GPU computing, multiple I/O, and expandable functions.



Embedded Automation Computers

Serves as flexible IoT gateways to bridge the gap between IT and OT and designs in different sizes and various mountings.

#### Industrial Communication



Industrial Gateways

Supports for MQTT, BACnet, Ethernet/IP, EtherCat, PROFINET, and OPC UA protocols.



Industrial Switches

Provides managed and unmanaged, Ethernet, PoE and SFP modules.



Serial & USB Communications

Serial converters, isolators and repeaters, USB converters, isolators, and hubs to connect legacy serial devices.

#### Data Connectivity



Remote I/O

Includes Modbus RS-485, Ethernet to OPC UA I/O modules with IT/OT protocols.



Wireless I/O and Sensors

Includes wireless technology with Wi-Fi, 4G, LoRaWAN, NB-IoT and LTE-M.



Intelligent Vibration Sensing Gateway

Includes from sensor, data acquisition, edge computing to AI utility.

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# INDUSTRIAL AUTOMATION

India's No.1 Industrial Automation Magazine



Inviting people to the editor.

## From The Editor

The 16th edition of Automation Expo held during August 23-26, 2023 at BEC, Mumbai concluded on a highly successful note. When Covid struck the world in early 2020, governments had to initiate strong measures and implement a strict lockdown in order to control the pandemic. Technology in general, automation in particular, was what softened the blow for the industry, helping it deal with the massive disruption caused by the lockdown and keep the production going. Today, every individual and organisation understands automation and its benefits better. This was amply evident during the expo, from the exhibits that had a strong component of robotics, AGVs/AMRs, industrial networks and IoT devices, hardware and software to support the emerging technologies, besides the usual instrumentation and control safety systems that are the mainstay of the show. The exhibitors and visitors were happy at the end of it. As organisers of this iconic show, the success of the event is just the encouragement we need to continue the efforts to make it bigger and better with each edition. There is a brief report on Automation Expo 2023 in this edition, but a more detailed pictorial review would appear in the October 2023 edition.

Semiconductors are the most strategic resource of the world today, points out an expert in his interview featured as part of the Cover Story, Semiconductors in Limelight. That was another Covid realisation – how the world had a highly fragile supply chain for this critical requirement. Policymakers in the US and EU have rolled out massive investments to correct this anomaly and India has also joined the effort. This edition has several articles and expert views on how these efforts are channelised to have a more robust and responsive supply chain in place to avoid the crisis that had caused so much turmoil for the user industries.

**Dr. M Arokiaswamy**  
Editor & Publisher

arokiaswamy@industrialautomationindia.in

## In the month of October 2023, Industrial Automation is Media Partner for two iconic events



Visit us at [www.industrialautomationindia.com](http://www.industrialautomationindia.com) to know more about these events

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# Redefining Futureproof Industrial Networks



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& Cybersecurity



Next generation  
Managed Switches



Unmanaged Switches



Industrial Wireless

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(L-R) Dr Keyur Vora, Mr Vinayak Marathe, Dr M Arokiaswamy, Mr Vinayak Pai, Dr B R Mehta and Dr Thampy Mathew.



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## Semiconductors in Limelight

Industrial Automation believes over the next few years, the semiconductor industry will witness a significant increase in application of automation technologies.

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AUGUST 21 22 23 24

BEC, Mumbai, India

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#### FOCUS

#### Factory Automation

- Process Automation and Control
- Turnkey Solutions
- Field Instrumentation
- IIoT
- Cyber Security
- Control Rooms
- Electric Automation
- Software Solutions
- Infra Logistics
- Hydraulics & Pneumatics.

### HALL NO. 2

ROBOTICS,  
BUILDING AUTOMATION,  
INTERNATIONAL PAVILION

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## DFI joins forces with six distributors in India

DFI Partners with 6 Distributors to  
**SEIZE INDIA'S INDUSTRIAL  
OPPORTUNITIES**

DFI



DFI, a global leader in embedded systems and industrial computer (IPC) solutions, has had long-term plans for the Southeast Asian market. Focusing on India, where the economy has taken off in recent years, DFI has announced that it will expand its efforts. The company recently signed strategic cooperation agreements with six local distributors, including Dynalog Limited.

DFI hopes to leverage its 40 plus years of experience in the IPC field and the strong distribution capabilities of its local partners to accelerate market penetration and seize opportunities in industrial automation, networking, defense, transportation, smart cities, and other sectors in India.

The collaboration facilitated by DFI aims to achieve two main objectives: rapidly increase "brand awareness" and "market share" in India. The selected distribution partners each possess unique advantages in different areas. Dynalog has over 30 years of experience in automation solutions and a market presence covering all of India.

Technics is a leading Indian automation solutions provider with a strong focus on the industrial automation and IoT markets and occupies an important position in Northern India. Alltronix, Avihs, and Netport are actively involved in the southern region of India, while LUBI Electronics is a leading automation solutions provider in India with a strong focus on the embedded systems market, such as embedded computing and System-on-Modules.

Combining local distribution channels, DFI aspires to become the best partner in India's industrial transformation.

For more information, please visit: <https://www.dfi.com>

## Schneider Electric hosts a Thought Leadership Summit



Schneider Electric, the leader in the digital transformation of energy management and automation, recently organised a CXO connect aimed at attracting prominent industry leaders for a dialogue on accelerating actions towards sustainability. Acknowledging Amritkaal as a pivotal moment in India's economic and social progress, Schneider Electric advocated for industries and corporations

to adopt a more electric and digital strategy, accelerating the nation's journey towards a more sustainable future. While India has emerged as a leader in mitigating the climate crisis, its key contributors to carbon emissions include sectors like industry, buildings, and transportation, accounting for 46%, 28%, and 16%, emissions respectively. This is where electric and digital technologies can emerge as game-changers. The swift adoption of existing digital and energy-efficient technologies at scale has the potential to curtail carbon emissions significantly.

The event, which was part of the organisation's 'Green Yodha' sustainability drive, saw attendance of prominent industry leaders including Mr G Asok Kumar, I.A.S., Director General, National Mission for Clean Ganga; Mr Sriram Khattar, MD, DLF Rental Business, Mr Sunil Gupta, MD and CEO, Yotta Data Services, Mr Anshuman Magazine, Chairman & CEO, India, South East Asia, Middle East & Africa, CBRE; Mr Videh Jaipurkar, CEO, Delhi International Airport Limited and Ms Vibha Dhawan, Director General, TERI.

## SANY India delivers one of the biggest Crawler Cranes in India



SANY India, a leading manufacturer of construction equipment, reached a significant milestone by delivering 8 units of the SANY SCC7500A 750 T crawler cranes, in the first quarter of financial year 2023-24, to Sanghvi Movers Limited (SML), one of the largest crane rental company in India and 6th largest globally in terms of

its fleet size. With delivery of these 8 units of Sany SCC7500A, 750 T Crawler Cranes, SML now owns 10 units of these cranes which is the largest fleet of Sany Cranes owned by any company across the world.

This delivery strengthens SML's position as the largest Hoisting Solutions Company in India, with a fleet of 45 SANY crawler cranes, truck cranes and all-terrain cranes available as rental solutions for core infrastructure projects across multiple sectors.

The keys for SANY SCC7500A 750 T crawler cranes were handed over to Sanghvi Movers Ltd at a function in Pune recently. The SCC7500A is a 750 T lifting capacity crawler crane, designed to excel in wind energy and non-wind energy applications (such as Cement Sector, Petro-Chemicals & Refinery, Steel Plants & Power Plants), with a maximum boom length of 108 mtr and a maximum luffing jib combination of 96 mtr + 96 mtr.



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## L&T Construction builds 3D printed post office – a global first



L&T Construction, the Indian construction giant with group sales of USD23 bn and a leader in the 3D construction printing industry in India, unveiled the country's first 3D printed post office, a groundbreaking project completed in just 43 days. Powered by COBOD's BOD2 3D construction printer, this achievement underscores the immense potential of 3D printing technology in revolutionising the construction landscape.

India's Prime Minister, Narendra Modi, shared the achievement on his social media, stating: "Every Indian would be proud to see India's first 3D printed Post Office at Cambridge Layout, Bengaluru."

A testament to our nation's innovation and progress, it also embodies the spirit of a self-reliant India. Compliments to those who have worked hard in ensuring the Post Office's completion."

This recognition from the nation's highest authority emphasizes the project's significance in advancing India's technological expertise. The project already had a high profile, as Union Railways & Communication Minister Ashwini Vaishnaw in April sparked excitement by highlighting the project on social media. The post office was inaugurated last week by Minister Ashwini Vaishnaw, underlining the Indian government's commitment to embracing cutting-edge technologies for national development.

The post office spans a floor area of 1,021 square feet (94.9 m²), and according to L&T is estimated to have cost Rs 2.6 mn (USD \$31,200), about 40% lower than what the cost would have been if conventional construction had been used.

## Feintool wins major contract from renowned fuel cell manufacturer in China



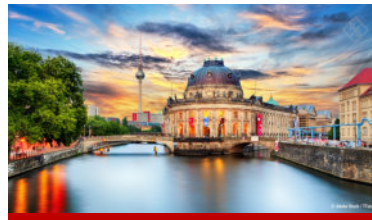
Feintool wins a major customer in China's booming hydrogen economy. Together with the fuel cell manufacturer Feintool has developed a new generation of fuel cells. High volume production of metallic bipolar plates will start in Taicang in 2024.

China is vigorously pushing ahead with the hydrogen economy and

Feintool has emerged as one of the first European companies to establish a presence in this highly competitive market. The technology company has teamed up with a renowned Chinese manufacturer to develop a new generation of high-performance fuel cells. In 2024, Feintool will ramp up the high volume production of metallic bipolar plates. These form the core of the fuel cells, which are mainly used in buses and commercial vehicles. This substantial order is anticipated to generate sales in the double-digit millions (CHF) over the next few years.

"We are proud to have won a major customer in a market dominated by domestic players. We look forward to contributing to the decarbonization of China with our advanced production technology," says Marcel Pernici, President of Feintool's parts business in Asia. Feintool has a proven track record as a trusted development partner with the customer, which has six branches in China and supplies the country's leading bus and commercial vehicles manufacturers with fuel cell stacks.

## Rohde & Schwarz to showcase latest mmWave test solutions at EuMW, Berlin



Berlin is the place to be in 2023, especially for the microwave industry. The European Microwave Week (EuMW) is Europe's premier annual microwave, RF, wireless and radar event and is coming to the German capital. German based test and measurement expert Rohde & Schwarz will present a

comprehensive portfolio of state-of-the-art test solutions to handle the latest industry challenges. A special focus will be on early sub-THz research for 6G.

Rohde & Schwarz is a globally active, leading T&M specialist with headquarters in Germany and will exhibit at this year's European Microwave Week 2023 in Berlin from September 19 to 21 under the motto "From Gigahertz to Terahertz". Visitors can learn about the company's latest test applications for microwave components, automotive, and aerospace and defense at booth H105 in Messe Berlin Hub27

The Rohde & Schwarz booth will focus on the company's growing range of cutting-edge test solutions for 6G. Academia and key industry players recognize the potential of the D band (110 GHz to 170 GHz) as a candidate for beyond 5G and 6G mobile communications as well as for future sensing and automotive radar applications. To support pioneering mmWave and sub-THz research, Rohde & Schwarz is rolling out an advanced RF test and measurement portfolio.



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## New FPT C16 2-stage turbo engine for CASE IH Steiger 715



FPT Industrial, a brand of Iveco Group and the world-leading manufacturer of low environmental-impact powertrain solutions, chose the Farm Progress Show 2023 to present its brand new C16 TST, 2-stage-turbo engine powering the new Case IH Steiger 715 flagship tractor.

Celebrating its 70th anniversary, and one of the largest outdoor farm shows in the USA, Farm Progress Show was held in Decatur (Illinois) from 29 to 31 August 2023.

At the Case IH stand, FPT Industrial showcased the result of a close and intense partnership with Case IH, in order to provide the new Steiger 715 with performance increases of more than 10% in terms of power and over 6% in terms of torque compared to the previous C13 TST-powered Steiger 645.

The reason for this significant power and torque increase lies in the fact that Case IH Steiger customers are pulling wider and wider implements faster to increase productivity.

The most powerful Steiger ever, available in Quadtrac® configurations, the new Steiger 715 is designed to make the largest fields smaller by covering more acres per hour per day, pulling larger implements faster, delivering more power and increasing both productivity and efficiency.

Pivotal to keeping the promises made to the most demanding farmers is the new 16-litre C16 TST engine tailored for 4WD tractors. This new engine has been extensively tested for more than 20,000 hours both on the bench and in the field.

## Endress+Hauser strengthens commitment in India



Endress+Hauser has opened a new production building on its campus in Aurangabad, India. This milestone not only underlines the company's commitment to the region but also reaffirms its continued investment in world-class production and working environments. The formal inauguration of the building took place

on 1 August 2023 in the presence of the Endress+Hauser Temperature+System Products management, as well as high-ranking representatives of various industry associations. After the official inauguration of the new building, a family party was held, giving employees' relatives the opportunity to visit the new premises.

In addition, employees celebrating anniversaries were honored for their many years of service to the company in the presence of their family members. The day was rounded off with an evening banquet at which traditional Indian cuisine was served. The new production building is a modern facility for the manufacture of temperature measurement technology and system products as well as liquid analysis. The two-story building covers a total area of 5,400 square meters and was realised with an investment of 4.4 million euros. The first floor houses new production spaces for Endress+Hauser Temperature+System Products, offices and a modern cafeteria. The second floor houses production and office space for Endress+Hauser Liquid Analysis. To minimise the environmental impact, a solar installation covers 80 percent of the building's electricity consumption.

## WIKA to build primary school in Kesnand Village, Pune



WIKA India, the global instrumentation major, as part of its CSR activities, laid the foundation stone for the construction of a school building on the premises of the Zilla Parishad Primary School, Kesnand village in Pune recently. The foundation stone was laid by Mr Alexander Wiegand, Chairman and CEO of WIKA Group of Companies, in the presence of Mr Andreas

Keiger, Executive Vice President – EMEA/India, WIKA Group and Mr Gaurav Bawa, Senior Vice President – WIKA India Group.

Recognising the challenges faced by the school due to lack of space, WIKA took the initiative to build five fully equipped classrooms to facilitate uninterrupted education for the students in the village. The initiative will increase the school's seating capacity by 200 students, giving an opportunity to more students to avail education. This will particularly benefit students from lower financial backgrounds and promote primary education in the area.

During the ceremony, Mr Alexander Wiegand expressed his gratitude for WIKA's presence in Kesnand village over the past 25 years. "Education is the right of every child and quality education determines the future of not just the children but also the community and the country as a whole. We are glad that WIKA has played a small role in providing education to every child in this village," he said.



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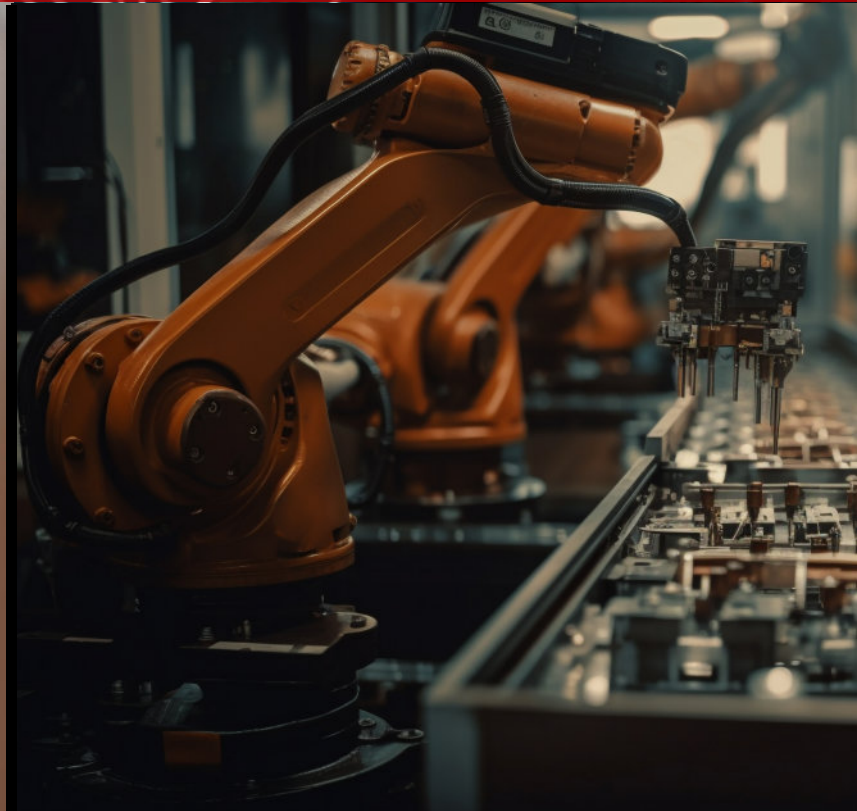
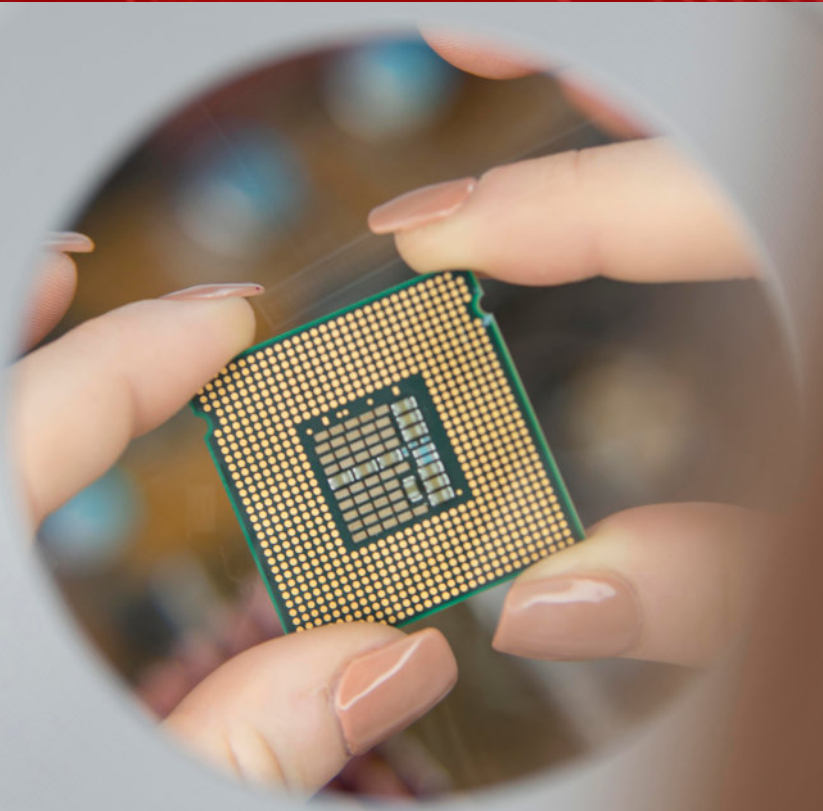
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# COVER STORY







A worker working on electronic components at high-tech factory. Image by nikitabuida on Freepik

## Scaling Up Production of Chips with Automation

**I**ndustrial Automation believes over the next few years, the semiconductor industry will witness a significant increase in application of automation technologies.

Modern electronics is built on integrated circuits (ICs). Also known as chip, microchip or microelectronic circuit, the IC is a semiconductor, usually made from silicon wafer. The chip powers everything from smartphones and computers to medical devices and automobiles. A thorough understanding of the IC and the intricate

processes involved in its production is essential for industry professionals. Let us delve deeper into the world of ICs and examine their importance, the production process, and the crucial role that automation plays in this intricate process.

Let us get started by understanding what an IC or a chip is.

The IC is a small semiconductor device that combines several electronic parts, including transistors, resistors, and capacitors, all packed in a single silicon chip. These chips have transformed electronics, allowing for the development of powerful and energy-efficient devices.

The two main categories of ICs are analog and digital. Analog ICs facilitate continuous signals, making them ideal for audio and video processing. Digital ICs, on the other hand, manipulate discrete

binary signals, laying the groundwork for computing and digital communication.

### **The IC fabrication process**

The process of manufacturing chips, also known as the IC fabrication process, is extremely complex. We have mentioned below the key steps involved in chip manufacturing.

**Design and Layout:** Skilled engineers begin the process by designing the circuitry of the chip. They carefully design the layout, laying out how each element will be connected to produce the desired functionality.

**Wafer Fabrication:** Silicon wafers are the building blocks for the fabrication of integrated circuits. These wafers are made from silicon crystals that have been thinly cut into disks the size of a circle. The purity and quality of the



Female technician working on iron and electronics motherboard (Image by search&track=ais on Freepik)

wafer are essential for ensuring consistent IC performance.

**Photolithography:** Through the process of photolithography, the silicon wafer is repeatedly covered with the IC's design layout. To create the pattern, a photoresist material is applied to the wafer's surface, exposed to ultraviolet light through a mask, and then developed.

**Etching:** Using chemical or plasma processes, the exposed wafer areas are selectively removed (etched). It describes the different silicon wafer features, such as transistor channels and interconnects.

**Doping and Implantation:** Ion implantation or diffusion processes are used to introduce dopants (impurity atoms) into the wafer in order to change the electrical characteristics of the silicon. This process is essential for creating areas with various conductive properties.

**Oxidation:** When a wafer is heated to a high temperature and placed in an oxygen-rich environment, a thin layer of silicon dioxide (oxide) grows on the wafer's surface. In the IC, the oxide layer serves as insulation.

**Deposition:** Using chemical vapour deposition (CVD) or physical vapour deposition (PVD), thin films of various materials, including silicon, metals, and dielectrics, are deposited onto the wafer. These films make up the IC's conductive and insulating layers.

**Chemical Mechanical Polishing (CMP):** CMP is used to remove excess material from the wafer surface and produce a smooth, even surface topography.

**Patterning and Metallization:** Additional photolithography steps and etching procedures define the interconnects, which connect the various wafer components. The final wiring that connects the transistors is made by depositing and patterning metal layers, usually made of aluminum or copper.

**“The process of manufacturing chips, also known as the IC fabrication process, is extremely complex.**

**Testing and Packaging:** Each integrated circuit or chip is rigorously tested to ensure its functionality. The functional chips are separated into individual units and packaged in protective casings with external connection points, while the defective chips are discarded.

**The role of automation in IC manufacturing**  
For many years, dedicated automation teams have been playing essential roles in semiconductor manufacturing facilities. These teams manage the scheduling and tracking of chip production, troubleshoot network or equipment issues, and transfer data files to and

from central locations. They also convert the data that station controllers output. For semiconductor companies at every stage of their operations, from research and chip design to production and sales, automation technologies like artificial intelligence (AI) and machine learning (ML) have the potential to generate enormous business value.

Fabricating integrated circuits requires a lot of capital. Due to the complicated manufacturing challenges, they have high operating costs. They also have to deal with ongoing changes in consumer and market demands. The fabrication of chips consumes a lot of energy and power as they run nonstop during times of high demand. This is where automation and Industry 4.0 come to the rescue.

In the words of Mark da Silva, senior director of the smart manufacturing initiative at SEMI, “Smart manufacturing, or Industry 4.0, is a collection of technologies that have the potential to increase the efficiency of traditional semiconductor manufacturing facilities.”

Integrated circuits are the driving force behind modern-day technological advancements. In order to produce dependable, effective, and cutting-edge electronic devices, industry experts must comprehend the complexities of chip manufacturing and the pivotal role of automation.

Automation technologies can drive the smart manufacturing of chips, improving the accuracy and repeatability of the fabrication process and speeding up technological advancement in order to put cutting-edge electronics in the hands of customers around the world. Future developments in the field of chip production are expected to be even more exciting as automation advances further.

### Meeting the challenges

The semiconductor industry worldwide has been driving technological innovation and powering the digital revolution for decades. Since the global demand for chips is growing at a significant pace, chip complexity and the required skills remain major challenges. This is where automation comes in, playing an integral part in semiconductor manufacturing. The semiconductor industry has faced various difficulties and opportunities, including chip shortages, rising chip demand, government investments, and more. While there may be challenges that affect the industry's outlook,



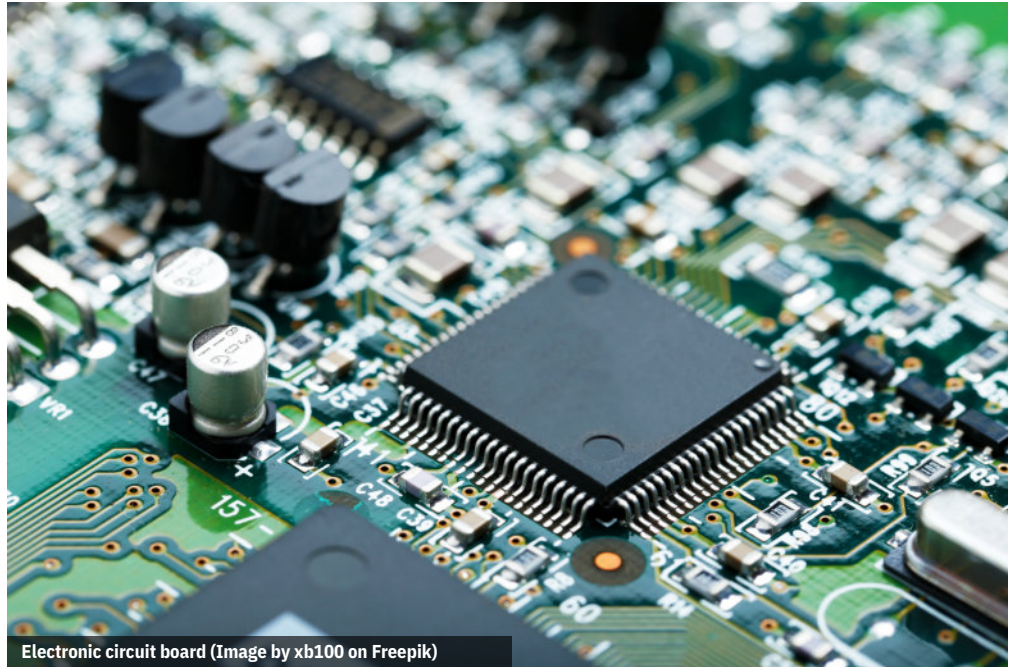
demand for semiconductors is anticipated to be strong throughout the decade, with revenues expected to increase by more than 80% from \$550 billion in 2021 to \$1 trillion in 2030. Smart manufacturing solutions can help alleviate the semiconductor industry's talent shortage. According to Anjaneya Thakar, senior director of product marketing in Synopsys' Silicon Engineering Group, "The rapid growth of IC manufacturing capacity has created a severe shortfall of experts to run these modern factories. Smart manufacturing is expected to automate decision-making to compensate for this shortfall."

Taking note of several reports and articles published in recent years by organisations like McKinsey & Company and the Semiconductor Industry Association, the impact of the current talent shortage in the chip manufacturing industry is being felt globally. Automation in semiconductor manufacturing can be essential, driven by various applications and benefits, such as the ability to carry out tasks and processes seamlessly. It can provide significant benefits to manufacturers, such as enhanced productivity and faster learning ramps for both new and reskilled technical resources.

#### Automation exposure to IC manufacturing

To improve the efficiency of their operations, many manufacturers are turning to technology such as automation, artificial intelligence (AI), and machine learning. According to a McKinsey survey, 30% of semiconductor device manufacturers are already generating value with the help of AI and ML. These manufacturers have largely invested in AI and ML talent as well as in data infrastructure, technology, and other enablers. They have also fully scaled up their initial use cases. Conversely, about 70% of manufacturers' AI/ML processes are still in the pilot stage.

AI and ML are gaining importance as crucial tools across the entire value chain as chip manufacturers try to boost productivity in research, chip design, and manufacturing while also shortening the time to market. According to another McKinsey study, semiconductor companies' earnings before interest and taxes increase by US\$5 billion to US\$8 billion annually as a result of these technologies (AI and ML). Automated tools can deliver faster time-to-data, improve workforce productivity, and increase manufacturing throughput. By embracing Industry 4.0, manufacturers can collect data specific to equipment or workstation controllers.



Electronic circuit board (Image by xb100 on Freepik)

They can also track all the information related to production workflows. By integrating this information with automation techniques and algorithms, businesses can achieve lower operational costs and improved production efficiency. Such approaches can be implemented in the design of new factories as well as advancements to existing factories.

**“In the Indian context, the semiconductor manufacturing industry plays a pivotal role, contributing a lot to the country's economic growth**

#### Automation in the Indian semiconductor industry

In the Indian context, the semiconductor manufacturing industry plays a pivotal role, contributing a lot to the country's economic growth. As India continues to develop its semiconductor ecosystem, automation has a significant role in advancing the industry, enabling the country to emerge as a leading producer of chips or semiconductors at a global level.

However, there are certain challenges ranging from the talent pool and investments and infrastructure to research and development (R&D), policy support, data security, and intellectual property.

Recently, in an effort to boost semiconductor manufacturing in the country, Union Minister for Electronics and Information Technology, Ashwini Vaishnaw, announced that the government will soon launch a program to set the country on a good semiconductor path for the next ten years.

"When PM approved the Semicon India program on January 1, 2022, we promised that within the next 14-16 months, we will work hard, learn from the world's experience, and come out with a program which will take the country on a good semiconductor journey for the next 10 years," Vaishnaw said.

The Semicon India Program has launched with an outlay of Rs 76,000 crore. The program aims to foster the growth of India's semiconductor and display manufacturing ecosystems.

The goal of the Semicon India Program is to offer companies and consortiums that work in Silicon Semiconductor Fabs, Display Fabs, Compound Semiconductors, Silicon Photonics, Sensors (including MEMS) Fabs, Semiconductor Packaging (ATMP/OSAT), and Semiconductor Design an alluring incentive support system. Several multinational corporations are paving the way in order to support the government's initiatives to take India's semiconductor industry to new heights.

According to a news report from the Economic Times, Foxconn is reportedly in talks to create new partnerships with Japan's TMH Group and

Taiwan Semiconductor Manufacturing Co (TSMC) to set up semiconductor fabrication facilities in India.

It was previously reported that the HCL Group is about to submit a proposal to the Centre for the development of an assembly, testing, marking, and packaging (ATMP) unit for semiconductors, with a project cost estimate of between US\$200 and US\$300 million.

### Top companies and startups driving innovation in chip manufacturing

The IC manufacturing industry in India and abroad is a fast-paced and competitive sector. Companies at both the local and global levels are significantly contributing to advancements in semiconductor manufacturing and associated technologies. Since the semiconductor industry is a dynamic and highly competitive landscape, several companies and startups are continuously setting the boundaries of technological innovation. Let us explore the leading semiconductor players in India and around the world.

**Vedanta Ltd:** Founded in 1980, Vedanta Ltd is India's leading diversified natural resources company. It focuses on zinc, silver, lead, oil and gas, iron ore, copper, aluminum, and power. In 2022, Vedanta and Taiwanese chipmaker Foxconn signed an MoU with the Gujarat government to set up the first semiconductor and display manufacturing plant in India at an investment of INR 1,54,000 crore. Foxconn has recently announced its withdrawal from the JV.

**Moschip Technologies Ltd:** As a publicly traded semiconductor and system design services provider, Moschip Technologies is a Hyderabad-based company. With significant investments in leading-edge technologies, the company has built a wide range of products and SoCs for networking, computing, and consumer-grade applications.

**SPEL Semiconductor Ltd:** Founded in 1984, SPEL Semiconductor deals with semiconductor integrated circuit (IC) assembly and testing facilities. The company has pioneered the Indian OSAT market and continues to grow steadily. With innovative and reliable services, it has become a preferred choice for businesses in the semiconductor industry.

Additionally, major Indian startups involved in the world of semiconductor manufacturing include Valtrix Systems, Saankhya Labs, Sankalp

Semiconductor, Chip Web Technologies, QpiSemi Technology Pvt Ltd, and Astera Labs, among others.

Apart from these Indian players, there are global companies and startups revolutionising the international semiconductor market. Some of the popular global players are Intel Corporation, Samsung Electronics, Taiwan Semiconductor Manufacturing Company (TSMC), Qualcomm, Broadcom, SK Hynix, Micron Technology, and Nvidia, among others.

Global startups that are leading the way in chip manufacturing include Cerebras Systems, Graphcore, Efinix, Wiliot, and SiFive. These companies, both at the national and international levels, constantly invest in research and development and automation technology in order to build cutting-edge chips that power the world.

### The strategic road map

The semiconductor industry has been witnessing exponential growth in India as well as abroad. This is significantly influenced by the rising demand for integrated circuits or chips across sectors. By investing in automation technologies such as AI, ML, and Industry 4.0, companies in the industry will be able to effectively optimise their portfolios and improve efficiency during the research and chip-design phases.

Companies can cut costs associated with maintaining yield, avoid time-consuming iterations, and accelerate yield ramp-up by eliminating defects and out-of-tolerance process steps. Additionally, they can automate the laborious procedures involved in designing physical layouts and performing verification.

It is no surprise that semiconductor manufacturers must go through numerous time-consuming and expensive iterations based on feedback from manufacturing if errors are made during the design of an IC.

Thus, by implementing machine learning algorithms, they may circumvent such problems and recognise patterns in component failures, forecast likely failures in new designs, and put forward optimal layouts to boost yield.

Companies must prioritise scaling up AI and ML initiatives on a strategic level. They should make efforts, which entail coordinating data, deciding on priority use cases, and fostering collaboration among the right business, data science, and engineering talents, to make their projects

successful. The AI/ML efforts should also ideally be tied to specific business goals so that business units and business functions have a shared vision to experience the transformation through to completion.

### Conclusion

The semiconductor industry is on the verge of transformation. Companies that do not invest significantly in automation strategies and technologies could experience risks and be left behind the competition. Despite adopting different strategies depending on their business models and objectives, level of AI/ML proficiency, and strategic priorities, the end goal of semiconductor companies is always to enhance and advance productivity and innovation.

**“Companies must prioritise scaling up AI and ML initiatives on a strategic level.”**

We at Industrial Automation believe that over the next few years, the semiconductor industry will witness a significant increase in the application of automation technologies and smart manufacturing. Scaling up their strategies will enable companies to harness the full potential of automation technologies and drive efficiency and innovation.

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# 'Today chips are the most strategic resource in the world'

**S**teve Banker, Vice President, Supply Chain Management, ARC Advisory Group.

**What caused the severe disruption in the semiconductors supply chain during the Covid pandemic?**

A shift in demand was part of it. People stuck at home were buying consumer electronics and there was more demand for remote working in some areas. But the semiconductor sector was also too cautious. Even without Covid, there were indications that multi year supply was going to exceed demand. But when a chip plant costs billions of dollars and years to get up and running, Taiwan Semiconductor Manufacturing Company (TSMC) is building two plants in AZ that will cost \$40 billion; there are reasons why these suppliers would be conservative. Finally, you can't just blame the chip companies. Many big companies do not have a risk management program that includes visibility to sub tier suppliers to the chip manufacturers. If the sub tier suppliers don't provide the fabricator with their parts, chips don't come out the other end. Similarly, if a Tier 1 component supplier to an auto company suffers a chip shortage, the OEM still ends up with a supply chain issue.

**Is indiscriminate use of high-end semiconductors for applications that do not use their full potential, adding to the crisis? In other words, is there a case for rationalisation of use?**

Not sure I'd say "indiscriminate." But Tesla, the most vertically integrated of the auto makers, had the fewest problems both because of better visibility to their supply chain and because their use of chips was more focused and targeted.

**The US and Europe with active government support has embarked on a massive production spree to correct the geographical imbalance. How will this impact the supply situation?**

I think this needs to be put in context. In August of 2022, the CHIPS and Science Act was signed into law by President Biden. The Act provides \$280 billion in new funding to boost domestic



Steve Banker

research and manufacturing of semiconductors in the United States. But the reason for this has to do with growing tensions between China and the West. In decades past, oil was strategic. Today chips are the most strategic resource in the world.

Taiwan Semiconductor Manufacturing Company (TSMC) is the world's largest contract chip manufacturer, and it is responsible for supplying semiconductors to most of the world's largest technology firms. It produces the world's most sophisticated chips.

While Apple designs the most advanced chips for their smartphones, only TSMC can manufacture

them. These chips are currently manufactured at a single site in Taiwan.

The semiconductor industry is a global supply chain. No other facet of the global economy is so dependent on so few firms. Chips from Taiwan provide 37 per cent of the world's new computing power each year.

Two Korean companies produce 44 per cent of the world's memory chips. The Dutch company ASML builds 100 per cent of the world's extreme ultraviolet lithography machines, without which cutting-edge chips are simply impossible to make.



**As a highly capital intensive industry with heavy demand on resources like land, water and electricity, how difficult is the task of ramping up capacities?**

Right now as new plants are opening in the US the greatest problem is finding the right talent. When an industry gets outsourced to a foreign country, the talent dries ups.

**India too has embarked on a government backed initiative for creating a semiconductor ecosystem. What is the present status in terms of implementation?**

The Government of India has allocated a financial outlay of \$30 billion to make India a global hub for electronics manufacturing. Several subsidies and other incentives are on offer for setting up electronics manufacturing units in India.

The Government of India has allowed 100 per cent Foreign Direct Investment (FDI) under the automatic route in the sector. The US Semiconductor Industry Association (SIA) and the India Electronics and Semiconductor Association (IESA) announced in January 2023 to organise a private sector task force to strengthen bilateral engagement in the global semiconductor ecosystem.

**Digitalisation in industry in general and the electrification of mobility with future autonomous operations are developments that will need semiconductors in bulk. Will the world ever have enough capacity?**

Yes, the industry goes through cycles of too much capacity followed by too little. There is no reason to think that will change.

**Are there any new technology trends that are likely to revolutionise semiconductor production either with materials other than silicon, or some other breakthrough?**

Semiconductor industry is now an inseparable part of almost all sectors as it forms an essential component of all electronic items. It defines how efficiently and smartly we live. Artificial intelligence, 5G, and IoT will have major implications on the semiconductor industry in the coming years. 5G technology is likely to create a huge impact as the 5G chipset allows faster flow and processing of information. AI and IoT have sparked a new wave of innovation in the semiconductor industry and for maximum profitability both technologies must progress in tandem.

*(The views expressed in interviews are personal, not necessarily of the organisations represented)*

*Steve Banker heads the Supply Chain & Logistics consulting team at ARC. Steve's technology focus areas include transportation management, managed transportation services, warehouse management, and supply chain planning. At ARC, Steve has been covering supply chain technologies since 1996. He is one of the best known industry analysts covering supply chain management and a frequent speaker at industry events.*

*He has been widely quoted in trade publications covering logistics, material handling, and supply chain management and has had his articles published in Supply Chain Management Review. In recognition of his contribution to the supply chain and logistics field, Steve was selected as a 'Pro to Know' by Supply & Demand Chain Executive Magazine.*

*Steve has a column in Forbes.com covering sustainability and transportation and writes the Monday column in Logistics Viewpoints. Steve's research includes ROI analysis of a variety of supply chain applications and 3PL services, benchmarking, and best practice reports. He has aided users in supplier and consultant selections and suppliers with acquisitions and product roadmaps.*

## Semiconductor IP unleashes next-gen tech potential

Future Market Insight forecasts that the global semiconductor intellectual property (IP) market is poised to achieve a noteworthy milestone by 2033, surpassing a substantial valuation of US\$ 13.10 billion. With a projected CAGR of 6.7%, this growth trajectory indicates a significant rise from its estimated worth of US\$ 6.83 billion in 2023.

The semiconductor IP market is experiencing growth due to the escalating demand for automation and the rapid adoption of IP Core products in the consumer electronics industry. There is an ever-growing demand for cutting-edge electronic devices, such as smartphones, tablets, and wearable gadgets. The utilisation of semiconductor IPs is enhancing the capabilities of IoT products.

The industry is also expanding rapidly because of the increasing prevalence of internet access and the growing utilisation of smart connected devices, which further contribute to market growth.

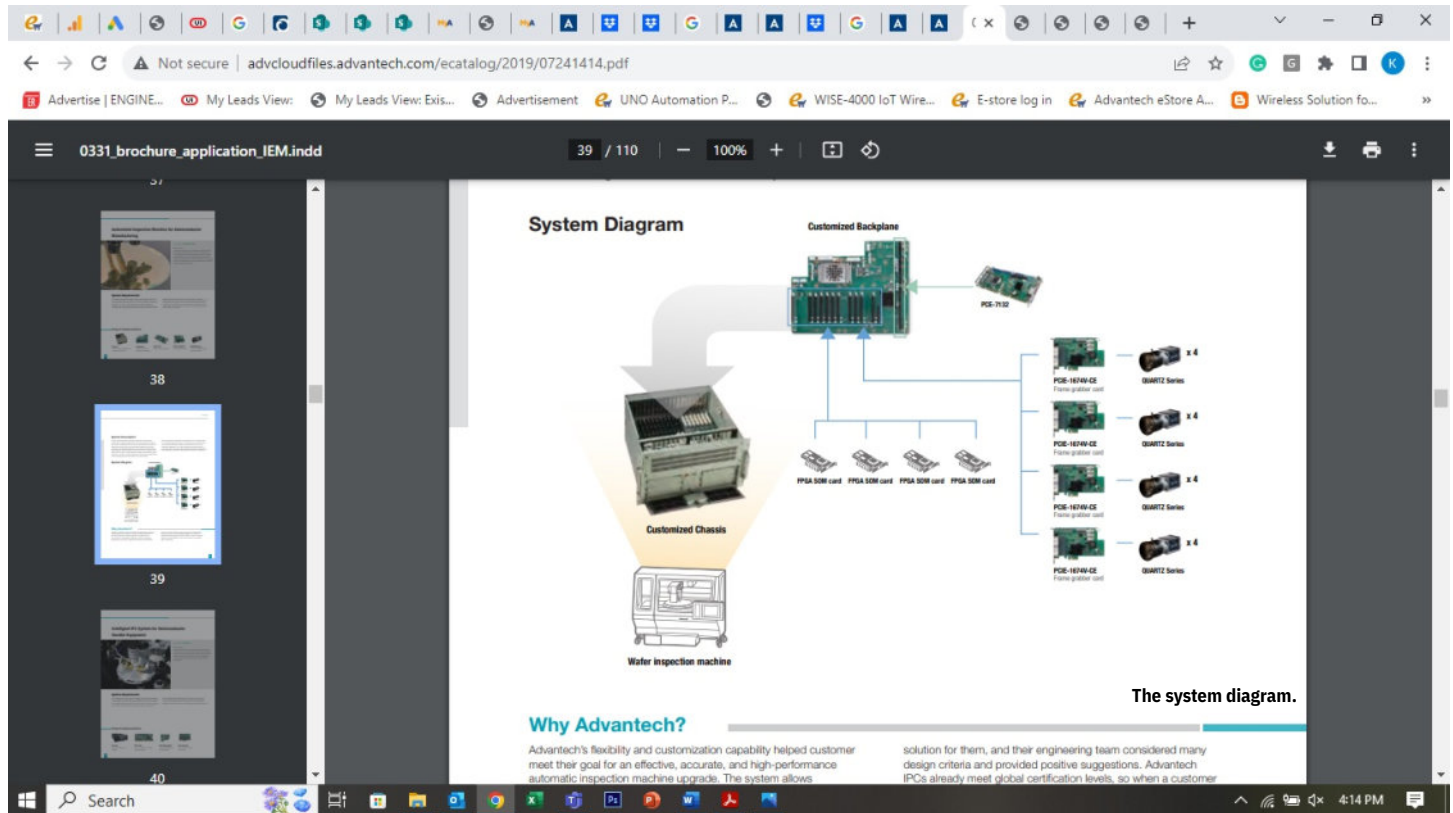
Semiconductor IP provides pre-designed and verified components that help these companies accelerate their product development cycles. Semiconductor IP enables companies to cater to market demands swiftly by leveraging ready-made components.

Developing semiconductor chips from scratch is a challenging process that requires significant time, effort, and investment. Companies strive to shorten their time-to-market and minimize development costs in today's fast-paced industry. Semiconductor IP addresses these challenges by offering pre-designed IP blocks and subsystems.

The semiconductor industry experiences constant advancements in manufacturing technologies, including smaller process nodes and enhanced integration capabilities. These technological breakthroughs present new design challenges that require specialized semiconductor IP solutions. To meet these demands, semiconductor IP providers develop and offer IP solutions optimised for the latest technological advancements.

The semiconductor intellectual property market thrives due to the growth of emerging markets like automotive electronics, industrial automation, robotics, and smart infrastructure. These emerging markets have unique requirements, such as functional safety, reliability, and power efficiency. Semiconductor IP providers meet these demands by offering application-specific IP solutions.

# Automated Inspection Machine for Semiconductor Manufacturing



## Advantech customised a solution for a multinational company based on their design criteria.

To keep their competitive edge, a multinational company needed to upgrade their production efficiency. To do this, they were looking for a high-performance automatic inspection system with multiple backplane slots for their multiple SOM boards that could execute effective and efficient inspection. For this application, it was necessary to have an optimised thermal solution to ensure the whole application worked reliably without any issues.

### System requirements

The company already had a legacy system they used to control, collect, and manage production line data, so they were looking to upgrade their existing AI system without too much fuss or

disruption to existing production. To do this, they decided they needed to integrate an Advantech IPC with multiple SOM boards into their own system. This would give them the extra capacity they needed and would not interfere with their existing infrastructure. For this upgrade the customer wanted to increase the accuracy and efficiency of the system and add frame grabber and graphic cards with higher data transfer speeds. However, the combined heat from all the cards, especially the FPGA card modules, might overwhelm the system so an optimised thermal solution was also required.

### System description

For this special application, Advantech helped to customise the chassis with a specially designed fan duct that matched the shape of the customer's SOM boards. This would concentrate the air flow from system fan through and across the boards to efficiently expel heat from system. To upgrade the system, the customer needs to have an industrial grade PCIe backplane with sufficient slots for multiple add on cards. And of course, a high watt power supply was needed to power everything. In addition, special cabling was required that assisted

the air ducts in directing the thermal emission out of the system. The final system incorporated a 6U chassis with 12 customised slots on a Gen3 backplane and a PCE-7132 SBC with Intel 10th Gen CPU. This provided a perfectly a stable and reliable environment for the customer's application. And, with a customised thermal solution in place, there was no need to add additional fans inside the system that would generate unwanted noise and create maintenance difficulties.

### Why Advantech?

Advantech's flexibility and customisation capability helped customer meet their goal for an effective, accurate, and high-performance automatic inspection machine upgrade. The system allows the customer to add additional extension cards for expanding performance in the future. Advantech was able to customise the solution for them, and their engineering team considered many design criteria and provided positive suggestions. Advantech IPCs already meet global certification levels, so when a customer applies for global certification, the whole process is completed within a short time.



With the VEGAPULS 42 radar sensor, VEGA expands its IO-Link portfolio for factory automation and thus offers an optimal performance spectrum for all level, switching and pressure applications. The all-inclusive range of instrumentation from a single source makes everything easier – including the setup and operation of the most varied and complex processes.



## VEGA expands radar portfolio for factory automation

### Radar sensor in hygienic design

VEGAPULS 42 brings VEGA's decades of radar experience to factory automation. The sensor meets the special requirements of the industry for levels in small tanks or clocked filling processes. It is equipped with everything that hygiene-sensitive processes need: Its switching frequency enables high cycle rates and correspondingly fast level changes. Its flexible connection options range from standard threads to the universal connection for its 1-inch hygienic adapter. When delivered, it is immediately ready for operation and, in the 3-wire version, communication with IO-Link.

### All the advantages of radar for automation

As a non-contact measuring principle, radar brings numerous advantages to the clocked processes in the food and pharmaceutical industries, such as filling, that other measuring

solutions cannot offer. The need for this is great, because reliable measured values are becoming increasingly important for efficient plant operation and optimal process control. With IO-Link, VEGAPULS 42 not only communicates universally, but can also be hooked up very quickly and inexpensively via a simple 3-wire connection. Sensor replacement is quick and automatic with the new Smart Sensor Profile 2, and adjustment is very easy using the VEGA Tools app on a smartphone with Bluetooth.

### Double certainty through visualisation

With VEGAPULS 42, you can see at first glance if the process is running as it should or if there's a problem. An illuminated ring that changes colour allows the sensor to be read from all directions, and even from a distance. "This configuration not only gives you immediate certainty about the current condition of the sensor," explains product manager Marvin Moser, "but also another way to check the process status."

#### IO-Link

#### Wireless adjustment

360° status display or on-site digital display

Universal connection for hygienic adapter

Stainless steel housing



#### Worldwide approvals



Protection classes IP66/67/69

Pressure range -1 ... +16 bar

Temperature range  
-40° C ... +130° C/  
15 min @ +150° C steam

# 'Increasing digitalisation, EVs driving significant demand for semiconductors'

**S**unil David, Digital Technology Consultant.

**What caused the severe disruption in the semiconductors supply chain during the Covid pandemic?**

The severe disruption in the semiconductor supply chain during the Covid-19 pandemic was caused by a combination of factors, leading to a perfect storm that impacted various stages of semiconductor manufacturing and distribution. Here are some key factors that contributed to the disruption: increased demand for consumer electronics; supply chain disruptions; factory shutdowns and labour shortages; increased demand for automotive electronics; prioritisation of high-end products; fire incidents and natural disasters in some fab facilities; and geopolitical tensions and the Russia Ukraine War.

All of these factors combined to create a severe disruption in the semiconductor supply chain during the Covid-19 pandemic, causing shortages, longer lead times, and increased prices for various electronic products.

**Is indiscriminate use of high end semiconductors for applications that do not use their full potential, adding to the crisis? In other words, is there a case for rationalisation of use?**

Yes, the indiscriminate use of high-end semiconductors for applications that do not fully utilise their capabilities can indeed contribute to the crisis and semiconductor supply chain challenges. There is a strong case for the rationalisation of semiconductor use to address these issues more effectively. Here are some reasons why rationalisation is important: supply and demand imbalance; resource utilisation; impact on lower-end applications; innovation and productivity; and environmental concerns.

To address these issues, it is essential for industries and manufacturers to consider the specific requirements of their applications and adopt a more tailored approach to semiconductor selection. This could involve using lower- and mid-range semiconductors where appropriate, optimising designs for efficiency, and exploring



Sunil David

more specialised solutions for specific use cases. Collaborative efforts between semiconductor manufacturers, industries, and policymakers can also contribute to a more rational and sustainable use of semiconductor technologies.

**The US and Europe with active government support has embarked on a massive production spree to correct the geographical imbalance. How will this impact the supply situation?**

The active government support and the massive production spree embarked upon by the US and Europe to correct the geographical imbalance in semiconductor manufacturing can have several impacts on the overall global supply situation. With

the US and EU clearly focusing on building their semiconductor ecosystems so as to reduce its dependency on Taiwan and China over the next few years, it has its potential effects. Some of the effects are as follows: increased supply capacity; diversification of supply chain; short-term challenges; competing for resources; impact on existing suppliers; enhanced global collaboration; and influence on pricing. It's important to note that these impacts will take time to fully materialise, as semiconductor manufacturing is a complex and capital-intensive industry. Government initiatives and investments will play a significant role in shaping the outcome, but various factors, including market demand and



technological advancements, will also influence the overall supply situation. Additionally, the global semiconductor industry is highly interconnected, and changes in one region can have ripple effects worldwide. As such, global cooperation and coordination will remain crucial for achieving a sustainable and robust semiconductor supply chain.

**As a highly capital intensive industry with heavy demand on resources like land, water and electricity, how difficult is the task of ramping up capacities?**

Ramping up capacities in the semiconductor industry is indeed a highly complex and challenging task due to its capital-intensive nature and heavy demand on resources like land, water, and electricity.

Despite these challenges, the semiconductor industry continually strives to increase capacity to meet growing global demand. Governments and companies are investing heavily in new fabs, partnerships, and research and development to accelerate the process and address supply constraints. Additionally, advancements in process technology and manufacturing techniques, such as automation and advanced process nodes, are being explored to enhance production efficiency and capacity. However, achieving a substantial increase in capacity remains a long-term endeavor that requires careful planning, substantial investments, and collaboration across the industry.

**India too has embarked on a government backed initiative for creating a semiconductor ecosystem. What is the present status in terms of implementation?**

Prime Minister, Shri Narendra Modi, inaugurated SemiconIndia 2023 in Gandhinagar, Gujarat late July 2023. With the theme "Catalysing India's Semiconductor Ecosystem" the conference objectives were to exhibit India's semiconductor strategy and policy and with a clear vision to position India as a global hub for semiconductor design, manufacturing, and technology development. The 'Semicon India 2023' conference clearly emphasised investment opportunities in India's semiconductor sector through informative presentations and stimulating panel discussions led by industry experts. The event objectives were to accelerate the progress of the semiconductor industry by facilitating networking, technology demonstrations, and lucrative business prospects. Throughout the three-day conference, which concluded on July 30, experts from

various parts of the world specialising in semiconductor chip, display fab, chip design, and assembly had convened to share their insights on emerging opportunities in India. Well known companies such as Foxconn, Micron, AMD, IBM, Vedanta, NXP Semiconductors, STMicroelectronics, Infineon Technologies, and Applied Materials, among others had actively participated in the event.

**Digitalisation in industry in general and the electrification of mobility with future autonomous operations are developments that will need semiconductors in bulk. Will the world have enough capacity?**

The increasing digitalisation in various industries and the electrification of mobility, coupled with the future prospects of autonomous operations, are indeed driving a significant demand for semiconductors. As these technologies continue to advance, the world will face substantial challenges in meeting the growing need for semiconductor production capacity.

While the semiconductor industry has historically shown remarkable progress in scaling up capacity to address rising demand, there are several factors to consider when assessing the world's ability to meet this exponential need.

**Are there any new technology trends that are likely to revolutionise semiconductor production either with materials other than silicon, or some other breakthrough?**

Yes, there are several new technology trends that have the potential to revolutionise semiconductor production and impact the industry significantly. Some of these trends include:

**Beyond Silicon:** While silicon has been the dominant material for semiconductor manufacturing for several decades, there are emerging alternatives that hold promise for the future.

**3D Stacking and Packaging:** This approach allows for denser and more powerful chips, reducing interconnect delays and enhancing performance while optimising space utilisation.

**Extreme Ultraviolet Lithography (EUV):** EUV is a cutting-edge semiconductor lithography technique that uses extreme ultraviolet light to print smaller features on chips.

**Neuromorphic and Quantum Computing:** These technologies may require new semiconductor materials and design approaches to harness their full potential.

**Materials Innovation:** Advancements in materials science are continually driving new possibilities in semiconductor manufacturing.

**Internet of Things (IoT) and Edge Computing:** The rapid growth of IoT and edge computing demands low-power, high-performance chips for various applications.

**AI Hardware Accelerators:** As artificial intelligence applications expand, dedicated AI hardware accelerators are becoming increasingly important.

**System-in-Package (SiP) Technology:** SiP technology integrates multiple chips, sensors, and components into a single package, enabling smaller form factors and more versatile devices.

**Advanced Packaging:** Advanced packaging techniques, such as fan-out wafer-level packaging (FOWLP) and chiplets, provide opportunities for modular, cost-effective, and heterogeneous integration of components.

These trends represent exciting opportunities for semiconductor manufacturing and could lead to revolutionary advancements in the industry. Each of these developments has its unique challenges, and successful implementation will depend on research, collaboration, and investment from various stakeholders in the semiconductor ecosystem. As technology continues to evolve, these trends will shape the future of semiconductor production and drive innovations across industries.

***(The views expressed in interviews are personal, not necessarily of the organisations represented. This is an abridged version of a more detailed interview that appears online on [www.industrialautomationindia.com/interviews](http://www.industrialautomationindia.com/interviews))***

*Sunil David has 28 years of experience in the IT and Telecom industry of which close to 20 years was with AT&T, one of the top Communication Service Providers of the World and a Global Fortune 100 Firm. Until recently, Sunil was the Regional Director (IoT) India and ASEAN for AT&T India where he was responsible for building the IoT strategy, Sales, Business Development and also worked on building a robust IoT partner ecosystem; and was also actively involved in a number of marketing initiatives to help enhance the AT&T brand in the IoT space.*

# BESS – A New Era of Power



## Alvin Chen deciphers the four major data challenges in large-scale battery energy storage systems (BESS).

As the sun sets on coal power, we see the rise of large-scale Battery Energy Storage Systems (BESSs) together with a surge of renewable energy capacity. Bridging a century-long technological divide, industry pioneers are merging innovative battery storage technology with established grid systems. Optimising grid balance and ensuring smooth operation of storage devices is no small task. So, what's their secret to ensuring a successful energy transition? The answer is simple: data.

Across the industry, monitoring and control systems – such as battery management systems (BMS) and energy management systems (EMS) – are becoming as crucial to energy storage as the batteries themselves.

Understanding the complex language of system data is the first step in making these systems effective. Specialist knowledge is key to collecting and interpreting the data that powers Operational Technology (OT).

Although data is a powerful tool, it must be leveraged effectively for reliable operation and growth. Here are four distinct data challenges that BESS must grapple with:

### 1. The 'Insufficient Data' Dilemma

BESS is more than just battery storage. Fire suppression systems, air conditioning, and power conservation systems can also fall under this segment. However, these different types of equipment often use differing data communication protocols and interfaces. As a result, getting comprehensive status information from these critical devices can be challenging.

### 2. The 'Unusable Data' Puzzle

A 20/40-foot battery cabinet generates a large amount of data each minute, including temperature readings, voltage levels, and current measurements, among others. Avoiding bandwidth and processing inefficiencies while sorting useful data from noise can be a monumental task.

### 3. The 'Incomplete Data' Conundrum

BESS is important for managing grid stability, and there is great demand for real-time regulation and site information. For example, efficient use of stored wind and solar energy requires long-term monitoring and analysis of BESS system data, while grid stability requires real-time automatic frequency control. Both applications require comprehensive, high-speed data transmission,

which can be facilitated by long-distance communication and rapid fallback networks.

### 4. The 'Insecure Data' Quandary

BESS connects power generation, transmission, and distribution. This interconnectivity can result in a larger attack surface for cyberattacks. To minimise vulnerabilities and protect the power grid, robust security protocols are a must for system suppliers.

Overcoming these four data challenges is crucial for the reliable operation and growth of BESS. These systems must adapt to the changing energy market to enhance the efficiency, reliability, and security of the energy supply.



*Alvin Chen is an experienced integrated marketing leader in the industrial automation market for over 15 years. He specialises in marketing intelligence research, focusing on data centre*

*infrastructure, mining, and BESS. Based on research outcomes, Alvin develops marketing strategies to drive business growth. In his earlier years at Moxa, he was a product manager for Industrial PoE switch and Firewall business. Alvin also leads projects in Moxa's Product Cyber Security Response Team, ensuring product security and customer service improvement.*



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- High degree of process reliability
- High degree of accuracy



# Automation Expo 2023

## Witnessing a Manufacturing Resurgence



(L-R) Dr Keyur Vora, Mr Vinayak Marathe, Dr M Arokiaswamy, Mr Vinayak Pai, Dr B R Mehta and Dr Thampy Mathew.

**The 16th edition of Automation Expo witnessed the spirit of a resurgent manufacturing sector like never before.**

The vendors as well as end users of industrial automation products and technologies made a beeline for entry into the Bombay Exhibition Complex at Goregaon East in Mumbai on the morning of Wednesday, August 23rd. The exhibitors arrived early to ensure every item on display at their booths was positioned at the right angle to present the best profile to the visitors who trooped in a little later.

The monsoon, having expended its fury a month earlier, was not a spoiler, the occasional shower lasting but a few minutes before the clouds made way for the sun. In short, a pleasant morning

welcomed the 16th edition of Automation Expo, the biggest show of the Indian subcontinent.

As the inaugural ceremony began with the traditional lighting of the lamp there was a festive atmosphere at the Grande Hall in the BEC Complex, just across the road facing the exhibition halls. The ceremony began with the traditional lighting of the lamp in the presence of Chief Guest, Mr Vinayak Pai, Managing Director & CEO, Tata Projects Limited; Guest of Honour, Mr Vinayak Marathe, Head – India Business Operations, Phillip Townsend Associates, Inc; Dr M Arokiaswamy, Chairman, IED Communications and distinguished members of the Board of Governors – C-Level executives of leading companies in the automation domain who are the mentors for Automation Expo since inception and instrumental in the successful conduct of each edition of the show.

Dr B R Mehta, former Sr VP, Reliance Industries and Member, Board of Governors and Chairman, Steering Committee, for Automation Expo,

welcomed the Chief Guest, Guest of Honour and the delegates to set the tone for the inaugural ceremony.

Next, Dr M Arokiaswamy, Chairman, IED Communications and the visionary founder of the iconic show, began by thanking all the VIPs and delegates for their presence and spoke of the significance of the day as India's Moon Mission, the Chandrayaan-3 was scheduled for the soft landing on the lunar surface that evening. He thanked the exhibitors for the overwhelming response to the show and promised them a Mega Event in 2024 – Bigger and Better – the credo of the organisers.

Referring to the 16th edition of the show as the Sweet Sixteen moment in the two decades of the show that was launched in 2002, Ms Jyothi Joseph, Director, IED Communications, mentioned the crucial role the members of the Board of Governors play behind the scenes for the smooth conduct of the Automation Expo





Schneider Electric showcased the Lexium Cobot at Automation Expo 2023.



Anuj Bihani, MD, AlStrut India, explaining the functions of the UR cobot.

making it truly representative, responding to the contemporary needs of the user industries.

In his address, Mr Vinayak Marathe, Guest of Honour, spoke about the importance of automation in the present scenario. Automation is not an expenditure, it is an investment, he said, adding that it is an investment with the fastest return. Regaling the audience with several anecdotes, Mr Marathe had a word of caution to the plant managers – one human error can cost the company more than a year's profit – the error automation can prevent.

Mr Vinayak Pai, Chief Guest, in his speech referred to the healthy post-Covid GDP growth of India and said the country is in a unique position, credit of which goes to the Indian education

system which is today a talent pool for the world. Dividing the post Independence India in three distinct phases of growth – Agriculture followed by Services, he asserted that now is the turn of Manufacturing. The country is poised to be the manufacturing hub of the world.

The Inauguration Ceremony was followed by the ceremonial cutting of the ribbon in Hall 1 of the exhibition and the VIPs then made a round of the place, visiting various booths and understanding the innovations showcased by various exhibitors. Concurrent events at the exhibition were CEO Networking Nite in the evening of August 23rd; Conferences on Futuristic Instrumentation & Automation, and Factory Automation on the 24th of August; and Prize Distribution Ceremony on August 25th. Over 500 companies participated in

the event with 20,000 plus products and a total of 39,548 visitors were recorded during the 4-day show.

A new initiative at this edition of Automation Expo was the India Automation Challenge 2023 (IAC 2023) for engineering students to showcase their skills and compete for cash prizes up to Rs 1,00,000. Conceived and organised by Industrial Automation, India's leading monthly publication on discrete manufacturing and process automation, the initiative aims to inspire young minds, provide exposure to real-world automation challenges, and create a talent pool of practical solution-oriented professionals.

IAC 2023 with IEEE Bombay Section as Technology Partner was mentored by eminent professionals from the automation industry that include names like: Dr B R Mehta, Former Sr VP, Reliance Industries and Member, Board of Governors and Chairman, Steering Committee, for Automation Expo; and Prof Dattatray S Sawant, ISA Maharashtra Student Section Liaison and Student Activities Chair, IEEE Bombay Section.

Over 100 entries were received for the IAC 2023. Top 10 finalists were shortlisted and provided space at the expo. Winners were declared and felicitated at a grand ceremony on August 25, 2023, during Automation Expo 2023. The prize distribution ceremony was sponsored by Axis Solutions Pvt Ltd and Delta Electronics.

*(The complete pictorial report of Automation Expo 2023 will be featured in the October 2023 edition of Industrial Automation. The show report is available on the Industrial Automation portal)*



A visit to the India Automation Challenge booth of student projects.

# CRM in Manufacturing: Accelerating Marketing and Sales Success

**CRM has revolutionised the manufacturing industry by accelerating marketing and sales success, says Nilesch Patel.**

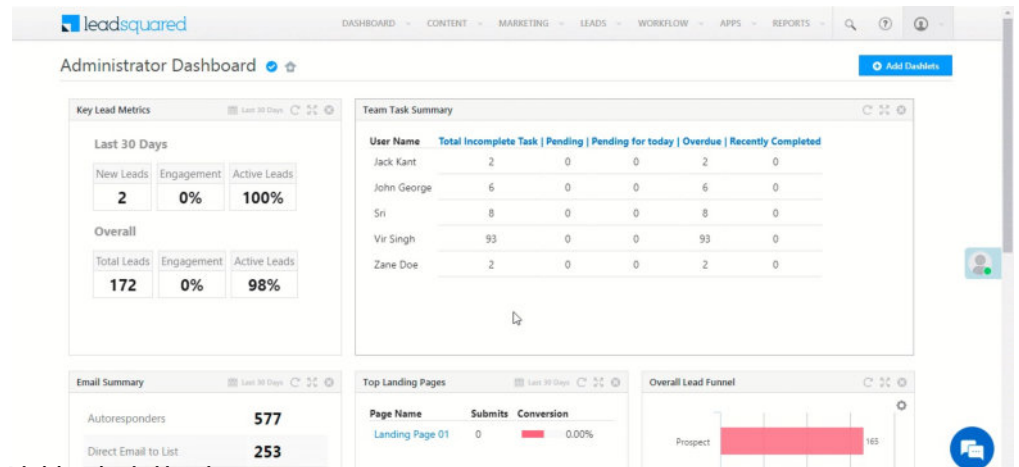
In the manufacturing industry, having a substantial product is undoubtedly crucial, but building and managing a strong dealer and distributor network is equally important. Throughout my experience in this industry, I have come to recognise the pivotal role that influential dealer and distributor management plays in driving success, and one thing that has proven helpful is Customer Relationship Management (CRM) software. We can harness the power of CRM to revolutionise operations and speed up marketing and sales achievements.

Apart from that, CRM has also shown a transformative impact on manufacturing processes by streamlining dealer onboarding, optimising order placement, tracking team performance, and providing valuable insights. With CRM as our trusted ally, we can thrive and succeed in the ever-evolving landscape of manufacturing.

Given the highly competitive landscape of manufacturing, seamless and efficient onboarding of dealers and distributors becomes necessary. Whereas, drowning paperwork and lengthy verification slows down the onboarding processes, eventually hindering the team's growth.

CRM that enables us to centralise and automate crucial tasks, capture vital details, and organise documentation might come handy here. By leveraging CRM, we can also focus on building solid and lasting partnerships while bidding farewell to administrative burdens.

Once you have your dealer network growing smoothly, the next step is to make your order placement process efficient. For years CRM software and systems like SAP or dealer apps have been integrated seamlessly to make the order placement process easier.



## Administrative dashboard

Picture this — dealers can easily browse product catalogs, check real-time stock availability, and place orders via specialised portals or user-friendly mobile apps.

The implementation of CRM eradicates the chances of human errors and streamlines order processing, effectively bridging the gap between manufacturers and dealers. This ensures order accuracy, and ultimately enhances customer satisfaction.

CRM also equips us with the ability to track and monitor our sales teams' performance in real-time, capturing essential information regarding client contacts, meetings attended, and transactions completed.

Armed with this valuable data, we can make informed decisions, offer targeted assistance, and foster a culture of continuous development by gaining insights into both team and individual performance.

This optimisation of performance enables us to identify and address problem areas, driving sales success through a comprehensive understanding of our sales teams' operations.

In any industry, data-driven decision-making serves as a crucial compass for staying ahead of the competition and manufacturing is no exception. The comprehensive dashboards offered by CRM software act as a data-command center.

And these dashboards become our source of truth,

offering a holistic view of performance indicators such as sales performance, lead conversion rates, order quantities, and revenue growth.

With CRM as our guiding force, we can successfully navigate the ever-changing business environment, achieving sustainable development.

CRM has revolutionised the manufacturing industry by accelerating marketing and sales success. It simplifies dealer and distributor onboarding, streamlines order placement, and enables effective performance tracking. With comprehensive dashboards and real-time insights, CRM empowers data-driven decision-making; driving sustainable development and helping manufacturers stay ahead in a dynamic business environment. CRM is a reliable ally that transforms operations and propels growth in manufacturing.



*Nilesch Patel, Founder CEO of LeadSquared, is focused on helping businesses in high velocity, high volume sales to improve their sales execution and increase sales*

*efficiencies. He is on a mission to build LeadSquared as software partner of choice for sales execution for businesses, and he firmly believes that an awesome product and great customer service are both central to making that happen.*



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### BEARINGS



### AUTOMATION



### FACTORY AUTOMATION



## Semiconductor Industries in India

**I**ndia is on an ambitious journey to become a global semiconductor manufacturing hub, says Darshana Thakkar.

In the last two decades, digital technologies have transformed the life of every human and business practice. The driving factor is technological advancement. Digital tools and their advanced application transformed electronic manufacturing industries.

The core ingredient of the electronic sector is semiconductor material and the chips of its products. Over the years, a few chip manufacturers from countries like America, Japan, Korea, Taiwan, and China pioneered the Semicon sector.

In recent years, specifically in the post-Covid era, the world has wanted to diversify the global supply chain of semiconductor chipsets. With the emergence of technologies like Industrie 4.0, IoT, AI, and ML, the demand for semiconducting products has increased drastically. India, a young country with a higher number of citizens using digital tools, no longer wants to be dependent on the world.

India, one of the biggest markets and fastest-growing economies, is a promising player in the global semiconductor industry. Even the world is now looking at India becoming a global semicon product supplier.

To fulfill the aspiration to make India a global hub for Electronics manufacturing, the government of India has launched the India Semiconductor Mission (ISM), a specialised and independent Business Division within the Digital India Corporation that aims to build a vibrant semiconductor and display ecosystem to enable India's emergence as a global hub for electronics manufacturing and design. Led by global experts in the Semiconductor and demonstration ecosystem, the mission aims to serve as a focal point for the comprehensive, coherent, efficient, and smooth deployment of the Program for Development of Semiconductor and Display



Ecosystem in consultation with the Government ministries/departments/agencies, industry, and academia.

### The India Semicon Mission

Semicon India Program aims to provide attractive incentive support to companies/consortia that are engaged in Silicon Semiconductor Fabs, Display Fabs, Compound Semiconductors/Silicon Photonics/Sensors (including MEMS), Fabs, Semiconductor Packaging (ATMP/OSAT), and Semiconductor Design.

The program will give Semiconductor and display manufacturing impetus by facilitating capital support and technological collaborations.

Under this mission, the Indian government is organising specialised events and conferences. The vision is to position India on the world's Semiconductor map and to build a vibrant semiconductor innovation and manufacturing ecosystem.

1. Semicon India Conference 2022 at Bengaluru, Karnataka.
2. Semicon India Conference 2023 at Gandhinagar, Gujarat.

### Key objectives of the ISM

#### i. Strategy

Formulate a comprehensive long-term strategy for developing semiconductors & display manufacturing facilities and semiconductor design ecosystem in the country in consultation with Government ministries/departments/agencies, industry, and academia.

#### ii. Supply Chain

Facilitation the adoption of trusted electronics through secure semiconductors and display supply chain, including raw materials, specialty chemicals, gases, and manufacturing equipment.

#### iii. Design & Startup

To enable a multi-fold growth of the Indian semiconductor design industry by providing requisite support in the form of Electronic Design Automation (EDA) tools, foundry services, and other suitable mechanisms for early-stage start-ups.

#### iv. Intellectual Property

To promote indigenous Intellectual Property (IP)



## Top 10 Semiconductor Manufacturing companies in India



- 1) Saankhya Labs , Bangluru
- 2) ASM Technologies , Bangluru
- 3) Broadcom Inc, Bengaluru
- 4) Chiplogic Technologies, Bengaluru
- 5) CDIL, New Delhi
- 6) MosChip Semiconductor Technologies, Hyderabad
- 7) Einfochips, Ahmedabad
- 8) Tata Elxsi, Bangluru
- 9) Semiconductor Laboratory, Mohali
- 10) NXP Semiconductors, Bangluru

Top 10 semiconductor manufacturing companies in India.

generation and encourage, enable, and incentivise the Transfer of Technologies (ToT).

### v. Partnership

To enable collaborations and partnership programs with national and international agencies, industries, and institutions for catalysing collaborative research, commercialisation, and skill development.

To achieve the objective of the ISM, the government has launched various schemes to promote the development of chip manufacturing within India to become not only self-dependent but also a global supplier.

### i. Semiconductor Fab

The Scheme for setting up Semiconductor Fabs in India shall extend fiscal support of up to 50% of project cost on a pari-passu basis to the approved applicants.

### ii. Display Fabs

The Scheme for setting up Display Fabs in India shall extend fiscal support of up to 50% of project cost on a pari-passu basis to the approved applicants.

### iii. Compound Semiconductor

The Scheme for setting up of Compound Semiconductors/Silicon Photonics/Sensors (including MEMS) Fabs/Discrete Semiconductors Fab and Semiconductor ATMP/OSAT facilities in India shall extend fiscal support of 50% of capital expenditure to Compound Semiconductors/Silicon Photonics/Sensors (including MEMS) Fabs and Semiconductor Packaging (ATMP/OSAT) units.

### iv. Design Linked Incentive (DLI)

The Design Linked Incentive (DLI) Scheme aims to offer financial incentives as well as design infrastructure support across various stages of development and deployment of semiconductor design(s) for Integrated Circuits (ICs), Chipsets, Systems on Chips (SoCs), Systems & IP Cores and Semiconductor linked design(s) over a period of 5 years.

(Source: <https://ism.gov.in/scheme-semiconductor-fabs>)

India's semiconductor industry is on the brink of a transformative era fueled by ambitious visions.

During the inauguration of Semicon 2023 at Gandhinagar, Gujarat, India's honourable PM Narendra Modi announced the creation of a talent pool of over 100,000 skilled chip design engineers by 2028.

### Opportunities in India's semiconductor industry

India's semiconductor industry is booming with opportunities.

1. The global demand for semiconductors in various sectors, such as electronics, telecommunications, automotive, and healthcare, presents a lucrative opportunity for India to expand its market reach and global presence.
2. The Indian government's proactive initiatives, the 'Make in India' campaign, and favorable policies, have created an enabling environment for semiconductor manufacturing and research, attracting foreign investment and fostering indigenous innovation.
3. With the vision to develop a talent pool of over 100,000 skilled chip design engineers by 2028, India has immense potential to become a

semiconductor design and innovation hub, driving technological advancements and job creation.

4. Collaboration between academia, research institutions, and industry players will enhance knowledge-sharing research capabilities and foster innovation, strengthening India's semiconductor ecosystem.

Let's work together to make India a leader in the semiconductor industry.

### Challenges in India's semiconductor industry

1. Talent shortage is the primary obstacle. The scarcity of skilled chip design engineers is a major challenge hindering the industry's growth. Bridging this gap requires targeted efforts in training and upskilling to meet the demands of a rapidly evolving sector.

2. Infrastructure Development demands high investment, making it difficult for small enterprises and start-ups. : Establishing world-class semiconductor fabrication facilities and research centres requires substantial infrastructure and technology investment.

3. Intellectual Property (IP) Protection is another big challenge. Ensuring robust IP protection and adhering to global standards is crucial for building trust and attracting investments from international semiconductor companies.

4. Rapid Technological Advancements keep the stakeholders and the whole ecosystem on their toes. Swift technological advancements characterize the semiconductor industry. Staying at the forefront of innovation demands continuous learning and adaptability.

A new initiative by the Indian government to foster the Semicon Ecosystem:

1. Technology firms will be given 50 percent financial assistance for setting up semiconductor manufacturing facilities.
2. For the semiconductor ecosystem, the government plans to change the engineering curriculum.
3. 300 colleges are identified in the country for starting courses on semiconductor design.
4. The government has recently approved the 'National Quantum Mission' and will introduce the Nation Research Foundation Bill in Parliament.
5. The National Quantum Mission aims to seed, nurture, and scale up scientific and industrial research and development and create a vibrant and innovative ecosystem in quantum technology.
6. The country has announced different types of

tax relief for a new manufacturing industry. At present, India is among the countries with the lowest corporate tax. And it made the taxation process faceless.

India is taking a big step forward in the semiconductor industry. The government has announced a new initiative to foster the semiconductor ecosystem.

## Top 10 semiconductor manufacturing companies in India

1. Saankhya Labs, Bengaluru
2. ASM Technologies, Bengaluru
3. Broadcom Inc, Bengaluru
4. Chiplogic Technologies, Bengaluru
5. CDIL, New Delhi
6. MosChip Semiconductor Technologies, Hyderabad
7. Einfochips, Ahmedabad
8. Tata Elxsi, Bengaluru
9. Semiconductor Laboratory, Mohali, and
10. NXP Semiconductors, Bengaluru.

## Conclusion

India, one of the fastest emerging economies, is on its ambitious journey to become a global

semiconductor manufacturing hub. With the vast talent pool, remarkable government support, an increasing number of chip design start-ups, and the involvement of foreign players, India continues to promote 'AtmaNirbharBharat', a self-reliance campaign to reduce its semiconductor import burden and strengthen domestic manufacturing capabilities.

The Design Linked Incentive (DLI), Chips to Start-ups (C2S) and Scheme for Promotion of Electronic Components and Semiconductors (SPECs) are also making a positive impact on India's semiconductor industry.

Moreover, the Government of India has launched several skill development programs like SANKALP, Skill Acquisition and Knowledge Awareness for Livelihood Promotion, which aims to train around 10 million people in various sectors, including ESDM, and PMKVY, Pradhan Mantri Kaushal Vikash Yojana, under NSDC.

India's semiconductor industry employs over 55,000 design engineers responsible for overseeing diverse engineering functions. With the efficient and accessible availability of the PLI

scheme, the Government of India aims to promote value-added chip-design research and attract foreign players to establish their semiconductor design and development facilities in India.



*Darshana Thakkar is MSME Transformation Specialist and Founder, Transformation – The Strategy Hub. An Electrical Engineer followed by MBA – Operations with hardcore industry*

*experience in managing business operations, Darshana is an expert in transformation of businesses that helps them achieve growth with speed and scale.*

*She has invested 27 years in transforming Micro and Small Enterprises. Her rich experience in resolving pain areas and the MSME/SME industry's real-life problems are helping the organisation for quick results.*

*darshana.transform@gmail.com*

## The Radar Level Transmitter Market is likely to witness a worth of US\$ 1.8 Bn

According to Future Market Insight, the global radar level transmitter market is projected to reach a value of US\$ 850 million in 2023, registering a CAGR of 8.0% from 2023 to 2033. This is anticipated to grow a value of US\$ 1.8 billion by 2033.

Radar level transmitters are gaining immense popularity given their numerous benefits in comparison to alternative level measurement devices. One notable advantage is their immunity to fluctuations in temperature or density. Additionally, they offer the flexibility to measure levels in both enclosed and open containers. These features make them highly reliable in several key industries.

The global surge in industrialisation stands as a crucial factor propelling the market. As industries continue to emerge, the demand for precise and dependable level measurement escalates. Radar-level transmitters find applications across diverse sectors including oil and gas, chemicals, food and beverage, pharmaceuticals, and water and wastewater treatment.

A focus on optimising asset utilisation and a shift toward non-contact laser transmitters also support the market expansion. A growing need for more efficient measurement solutions and stringent government regulations to mitigate risks associated with hazardous substances is likely to force market progression.

A notable trend observed in the market is the growing prevalence of wireless technology. Traditional wired radar level transmitters are substituted with wireless counterparts given their numerous advantages. These advantages include enhanced flexibility, portability, and simplified installation. Furthermore, wireless radar-level transmitters provide real-time data.

The market is experiencing a prominent trend with the growing uptake of cloud-based solutions. This adoption brings forth various advantages, including lowered operational costs, scalability, and improved security. Moreover, cloud-based solutions provide real-time data which helps in well-informed decision-making processes.





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# Cyber Attacks Are on the Rise; Are Your Applications Safe?

**T**he menace of cybercrime looms over businesses of all sizes and spans every sector.

Assuming cybercriminals maintain their current attack frequency, cybercrime is projected to experience a 15% annual growth rate, resulting in a global cost of \$10.5 trillion each year by 2025. This staggering figure would position cybercrime as the world's third-largest economy, trailing only the United States and China.

Sadly, the menace of cybercrime looms over businesses of all sizes and spans every sector, leaving no room for escape. Considering this, it is imperative that cybersecurity takes precedence and should be a paramount concern for everyone as we approach 2024.

## Cybersecurity and software

Naturally, software applications, especially those that are cloud-based, will be the first point of entry for cybercriminals. Applications can give hackers a direct route to your servers and networks, which is where they could damage your business the most.

We present more chances for cybercriminals to breach our systems as we continue to rely on technology to develop our operations, enhance our performance, and better engage our workforce.

Every organisation should be concerned about cybercrime, but banks and other institutions that handle extremely sensitive data may be said to be the most at risk.

According to IBM Security's 2023 X-Force Threat Intelligence Index, the financial and insurance sector was actually the second most targeted industry in 2022, behind manufacturing and the most frequent attack type being ransomware.

It all makes perfect sense to the criminals. Data that is not genuinely valuable to anyone is



Cybersecurity should be a paramount concern for everyone.

considerably less of an impact than extremely sensitive and personal information that is stolen and held for ransom. Sadly, you will be at the top of the target list if your company deals with highly sensitive data.

## How can I guarantee the security of my applications?

One of the best ways to safeguard your business is to make sure your software developers think about security right from planning to deployment and all the way through ongoing support.

Uncovering risks and vulnerabilities can be done using various tools, one of which is threat modeling. Threat modeling helps secure systems and data by using hypothetical scenarios, system diagrams, and testing. Corrective measures can be developed to close gaps if vulnerabilities are found.

## What should I look for in a software partner?

Partnering with a software partner who prioritises security first is crucial when it comes to application security. Choose a partner who holds the necessary certifications, such as ISO9001, ISO27001, and Cyber Essentials. These well-known frameworks show how seriously they treat cyber security.

Don't take it easy after you identify the right software partner. Make sure they are staying current with best practices and the most recent security risks by regularly checking their security qualifications and accreditations.

Innovature has been certified on ISO/IEC 27001:2013, the international standard on data privacy by Bureau Veritas Certification (BVC). This certification is typically given to businesses whose operational procedures meet high international standards.

Handling critical and sensitive data is not just a responsibility but a privilege we deeply value. Our dedicated team has worked tirelessly to ensure that our client's information remains protected and safeguarded at all times.

**Article Courtesy: NASSCOM Community – an open knowledge sharing platform for the Indian technology industry:**

<https://community.nasscom.in/communities/digital-transformation/cyber-attacks-are-rise-are-your-applications-safe-0>

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# ‘India is at a very interesting cusp in its manufacturing evolution’

**S**uprakash Chaudhuri,  
Head – Digital  
Industries, Siemens  
Limited, India.

**Digitalisation and automation are said to be game changers – what are the technologies deployed to facilitate this change?**

A complete and holistic digitalisation flow across the manufacturing cycle using a ‘Digital Twin’ is a critical constituent in helping our customers in their digital transformation journey.

The Digital Twin helps merge all the data from the entire lifecycle of products and production, from the initial concept to the finished products, as well as their production and feeds this back into a performance cycle where further enhancements are possible. Cutting-edge technologies like AI, Machine Learning, Big Data and Analytics using various cloud and edge applications, 5G technology and Cybersecurity make it possible to harness data and use it intensively across the manufacturing value chain.

With our deep domain know-how and vertical experience, we are helping our customers create a blueprint for their digital transformation across the vertical (the digital flow from the digital twin of the product to the real product) and horizontal dimensions (from OT to IT) and co-create solutions.

Along with creating a level-playing field for Indian enterprises to compete with global players, we are also enabling Indian manufacturing enterprises, especially small and medium enterprises, to free up their capital expenditure and grow sustainably.

**How will the Siemens Xcelerator platform facilitate this transformation? What about the compatibility issues?**

To navigate complex environmental and business challenges, manufacturing enterprises need access to a wide variety of tools and platforms for maintaining data integrity, access and security, facilitating business decisions backed by



Suprakash Chaudhuri, Head of Digital Industries, Siemens Limited

intelligent insights, upskilling of the workforce and the management of complex cultural changes, amongst others.

Siemens has launched Xcelerator as an open and evolving digital business ecosystem with a curated portfolio of IoT-enabled hardware, software, and digital services, designed with the key principles of interoperability, flexibility and openness. It is aimed at supporting customer efforts to accelerate their digital transformation and create value for organisations of all sizes in industry, buildings, grids and mobility.

With partners across the spectrum, the Siemens Xcelerator ecosystem has IT/cloud partners and infrastructure services providers, consulting and service partners, and vertical solutions providers, all complementing Siemens solutions.

Its modularised functionality and APIs are integral to the journey towards next-generation software

architecture that will significantly reduce integration effort and complexity. Due to this, micro services are accessible anytime, anywhere, enabling pay-as-you-grow business models while packaged business capabilities and its components can be easily reused or integrated.

**Digital twins are increasingly deployed by sectors like aviation and automotive. How are other industries adapting to it?**

With the Digital Twin, we enable manufacturing enterprises to create a virtual model of a product or a production plant. It displays their development throughout the entire lifecycle and allows operators to predict behavior, optimise performance, and implement insights from previous design and production experiences.

Thanks to our comprehensive domain expertise and optimised tools, Siemens is the only company that can offer this holistic approach for



merging the virtual and the real world. With this, we enable our customers to reduce their product development times while at the same time increasing the flexibility, productivity and environmental efficiency of their production processes.

The adoption of digital twin technology varies across different industries and companies in India. Apart from aviation and automotive, industries such as manufacturing, construction, energy and utilities, and transportation have increased the adoption of digital twins. Its adoption in process industries like Pharmaceuticals, Oil, Chemicals and F&B is also on the rise.

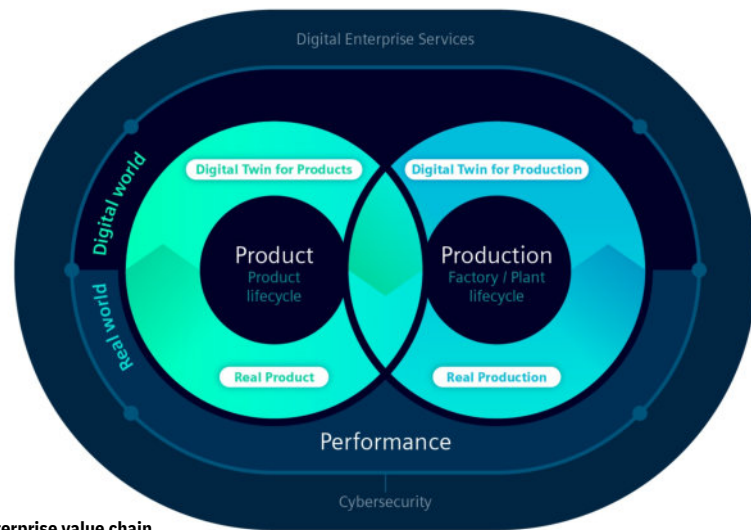
**Integration of IT/OT has always been a sensitive topic. Has the industry succeeded in breaking the silos?**

While the horizontal integration – the bi-directional flow of data across the manufacturing chain using a digital twin, opens up opportunities, it is the vertical integration – that is, a secure communication and data exchange between Information Technology (IT) and Operational Technology (OT) that is the backbone of digitalisation. However, responsibility for automation projects is splintered across departments, making it difficult for IT and OT teams to collaborate on digital projects. Firms also face challenges using data to enrich digitisation and automation efforts, including the lack of a unified data strategy across IT and OT.

If manufacturers are to succeed, they must cross the divide. Both sides must cross it with IT and OT meeting in the middle to share existing practices, learn from one another, and define new ways of working together. It is important to understand the requirements of both networks: Solution providers with experience in both areas understand industrial networks as part of automation, but also know the requirements of IT and calculate them accordingly. As a leading provider of automation technology, we know exactly how industrial networks must be designed. Our IT experience helps us with the digitalisation of plants and merging of the virtual and physical worlds.

**With the proliferation of IoT enabled devices, data collection is humongous. But is all this data analysed logically and used to advantage?**

It is true that many manufacturers have succeeded in only partially capturing the opportunities created by IIoT data and



The digital enterprise value chain.

supporting systems. One of the greatest obstacles is the acquisition and utilisation of operational data from machines. There are two aspects here – analysing the enormous amount of data in real time and doing so closest to its source.

The focus should always be on the user's desired goal. The purpose also defines which data and information is made available from the field via connectivity. Close cooperation between the software manufacturer and the user (co-creation) is key to combining plant, process, and customer knowledge and meeting the defined goal. The clever analysis and combination of this data can increase its usability exponentially, thus enabling even higher savings than originally expected.

Skilled data scientists/experts with experience in the particular industry combined with the IIoT analytics solutions are imperative for managing, optimising and predicting business operations, ultimately leading to improvements in efficiency and profitability.

**How can user industries ensure security and integrity of data and operations to protect against potential cyber threats?**

Going by the nature of it, a smart factory is connected and thus cybersecurity risks are of a greater concern than in a traditional manufacturing unit. However, it is entirely possible to mount an effective defence.

Reducing risks and bringing them under control require a comprehensive security concept that considers the various elements and nature of these attacks. Strong cooperation between the various parties involved, viz., automation system

operators, integrators, machine builders and vendors is also crucial. All aspects – from operating level to field level and from physical control to network and terminal protection must be tackled simultaneously to protect industrial systems against internal and external attacks. The most suitable approach for this is “defense in depth”, a multilayer security concept that gives plants both all-round and in-depth protection in accordance with the recommendations set out in IEC 62443, the leading standard for security in industrial automation. Any connected factory needs to have a strong foundation of cybersecurity.

To protect industries, Siemens relies on the multilayer defense-in-depth concept extended by Zero Trust principles because the only way to effectively counteract cyber threats is with a comprehensive concept that is applied at all the relevant levels. These levels are plant security, network security, and the system integrity of automation systems. Siemens offers a wide range of network and automation components with integrated security functions and the associated security services for implementing multilayer security concepts for industry.

**How do these solutions help plants with legacy equipment and limited resources?**

Security is an ongoing process, and it is important to regularly review and adapt your security measures as technology and threats evolve. While limited resources and legacy equipment may present challenges, a proactive and strategic approach can help mitigate risks and protect your industrial plant's operations and assets. Today, we can use data aggregators

Nine out of 10 customers see digital transformation as the most important future trend.



and communication cards to acquire data even from legacy systems. However, this is a 'need-and-use' based strategy and shall be defined based on a) the type of data that we intend to capture; b) use case for the captured data; and c) availability of IIoT device options that fit these legacy systems.

Overall, data protection and cybersecurity are no longer incidental to digital transformation; they are fundamental. Both have to be part and parcel of the company leveraging IIoT. For example, Siemens teamed up with governmental and business partners in cybersecurity to implement the Charter of Trust, an initiative to protect data of individuals and companies, prevent damage to people, companies and infrastructure, and create a reliable foundation on which confidence in a networked digital world can take root and grow.

Under plant security services Siemens security experts examine the whole system for specific vulnerabilities and security risks. This includes a security assessment, scanning services and industrial security consulting.

### **Companies today are under increasing pressure to follow sustainable practices that come at a cost and impact profitability. Is there a way out?**

Through automation, digitalisation, and the intelligent use of data we can enable the industry to manufacture more sustainable products, make production smarter and thus more resource-efficient, and ensure greater transparency of a product's CO2 footprint across the supply chain. If we can continuously optimise every product and every process digitally, we will use fewer resources, waste less energy and produce less

waste, thereby improving profitability. Dashboards can show where the energy hogs are hiding. Virtual prototypes replace physical models, with their massive use of materials. And by taking intensive advantage of data all along the value chain, you can reliably determine and reduce a product's ecological footprint. All of which transforms companies into true digital enterprises that can respond to all the real world's requirements quickly, flexibly – and most importantly, sustainably.

### **What is the scenario in the Indian industry vis-a-vis these tech solutions for transformation?**

We have been engaging a lot with our customers, and what we found is that nine out of ten customers see digital transformation as the most important future trend, placed above even globalisation and demographic change. These views are of key decision makers and senior management across industry verticals, from companies ranging in size from SMEs to large corporates. The importance of digital transformation has increased significantly since 2021, and so have the interest among our customers. India is at a very interesting cusp in its manufacturing evolution. Rapidly increasing adoption of automation in production with an inherent prowess in software is going to be decisive for the future of manufacturing in India. The ability to respond flexibly and efficiently to rapidly changing demand and new challenges with the integration of automation and digitalisation is the opportunity for Indian manufacturers – be it food and beverages, pharmaceuticals or the automotive industry.

## **Indie Semiconductor and SiLC Technologies form strategic technology partnership**

Indie Semiconductor, an Autotech solutions innovator, and SiLC Technologies, Inc (SiLC), a leader in silicon photonics innovation, have entered a light detection and ranging (LiDAR) partnership that enables coherent detection-based LiDAR platforms for next-generation sensing applications, including driver assistance, autonomous mobility, robotics and industrial automation. This partnership will deliver fully integrated vision system platforms deploying frequency modulated continuous wave (FMCW) detection, redefining benchmarks for rapidly emerging LiDAR applications. FMCW-based LiDAR delivers multiple real-world benefits compared to direct detection-based Time of Flight (TOF) solutions, including long-range with high precision, interference immunity, per-point instantaneous velocity and motion measurement. This ground-breaking partnership combines award-winning products from Indie and SiLC into reference platforms that enable an order of magnitude improvement in sensing performance, manufacturability, power consumption, form factor and cost relative to competing systems. "Indie is excited to partner with SiLC to bring the processing innovation from Surya to FMCW LiDAR, offering a breakthrough reference design," said Chet Babla, senior vice president, strategic marketing at Indie Semiconductor. "By combining the software-defined high-performance – but low power – analog and digital processing and system control capabilities of Surya™, coupled with SiLC's Eyeonic™ vision solution, system integrators and OEMs are enabled with 4D FMCW imaging for mass market deployment into multiple applications."



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# VEGA Expands Radar Portfolio for Factory Automation

**T**he new VEGAPULS 42 is making radar compact, communicative, and even more convenient to use.

VEGA is known worldwide for ensuring safe and stable processes with its level and pressure sensors, even under the most difficult conditions. The world market leader is now putting the finishing touches to its radar level portfolio, especially to meet the demands of fast processes in factory automation. The new VEGAPULS 42 is making radar compact, communicative, and even more convenient to use.

## Radar sensor in hygienic design

As the world market leader with decades of radar experience, VEGA is now making an entry into factory automation. VEGAPULS 42 meets the special requirements of the industry, which above all include perfect measuring results, even when it comes to levels in small tanks or clocked filling processes. The sensor is equipped with everything needed for hygiene-sensitive manufacturing processes, especially where food and pharmaceutical products are involved.

This is more efficient and resource-saving in today's highly competitive global environment. Its switching frequency enables high cycle rates and correspondingly fast level changes: Its flexible connection options range from standard threads to the universal connection for its 2,5 cm hygienic adapter. When delivered, it is immediately ready for operation, and in the three-wire version there is communication with IO-Link. In concrete terms this means that VEGAPULS 42 is a successful combination of simple adjustment, versatile connections and hygienic design that automatically comes with suitable process fittings and all-important approvals.

## All the advantages of radar for automation

As a non-contact measuring technology, radar



The new VEGAPULS 42 radar sensor.

brings numerous advantages to the clocked processes in the food and pharmaceutical industries that other measuring solutions cannot deliver, for example filling.

**“As the world market leader with decades of radar experience, VEGA is now making an entry into factory automation.**

The need for this is great, because reliable measured values are becoming increasingly important for efficient plant operation and optimal process control. With IO-Link, VEGAPULS 42 not only communicates universally, but can also be hooked up very quickly and inexpensively via a simple three-wire connection. A sensor can also be replaced quickly because the second-generation Smart Sensor profile writes parameters that were previously set directly into the new instrument.

With the VEGA Tools app, VEGAPULS 42 can be easily controlled and adjusted via a smartphone with Bluetooth.

## Double certainty through visualisation

With VEGAPULS 42, plant operators can see at a glance if the process is running as desired, or if there's a problem. An illuminated ring that changes colour allows the sensor to be read from all directions, and even from a distance. Product manager Marvin Moser is convinced that “this introduces even more security on site, because it not only gives operators quick certainty about the current sensor status, it's actually also a second way for them to check the status of the process”.

With VEGAPULS 42, VEGA expands its sensor portfolio for factory automation and thus offers an optimal performance spectrum for all level, switching and pressure applications. The all-inclusive range of instrumentation from a single source makes everything easier – including the setup and operation of the most varied and



complex processes. Intuitive and standardised, it makes work easier and saves training time. This simplicity results in more efficiency and reduces effort and costs.

#### Innovative measurement technology


Production processes are becoming ever more complex, and it is important that the measurement technology used to control and monitor these processes is understandable and intuitive. VEGA's innovative measurement technology makes this simple. It is easy to install and operate, and provides maximum security and reliability.

The company is active in more than 80 countries, with a globe-spanning network of subsidiaries and distributors. It employs over 2100 people worldwide, 1000 of whom work at its headquarters at Schiltach in the Black Forest in Germany.

Expanding the sensor portfolio for factory automation.



 **IO-Link**

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For more than 60 years the company has been providing solutions to demanding measuring tasks in a very wide range of applications. These include chemical and pharmaceutical plants, food and beverage manufacturers, drinking water supply and sewage treatment plants, landfills, mining operations, power generation, oil platforms, recycling, shipping and aerospace industries.

The company has all the necessary certificates and approvals for worldwide application. This applies to both the technical safety and to the quality of all products and services.

Highlights of the new VEGAPULS 42 radar sensor.

#### ELCINA welcomes new licensing requirements for imports

The Electronic Industries Association of India (ELCINA) welcomes the recent decision vide Notification No. 23/2023 dated 3rd August 2023 by DGFT, Ministry of Commerce and Industry, Government of India to implement a licensing requirement for imports of finished laptops, tablets, and personal computers falling under HSN 8471. This move aligns with ELCINA's vision to bolster domestic electronics manufacturing and reinforce the "Make in India" initiative promoted by Prime Minister Narendra Modi's government.

The new regulation, effective immediately, signifies a crucial step towards enhancing national security and reducing reliance on foreign imports. With rapidly expanding digitalisation and online transactions for all services, cybersecurity and safeguarding our data from phishing and malware has become imperative. This move will also provide impetus to Indian and global companies to consider establishing local manufacturing facilities and assembly lines, thereby boosting the overall electronics manufacturing ecosystem in the country.

ELCINA acknowledges that the implementation of the licensing requirement may pose initial short-term challenges for global companies and is committed to supporting them in streamlining their supply chains and benefiting from this opportunity. ELCINA firmly believes that this measure will encourage companies to explore opportunities for investing in the India manufacturing eco-system and value chain as India today provides strong support to the Electronic Systems Design & Manufacturing sector.

ELCINA commends MeitY (Ministry of Electronics and Information Technology) for creating a conducive environment for electronics manufacturing. The extension of the PLI 2.0 deadline for IT Hardware and the introduction of the \$2 billion incentive scheme underscore the government's unwavering support to ESDM sector and achieving the target of \$300 billion production by 2026. These strategic initiatives position India as a flourishing global electronics manufacturing hub.

# Absolute Precision in Battery Production

**M**icro-Epsilon offers a wide product range, based on different measurement principles, ideal for the production processes in demanding battery production.

As battery-powered applications such as electric vehicles become more widespread, global demand for high-performance batteries, such as lithium-ion batteries, is also increasing. The challenge in manufacturing modern batteries is to maximise their energy density, reduce their manufacturing costs and extend their useful life. To achieve these goals, sensors from Micro-Epsilon are used throughout the entire manufacturing process. They perform various measurement tasks for machine monitoring, thickness control and quality assurance.

Modern battery cells should offer performance as well as being environmentally friendly and sustainable on the road. The long-term goal is to move cars, buses, vans, as well as construction machinery and trucks away from fossil fuels and towards electric drives based on battery and fuel cell technology. The revolution of previous drives has long been heralded, and the production processes are running at full speed. To increase the performance of energy storage devices while



saving valuable resources, manufacturing processes are becoming increasingly complex. This requires innovative, high precision sensors that monitor the automated manufacturing processes inline.

A lithium-ion cell passes through many stations before final assembly. Production can be divided into three main process stages: electrode fabrication, cell assembly, as well as formation and aging. Sensors from Micro-Epsilon are used in all

important process stages to solve various measurement tasks. Micro-Epsilon offers a wide product range with the largest variety of physical measurement methods for precise displacement and distance measurements. What makes it special is that all of Micro-Epsilon's sensor technologies are developed, manufactured and distributed in-house. Therefore, customer-specific adjustments to the sensors can also be implemented if required.

## Conclusion

Micro-Epsilon offers a worldwide unique range of sensors, measurement systems and customised inspection systems in Europe. The wide product range, which is based on different measurement principles, is ideal for the production processes in demanding battery production.

Micro-Epsilon's high-precision sensors reliably measure displacement, distance, position, inclination, acceleration, colour and temperature in order to achieve robot-assisted 3D inspection of both matte and glossy surfaces using high-tech inspection systems.

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## PRODUCTS

### One-Box Tester, R&S CMX500



Rohde & Schwarz is first to submit 5G Next Generation eCall (NGeCall) protocol test cases to the 3GPP Global Certification Forum (GCF). The company is also launching a new 5G NGeCall application option that simulates the public safety answering point (PSAP) functions required for the end-to-end conformance tests that verify the interoperability of the equipment under test for the complete communication exchange. Both additions to the Rohde & Schwarz eCall portfolio now support early testing of new 5G Next Generation eCall systems with the R&S CMX500 one-box tester, contributing to a timely introduction of 5G NGeCall. eCall was introduced in 2015 and has been a mandatory requirement for all new cars in the EU since 2018. eCall systems currently make use of 2G/3G circuit-switched cellular networks. As these networks will be phased out in just a few years, emergency call systems will be adapted to the newest 4G/5G packet-switched cellular networks.

### Fieldbus Gateway, New SD



The Schmersal Group has launched a new version of the SD Gateway for its SD bus. Users will be able to take advantage of the improved fault diagnostics offered by the new SDG Fieldbus Gateway. This in turn will help to increase machine and plant productivity by minimising downtime and simplifying commissioning and maintenance. The device is also user friendly and easy to install. Electronic safety sensors and interlocks with SD interface can transmit comprehensive status and diagnostic data to a higher-level machine control system. Data from the serially connected switchgear is sent via the SD bus to the SDG fieldbus gateway and then passed on via the fieldbus to the machine control unit – enabling the forwarding of error messages such as overtemperature warnings, faulty actuator warnings and invalid actuator combination messages. The diagnostic information is transmitted separately from safety signals. Warning notifications enable controlled process shutdown and targeted maintenance so as to prevent process interruptions.

**You product information is awaited news in the pages of the monthly edition of Industrial Automation**

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# LNG: Natural Gas Liquefaction

**The Raman Rxn5 analyser with an MR method is an ideal solution for optimum efficiency of the liquefaction plant.**

The majority of natural gas (NG) is transported in gaseous form via onshore or offshore gas pipelines. For stranded gas reserves where there is little or no local demand, or for long transport distances (>1000 km offshore, >3000 km onshore), it becomes more economical to liquefy the natural gas prior to transportation. In addition, due to the nearly 600-fold reduction in volume for LNG versus NG, LNG is often the preferred method for local storage.

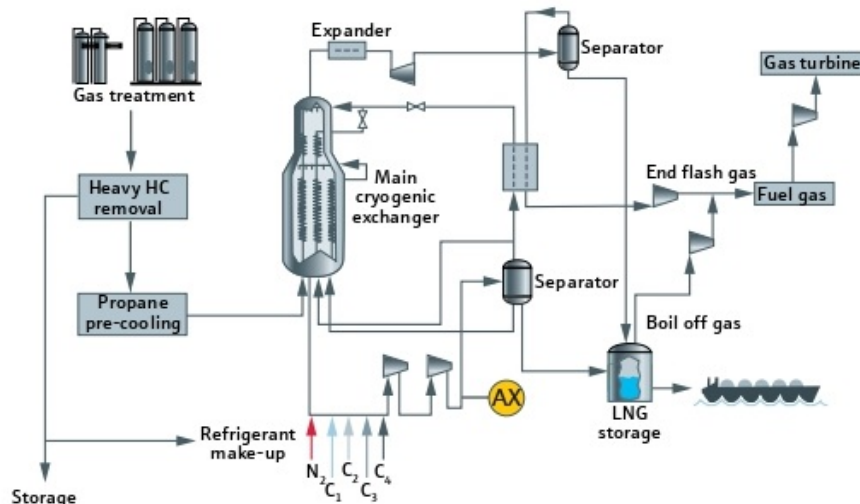
## Benefits at a glance

- Measure MR in situ in the cryogenic liquid phase
- Measure gas-phase refrigerants at the sample tap
- Fast update times (seconds to minutes)
- No analysis delays due to sample transport or vaporisation
- Measures a wide range of MR compositions and processes
- Does not shut down during flow interruptions; starts accurate analysis immediately upon flow resumption
- Lower OPEX

## Measurement of refrigerants used in liquefaction

While there are multiple liquefaction processes in use at LNG facilities today, the majority of plants use some variation of a mixed refrigerant (MR) process. Since NG liquefaction can constitute over 50% of the CAPEX and 40% of the total OPEX of a

Figure 1: Example of a mixed refrigerant liquefaction process for natural gas.



baseload LNG plant, it is essential that this process unit be run as efficiently as possible.

The ability to adjust the composition of the MR is a primary control parameter to allow a plant to maintain optimum efficiency during large turndowns, changes in feed composition, and accommodation of design uncertainties and off-design equipment performance.

The Raman Rxn5 analyser with a Rxn-41 cryogenic probe is a unique solution to the measurement of MR in the liquid phase. The ability of this system to measure in the pipe eliminates sample

vaporisation, transportation, and reduces lag time, providing composition updates in seconds, not minutes. When coupled with the Rxn-30 probe, the Raman Rxn5 analyser can also measure MR in the gas phase.

## Issues with traditional measurements

Refrigerant composition for liquefaction of natural gas is typically measured with a process gas chromatograph (GC). Over time the MR composition can change due to losses. Changes as little as 0.02% Mol in the MR component composition can produce over a 5% reduction in

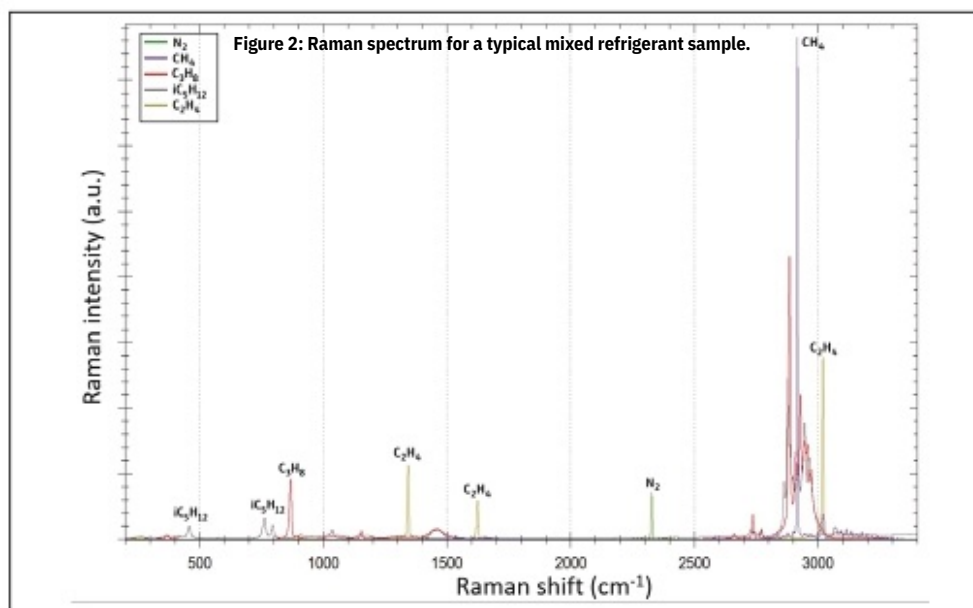


Figure 2: Raman spectrum for a typical mixed refrigerant sample.

energy consumption. Measurement uncertainties in the vaporiser-GC combination, combined with update times typically between 5 and 10 minutes, compromise its ability to provide an optimal level of control. In addition, heated sample transfer lines are required, adding lag time to the analysis.

**Solution: Raman Rxn5 analyser with a mixed refrigerant method**

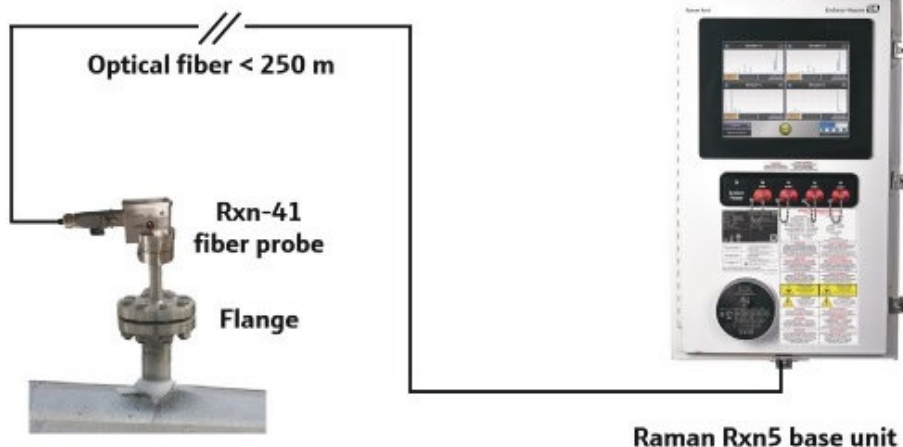
The Raman Rxn5 analyser with the Rxn-41 cryogenic probe is capable of measuring the full composition of the mixed refrigerants, including N<sub>2</sub>, at cryogenic temperatures, in the liquid phase and in the sample pipe, eliminating the need to vaporise the sample or transport it to the

**Mixed refrigerant typical performance**

Component	Composition (Mol %)	Precision (k=2)
Nitrogen (N <sub>2</sub> )	3.96	< 0.11
Methane (CH <sub>4</sub> )	39.51	< 0.20
Ethane (C <sub>2</sub> H <sub>6</sub> )	47.54	< 0.20
Propane (C <sub>3</sub> H <sub>8</sub> )	8.99	< 0.04

Table 1: Typical composition and precision of a common mixed refrigerant.

Figure 3: Recommended total process analysis solution.



analyser. With precision over 10 times better than a process GC/vaporiser solution, the Raman Rxn5 analyser with an MR method is an ideal solution for optimum efficiency of the liquefaction plant under various operating conditions and with a wide range of NG feedstock.

The Raman Rxn5 analyser with an MR method consists of the following:

- Raman Rxn5 analyser base unit
- Rxn-41 probe for liquid-phase measurements
- Optional Rxn-30 probe for gas-phase measurements
- Fiber optic cable (length from 15 to 250 metres, customised to your plant requirements), and
- Dedicated mixed refrigerant method.

**ABB expands partnership with Northvolt**

ABB and Northvolt are further strengthening their long-standing collaboration in the field of green batteries, an increasingly critical part in the ongoing energy transition. Since 2017, ABB has already delivered key electrification and automation equipment to power Northvolt Ett gigafactory for lithium-ion batteries in Sweden. This partnership is now being expanded to include battery recycling with ABB providing process electrification to power the world's largest battery recycling facility, Revolt Ett, being established by Northvolt in Skellefteå, northern Sweden. Financial details were not disclosed. The order was booked in the first quarter of 2023. Revolt Ett, the recycling site, will ultimately process 125,000 tons of end-of-life batteries and battery production waste each year – making it the largest plant of its kind in the world. It will service Northvolt's gigafactory on the same site, which brought one production block online in 2022 and will establish others to reach an annual production capacity of 60 GWh.

Northvolt supplies a range of lithium-ion batteries to the automotive, industrial, and large-scale energy storage sectors that support the global energy transition. The producer aligns with World Economic Forum

figures which show the demand for batteries is expected to increase 14-fold by 2030 due to the adoption of electric vehicles. ABB will deliver switchgears and variable speed drives to the facility, which will match the speed of the processes taking place in the factory, ramping power up and down as required, saving energy, improving performance and lowering maintenance.



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Connectivity Configuration

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- SIMIT
- Universal Robots RTDE
- WinMOD Net

Connected Variables

Structure	Simulation variable	...	Simulati...	Prepared...	Latest va...	..	Server variable
<b>Server</b>							
<b>Simulation to server</b>							
MainPusherExtended_IN	Controller.MainPusherExtended_IN	⚡	FALSE		FALSE	✓	IO.MainPusherExtended_IN
LiftHatchReady_IN	Controller.LiftHatchReady_IN	⚡	TRUE		TRUE	✓	IO.LiftHatchReady_IN
MainPusherRetracted_IN	Controller.MainPusherRetracted_IN	⚡	FALSE		FALSE	✓	IO.MainPusherRetracted_IN
PusherSensor_Bool_IN	Controller.PusherSensor_Bool_IN	⚡	FALSE		FALSE	✓	IO.MainPusherSensorBool_IN
FeedSensor_Bool_IN	Controller.FeedSensor_Bool_IN	⚡	FALSE		FALSE	✓	IO.FeedSensorBool_IN
<b>Server to simulation</b>							
J1_Closed_OUT	PusherJ1_Closed_OUT	🔧	730		730	✓	IO.pusher_J1_Closed_OUT
FeedBlockerControl_OUT	Controller.FeedBlockerControl_OUT	⚡	TRUE		TRUE	✓	IO.BlockerControl_OUT
MainPusherControl_OUT	Controller.MainPusherControl_OUT	⚡	TRUE		TRUE	✓	IO.MainPusherControl_OUT
LiftHatchControl_OUT	Controller.LiftHatchControl_OUT	⚡	FALSE		FALSE	✓	IO.LiftHatchControl_OUT
TurnPusherControl_OUT	Controller.TurnPusherControl_OUT	⚡	FALSE		FALSE	✓	IO.CornerPusherControl_OUT
PowerOn	LowInConveyor #3.PowerOn	⚡	TRUE		TRUE	✓	IO.PowerOnConveyors_OUT
PowerOn	LowInConveyor #2.PowerOn	⚡	TRUE		TRUE	✓	IO.PowerOnConveyors_OUT

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## Vario-X – Taking Digitalisation to New Level

**F**or decentralised solutions for the automation world of the future, Vario-X is the answer.

Murrelektronik has long since heard the automation sector's call for efficient, intelligent and simple installation concepts. Vario-X is its answer. This modular platform brings sensor and actuator systems into the immediate machine environment on a decentralised basis and offers a flexible, scalable solution for all applications. When combined with a digital twin, Vario-X takes digitalisation to a whole new level. The end result is considerable time and cost savings in installation, planning, operation and servicing.

Welcome to a world where networked production and digital integration are revolutionising automation. This transformation process is throwing up a whole host of questions for automation experts: How can the benefits of digital technologies such as AI, machine learning, IoT and big data analytics be put to effective use? How can existing systems be linked up to new digital solutions? The challenge lies in building a bridge between the past and future by connecting together analog and digital worlds. Murrelektronik is striving for a seamless, high-performance and futureproof topology.

### Vario-X – an impressive concept

A successful digital transformation needs consistent decentralisation. The concept at the heart of this decentralisation is as simple as it is brilliant. The first step is to pack the power supply along with peripheral components such as fuses and the main power switch into small, decentralised modules. The next step is to place these compact units directly alongside the production machine, along with the industrial PCs that take care of communication and control elements for the entire system or for individual modular machine components.

The award-winning Vario-X automation platform is the perfect embodiment of this approach. It is the enabler for decentralisation in industry and production. For the first time, all automation functions can be scaled as required and

**Vario-X is a modular and highly flexible automation platform to implement all automation functions.**

implemented on a decentralised basis, i.e., without a conventional control cabinet architecture. Besides being a platform, Vario-X is also an installation concept that can be adapted to suit specific purposes and customer requirements. After all, when it comes to creating an efficient installation solution, the basic idea of "simplifying, modularising, transferring to the field and combining technologies" is all-important – and provides the basis for building decentralised automation concepts.

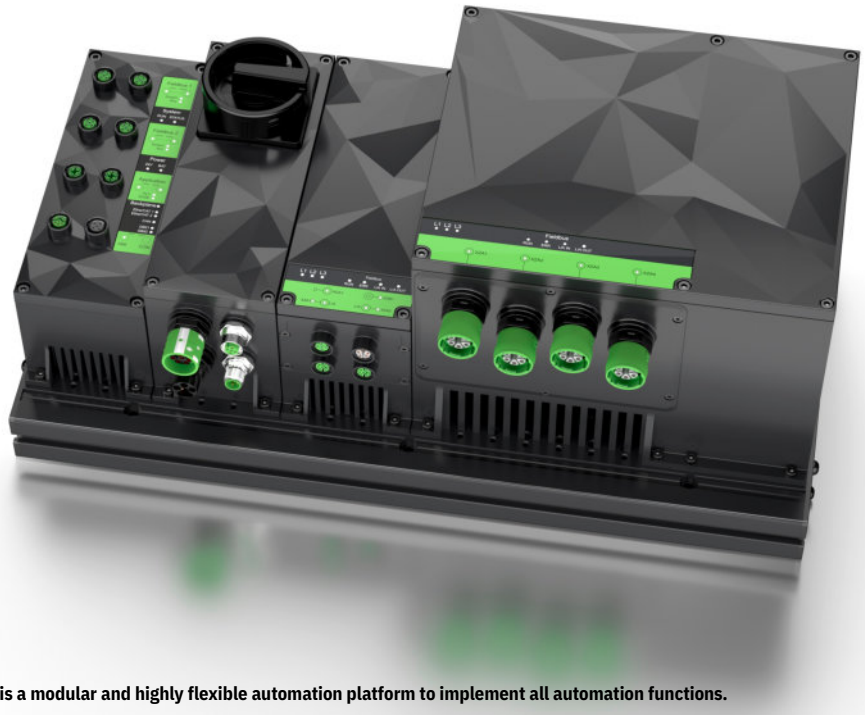
"Vario-X offers 100 percent decentralised, cabinet-free automation," says Olaf Prein, Head of Global Business Unit Automation at Murrelektronik. "Our automation platform delivers modular and transparent processes, higher added value in all areas of your company and, consequently, improved competitiveness and profitability in mechanical and plant engineering. Thanks to the integrated installation concept alone, Vario-X reduces the amount of time it takes to install a machine by around 40 percent."

Leading the way in this regard is a newly developed installation concept from Murrelektronik for

decentralised servo drive technology. One crucial component is the MQ15 DC plug-in connector, which features an innovative quick-connection system. A quarter turn is all it takes to connect up the machine system. This means that, when using pre-assembled cables, connections can be made easily, securely and – most importantly – without any errors. That saves time and thus reduces installation and planning costs.

### High-performance, robust, simple

While seamlessly integrating decentralised servo drives, Vario-X ensures reliable voltage, signal and data management in the immediate machine environment. At the heart of this innovative platform are robust water- and dust-tight enclosures with IP65 protection that house the power supply, control system, switches, safety technology and IO modules. These can be easily snapped into a no less robust backplane with integrated machine construction profiles. Equipped with a multicore CPU, the Vario-X controller can meet all requirements and be easily integrated into all higher-level Industrial Ethernet networks as an open control platform.





The 48 V system also offers enough power to cover virtually all areas of application.

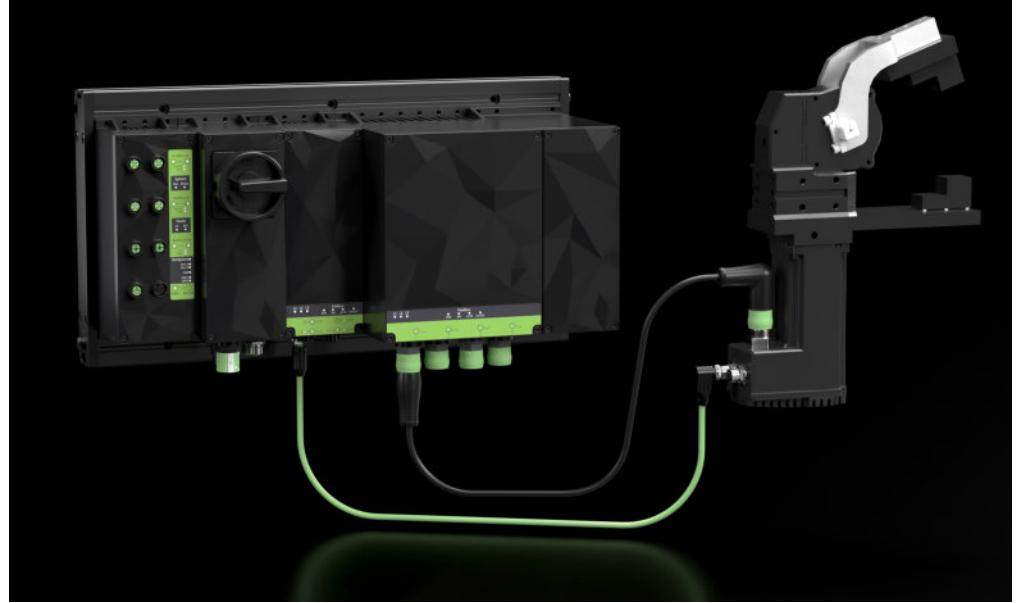
## From sensor to cloud

Vario-X is more than just a collection of backplanes, control modules, cables and so on. A machine system that is automated with Vario-X can also be accompanied by a digital twin. This versatile 1:1 virtual representation contains all the functions and parameters of the future, real-life system – and can be created as early as the project phase, before the first mechanical component has even been ordered or fitted. To do that, Murrelektronik takes the engineering files for machines and systems and creates a kinematic model using special software that can then simulate subsequent movements and sequences. As a result, innovative applications can be implemented with ease, such as visualising and controlling the digital system via augmented reality (AR) using a smartphone or tablet. The digital twin can also monitor the machine system as it operates and can read out machine data.

## An efficiency booster for production

Ever-growing demands relating to energy efficiency in production and manufacturing can also be supported on a dynamic basis. Take pneumatics, for example, a technology that is very widely used, but can have an efficiency rating of just 10 to 20 percent if it wastes a lot of

Power clamps operated by Vario-X are more dependable and less error-prone in operation than conventional pneumatic systems.



energy due to countless system air leaks and inefficient actuators. Vario-X offers a really simple means of electrifying system components that have previously been operated pneumatically. In fact, replacing pneumatics with electrics – for instance on clamping units in bodywork production – brings nothing but advantages all round. Business owners can reduce the amount of inefficient, difficult-to-control and relatively expensive pneumatics in their workshops, production planners can focus on a single energy

source (electricity), staff can finally work in noticeably quieter conditions and, of course, the environment benefits, too.

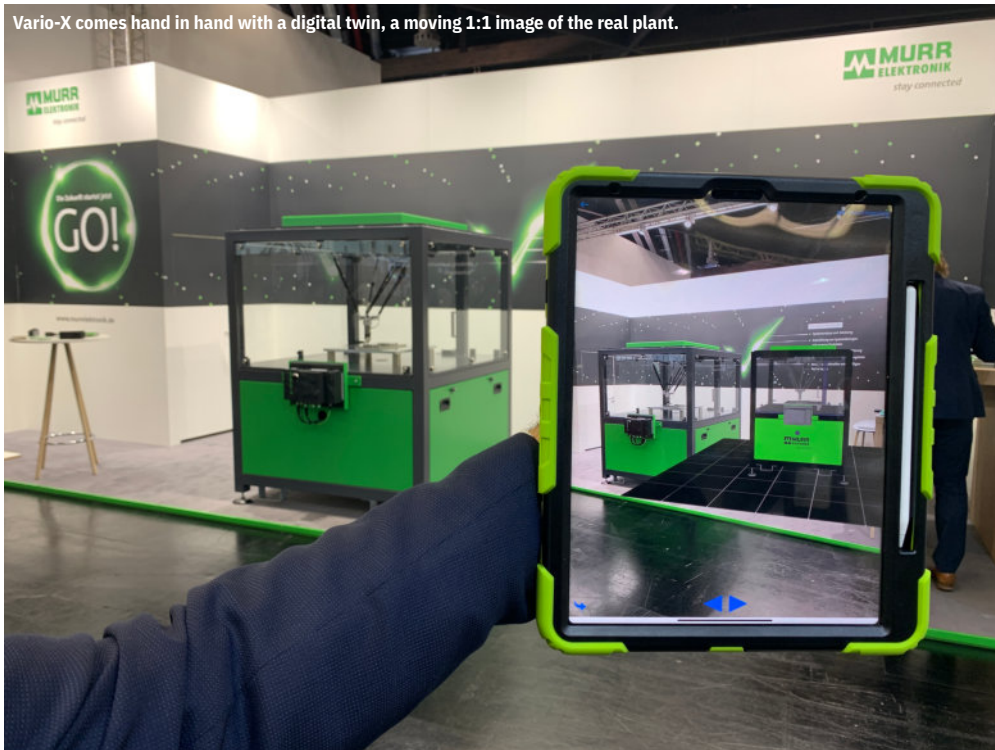
## Digital twins

Digital twins take digitisation to a new level. This digital image of the plant or machine contains all the functions and configurations of the system, including the original control software. This is relevant for preliminary considerations such as collision testing of moving parts in body construction. With augmented reality (AR) applications, all motion sequences can be viewed, and analysed, on a tablet.

During operation, the digital twin provides the data for condition monitoring and predictive maintenance. In this way, production anomalies can be detected and remedied before quality suffers. Long-term analyses enable statements to be made on energy efficiency and simulations of process changes, which provide information on possible savings potentials.

Vario-X shortens commissioning by an average of 40 percent based on a digital twin and its innovative installation concept. In addition, the overall system supports modular and transparent processes, higher value creation, and greater cost-effectiveness and sustainability in body shop. The bottom line is that, with consistent implementation of decentralisation, the platform enables entry into digital transformation during ongoing operations – the decisive step in the right direction.

Vario-X comes hand in hand with a digital twin, a moving 1:1 image of the real plant.





Companies must adapt to pre-existing challenges.

## Manufacturing Companies Must Go Digital to Capitalise On the Future

**D**igital transformation is the key to agile supply chains and meeting rapidly evolving consumer needs, writes Michael Schwarz, MES/MOM Software Expert, AVEVA.

Supply chain disruptions, fluctuating costs, and new consumer purchasing habits are driving a dramatic need for increased agility and resilience in manufacturing industries. Post-pandemic, global consumers are increasingly embracing digital channels over brick-and-mortar stores.

Today's manufacturers are battling ongoing

supply chain disruptions, including workforce-related challenges, which continue to impact their ability to run production plants at full capacity. At the same time, companies must also adapt to pre-existing challenges, such as retiring workers, a shortage of skilled workers, and ever-more pressing sustainability drivers pushing energy and waste reduction. Designing operations for a circular economy, too, is on the horizon.

During the pandemic, conventionally profit-led and efficiency-optimised manufacturers found themselves stuttering amid the need to be agile due to supply disruption. To survive – and thrive amid – this maelstrom of challenges, modern manufacturing companies have no choice but to adapt to the future.

In our transformed world, traditional supply chain drivers are rapidly changing. According to a 2021

report conducted by the World Economic Forum, 56% of the 3,000 CEOs surveyed listed agility and flexibility as their top strategic priorities.

### Digital transformation drives agility, flexibility and resilience

The digital transformation of manufacturing operations is a critical foundation for delivering operational efficiency and flexibility improvements, as well as the end-to-end supply chain visibility manufacturing enterprises need in a post-pandemic marketplace.

According to the World Economic Forum, manufacturing companies leveraging digital technologies to transform their end-to-end operations reduced costs by 5-30%, increased productivity by 5-40%, and achieved substantial agility and sustainability improvements. Producers who do not embrace digital





Digital transformation incentivises curiosity and spurs innovation.

technology could fall behind, whereas those who begin their digital transformations early will sharpen their competitive edge.

To seize business growth opportunities, manufacturers must incorporate robust digital tools and platforms that optimise their manufacturing value chain. To maintain competitiveness, such organisations should:

## “The digital transformation of manufacturing operations is a critical foundation for delivering operational efficiency and flexibility improvements,

1. Enable cross-functional supply chain visibility and collaboration to create production plans which are feasible to execute.
2. Deploy advanced production planning and scheduling methods to optimise plant schedules for throughput and on-time delivery and to adapt to more frequent change.
3. Digitise and standardise best practices, key performance indicators (KPIs), and reporting across their distributed network of plants.
4. Leverage operational data with predictive and prescriptive artificial intelligence (AI) for continuous productivity, asset reliability, and

eco-sustainability optimisation.

5. Create a digital thread that contextualises information across the supply chain to provide the visibility, transparency, and traceability consumers and regulators demand.

6. Establish new KPIs to measure and improve the speed and agility of their supply chains. Consumer product manufacturers' large, distributed networks require industry-specific digital strategies and tools that allow companies to leverage synergies and facilitate accelerated deployment across their multiple plants simultaneously.

To be successful, multi-site digital transformation strategies require a corporate, centralised “Centre of Excellence” approach to identify the best practices and supporting technologies, which can be standardised and quickly rolled out in parallel across multiple sites.

Digital twin technology can provide real-time situational awareness and lays the data foundation for more advanced capabilities, like artificial intelligence (AI), machine learning, and predictive quality, process, and asset performance. By abstracting production sites in a standardised digital twin of the plant, manufacturers can transform operations consistently across many sites with varying practices for similar operational activities.

Comprehensive digital execution solutions are vital for aligning people, equipment, and operational processes with advanced digital

technologies for efficient and compliant work execution, data capturing, and continuous improvement. As operational efficiency improves, so too does an operation's ability to change course swiftly in the face of disruption.

Technological advances in big data and predictive analytics, business process management, mobile applications, and augmented reality are enabling manufacturers to empower operators and decision-makers to make sense of operational data.

Newer platform and integration technologies like cloud, IoT, IIoT, and smart and edge devices are driving down the cost of digital transformation in the manufacturing sector.

Digital transformation incentivises curiosity and spurs innovation, as it makes information more readily accessible to workers by connecting them to plant processes, real-time data, and one another.

A digital thread – a single, contextualised, real-time source of operational data – ensures everyone has the same information at the same time, which allows multi-disciplinary teams to collaborate on projects seamlessly, thereby improving efficiency and agility in tandem.

And, because institutional knowledge is collected in a digital repository, resolutions to previous problems are stored. Likewise, operations can use these problems and resolutions for training and building a skilled and empowered workforce for the challenges of tomorrow.

In today's demand-driven marketplace, reliable and predictable operational performance can be the difference between a resilient, agile stance and falling short of customer expectations. Put simply, digital transformation turns disruption into opportunity.



Michael Schwarz is the MES/MOM Software Senior Product Marketing Manager at AVEVA. Michael is responsible for the commercialisation and go-to-market for the MES/MOM, Recipe & Batch Management and Manufacturing Operations Software for Mining, Minerals and Metals Industries.



## Servo Motor – An Introduction

**What is a servo motor?**  
**This article explains the concept and the benefits.**

A servo motor is a self-contained electrical device that moves parts of a machine with high efficiency and great precision. In simpler terms, a servo motor is a BLDC motor with a sensor for positional feedback. This allows the output shaft to be moved to a particular angle, position, and velocity that a regular motor cannot do. However, a servo motor is only one part of a closed-loop motion control system. A complete motion system includes an amplifier, control circuit, drive gears, potentiometer, shaft, and an encoder or resolver as well as the servo motor.

A servo motor consists of three main components:

**A motor:** This can be either a DC motor or an AC motor depending on the power source and the

application requirements. The motor provides the mechanical power to rotate or move the output shaft.

**A sensor:** This can be a potentiometer, an encoder, a resolver, or another device that measures the position, speed, or torque of the output shaft and sends feedback signals to the controller.

**A controller:** This can be either an analog or a digital circuit that compares the feedback signals from the sensor with the desired set point signals from an external source (such as a computer or a joystick) and generates control signals to adjust the motor's voltage or current accordingly.

### How does a servo motor work?

Servo motors are used to control position and speed very precisely, but in a simple case, only position may be controlled. Mechanical position of the shaft can be sensed by using a potentiometer, which is coupled with the motor shaft through gears. The current position of the shaft is converted into an electrical signal by the potentiometer, and

compared with the command input signal. In modern servo motors, electronic encoders or sensors are used to sense the position of the shaft.

Command input is given according to the required position of the shaft. If the feedback signal differs from the given input, an error signal is generated. This error signal is then amplified and applied as the input to the motor, which causes the motor to rotate. And when the shaft reaches to the required position, error signal becomes zero, and hence the motor stays standstill holding the position.

The command input is given in the form of electrical pulses. As the actual input applied to the motor is the difference between feedback signal (current position) and applied signal (required position), speed of the motor is proportional to the difference between the current position and the required position. The amount of power required by the motor is proportional to the distance it needs to travel.



## Advantages of servo motor

**Higher output power:** A servo motor produces a high output power. If you are into intense mathematical problems, you can calculate the output independently, but you can also let a servo drive do the job for you.

**Efficient & accurate:** Ensuring accuracy is something everyone strives for, which is a specialty for the servo motor. It attains its precision by a rotating motor that relays a signal back to its position and speed drive. Encoder accuracy guarantees that everything comes out smoothly.

**Accelerated torque:** Looking at the differences between a servo and a stepping motor, you will find that a servo motor can speed up loads due to its high torque ratio. It gets the increased torque from using gearboxes along with the engines to provide a reliable speed.

**Short period management:** An excellent detail about a servo motor is that it uses as much power as necessary, meaning it won't exert any extra energy, allowing for efficient power and torque usage for shorter periods.

## Servo motor applications

Servo motors are used in a wide range of industrial and commercial applications that require precise control of motion, including:

**Robotics:** Servo motors are commonly used in robotics for precise control of joint movements, as well as for grippers and end effectors.

**CNC machines:** Servo motors are widely used in computer numerical control (CNC) machines for precision positioning and motion control of cutting tools.

**Packaging machinery:** Servo motors are used in packaging machinery to control the movement of conveyor belts, as well as for the precise positioning and movement of packaging materials.

**Aerospace:** Servo motors are used in aerospace applications for precise control of aircraft components, such as flaps and landing gear.

**Autonomous guided vehicles:** Servo motors are used to power and steer the wheels in autonomous guided vehicles.

**Medical equipment:** Servo motors are used in medical equipment for precise control of medical

devices, such as surgical robots, prosthetics, and other medical devices.

**Printing and paper processing:** servo motors are used in printing and paper processing equipment for precise control of paper feeding, cutting, and folding.

**Industrial automation:** Servo motors are used in a wide range of industrial automation applications, including conveyor systems, material handling, and assembly lines.

## How to select a servo motor?

There are several considerations when selecting a servo motor for a specific application, such as the required speed, torque or force, motion profile, available physical envelope, and environmental factors. This means that the chosen motor solution must produce the load torque and speed requirements, fit in the available space, and perform as required under the subjected environmental conditions of the application.

A servo motor is part of a total mechanism that provides motion to a load – to move it, machine it, lift it, inspect it, etc. The servo motor is the muscle that provides the necessary torque, force,

and speed (required load point) to perform a given function. The fastest and most reliable way to determine these needs is with a motor sizing tool that calculates the load points required by a motor and analyses information about the load, transmission elements, and motion profile to select a motor from the motor database that matches the load parameters. As the initial load points are determined, the sizing tool checks for the optimum solution and narrows the motor choices based on the required torque, speed, inertial ratio, and associated margins acquired from the motor ratings.

*Varnika is an in-house brand offering by Durga Mechatronics created to satisfy the ever evolving needs of the Indian manufacturing industry.*

*We are dedicated to providing efficient and stable technical solutions for customers and continuously improving the efficiency of energy use. Our company, by applying the internationally advanced variable frequency control technology and the actual needs of domestic customers, has independently researched, developed and manufactured kinds of frequency inverters.*



Servo motors have wide range of applications



The digital ecosystem needs to be immune to changes and challenges.

## Fostering Digital Immunity in Technology Ecosystem

**I**nvesting in quality engineering practices can minimise downtime, prevent costly errors, and enhance customer satisfaction, says Shiladitya Chaudhury.

For non-technology companies, building the right software at speed is a top priority. However, Tom Cargill's Ninety-Ninety Rule states, "The first 90% of the code accounts for the first 90% of the development time. The remaining 10% of the code accounts for the other 90% of the development time."

This rule fundamentally states that when the rubber hits the road (once 90% of the work is

done), all hell breaks loose. Quality issues, mismatches with requirements, lack of scalability, reliability, and performance reveal themselves, hijacking the program schedule and cost along with them. The ninety-ninety rule is all too familiar to the IT industry veterans and easily relatable.

**“The digital transformation that businesses are undergoing cannot be looked at exclusively as a technology transformation initiative.**

Interestingly, this challenge was never solved, and the industry took this inefficiency as a part of the contingency of doing business. We were able to live

with these challenges as technology was an enabler of business rather than a business in itself. But now, technology is the business.

We can no longer afford inefficiencies to impact an application's speed, cost, and, more importantly, customer experience with the brand.

The digital ecosystem needs to be immune to changes and challenges. Leading organisations are coming up with a well-defined strategy that builds digital immunity across the landscape.

### **Embracing the ecosystem quality**

The digital transformation that businesses are undergoing cannot be looked at exclusively as a technology transformation initiative. Acknowledging it and knowing the difference separates leaders from followers or laggards. Leading organisations are investing in reshaping business competencies and org topologies with



a focus on innovation, quality, experimentation, and skill development – all directed to enhance customers' digital experience, engagement, and community buildup. Their approach encompasses their engineering ecosystems and competencies.

Contrarily, for organisations that are yet to climb the maturity curve, their focus is much more nearsighted and is limited to a project or, in certain cases, an initiative. The challenge in focusing on a project is its inability to bring scalable, sustained change. Projects are, by their very nature, time and feature bound with a clear end state. Ecosystem change, however, is a journey with a different set of progressive KPIs and goals.

Organisations in today's world are working to build a community of promoters with active brand engagement. And a community can only be built around a product or service that stands for its quality. Hence, 'ecosystem quality' takes center stage.

#### So, what is digital immunity?

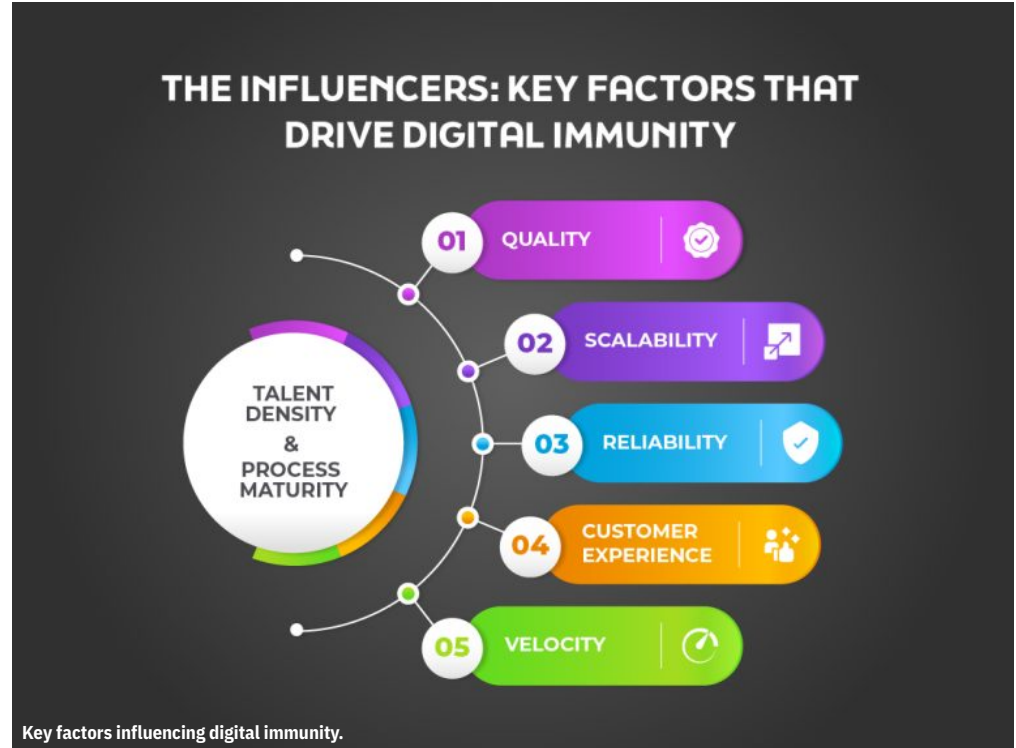
One can understand digital immunity by looking at the Japanese automobile industry that took over the world in 1970 by building a large promoters base by focusing on its ecosystem quality. It was not their superior inspection ability once a car is manufactured or their marketing capabilities that differentiated them. Their relentless focus on the leading indicators improved the ecosystem quality. Any automobile that came out – stood for its quality.

When it comes to technical products, be it automobiles, software, or reusable spacecraft, organisations cannot scale if they have not mastered quality.

Quality is a hindrance to scale. If we fight quality issues at each stage or project, scalability takes a back seat. The Japanese automobile industry was able to flood the market because they were able to perfect the art and science of quality, which led to their ability to focus on the next stage, i.e., how to make predictable and repeatable products at scale.

#### Relation between digital immunity & tech leaders

Digital immunity plays a crucial role in distinguishing tech leaders from laggards. Enterprises in the top technology-driven organisations typically perform far better in



customer acquisition, engagement and retention. A recent report by McKinsey, "A widening performance gap between top IT organisations and the rest," highlights the same divide. It's no surprise that these are also the organisations that have the ability to launch innovative products, and release products or services at a fast pace, and their online presence has a high customer engagement.

**“Reliability testing involves subjecting the application to a variety of scenarios and stress to uncover potential flaws**

#### The Influencers: Key factors that drive digital immunity

**Quality** – In today's digital-first world, purely functional or requirement quality should be treated as hygiene. No brownie points to get that right. Unfortunately, the reality is different, and a major reason for this is the lack of a complete and uniform understanding of the application requirements. What was required, understood, and developed follows a good Chinese whispers case study – a game where messages are

whispered from one person to another, and the original message is distorted.

Agile methodologies, with its close business and technology alignment, are designed to bring this gap down. However, we see organisations' inability to focus on agile principles and the value it creates while focusing on its ceremonies.

The need of the hour is to simulate the requirement, build greater blameless reviews, and have a clear definition of what is 'done.' Automated quality gates across Software Development Life Cycle (SDLC) and its close integration with build progression rules should take precedence.

**Scalability** – All businesses want to increase their user base or engagement. Hence getting the ecosystem to scale is critical. Scalability testing helps identify potential ecosystem bottlenecks, performance limitations, or resource constraints within the enterprise by simulating various scenarios, such as concurrent user access, high transaction rates, or increased data input. The goal is to determine how well the application and its surrounding ecosystem can scale, maintain responsiveness, and handle increased loads without compromising performance, stability, or user experience. By conducting thorough scalability testing,

organisations can proactively address scalability issues, optimise resource allocation, and fine-tune the application's architecture to scale seamlessly to meet growing user demands and business requirements. This enhances the application's performance and contributes to overall customer satisfaction, user retention, cost optimisation and business success in today's dynamic and rapidly evolving digital landscape.

## “The success of an organisation's digital immunity strategy depends on its talent density and the process it follows.”

**Reliability** – While scalability checks for an ecosystem's ability to handle the load, reliability focuses on assessing the application or IT landscape's ability to perform its intended functions without unexpected failures or errors consistently or addressing failures gracefully.

Reliability testing involves subjecting the application to a variety of scenarios and stress to uncover potential flaws or vulnerabilities that could impact its reliability.

Simulating different operating conditions, such as high user loads, extended usage periods, forcefully crashing random services, or intermittent network connectivity, to assess how the application responds and recovers from adverse situations. By conducting reliability testing, organisations can identify and address issues related to memory leaks, resource utilisation, error handling, and system crashes, among others.

The goal is to ensure that the application can withstand real-world conditions and deliver a seamless user experience without compromising reliability. By emphasizing reliability testing, organisations can enhance customer satisfaction, reduce downtime, and establish a reputation for consistently providing robust and dependable applications that meet user expectations.

**Customer Experience** – We discussed requirements and application quality, ecosystem scalability, and reliability. However, another critical aspect is how the said application

behaves on the customer's (end user's) device. Be it a mobile native app, a PWA, or an application on an entire device browser, the application's ability to provide a seamless cross-device platform experience is critical. This aspect holds special importance for applications designed to work on mobile or IoT devices. Handheld devices (smartphones, tablets, or e-readers) run on multiple OSes and versions, with each device OEM adding its bit of customisation, which can play havoc with third-party applications. Customer experience testing is the last mile usage test to ensure the application fulfills its given objective where it matters the most – on end-user devices.

**Velocity** – With the fast-paced nature of business and technology advancements, organisations need to deliver software products and updates quickly to stay competitive. It enables faster time-to-market, allowing businesses to seize opportunities and meet customer needs promptly. Focusing on Quality, Scalability, and Reliability with the best Customer Experience is critical, and so is the importance of doing all that at speed. Autonomous automated continuous testing, DevSecOps, and TestOps need to be well orchestrated through a platform-driven approach where the key focus is quality with speed. Building digital immunity cannot be an excuse to slow down. On the contrary, a better immune system enables faster and more predictable outcomes.

These core factors drive digital immunity across an organisation's ecosystem. Overarching the core drivers are an organisation's security focus, its principles, processes and procedures, audit and governance.

**Talent Density & Process Maturity** – The success of an organisation's digital immunity strategy depends on its talent density and the process it follows. More often than not, skills that gave us success in a traditional IT setup become a hindrance to digital transformation. Continuous skill enhancement leading towards more digital competency is required as an organisation's technology maturity that drives innovation at speed correlates to its engineering competency.

Examples of organisations that have robust digital immune systems include Google (Alphabet), Facebook (Meta Platforms), and Amazon.com.

### Way forward

Quality plays a crucial role in the digital transformation journey. As organisations embrace

digital technologies to streamline operations, enhance customer experiences, and gain a competitive edge, the focus on delivering high-quality digital products and services becomes paramount. Customers have higher expectations than ever before, demanding seamless user experience, reliable performance, and impeccable security.

To meet these expectations, organisations must prioritise quality throughout every stage of the digital transformation process. This involves rigorous testing, continuous monitoring, and ongoing optimisation to ensure digital solutions are free from defects, vulnerabilities, and performance bottlenecks.

Thus, investing in quality engineering practices can minimise downtime, prevent costly errors, and enhance customer satisfaction. Moreover, quality-driven digital transformation enables organisations to build trust and credibility, establishing a solid foundation for long-term success in an increasingly digital world. As technology continues to evolve, the role of quality will only grow more significant, driving innovation and enabling organisations to deliver exceptional digital experiences that delight their customers and drive business growth.

### Article Courtesy: NASSCOM Community – an open knowledge sharing platform for the Indian technology industry:

<https://community.nasscom.in/communities/digital-transformation/fostering-digital-immunity-technology-ecosystem>

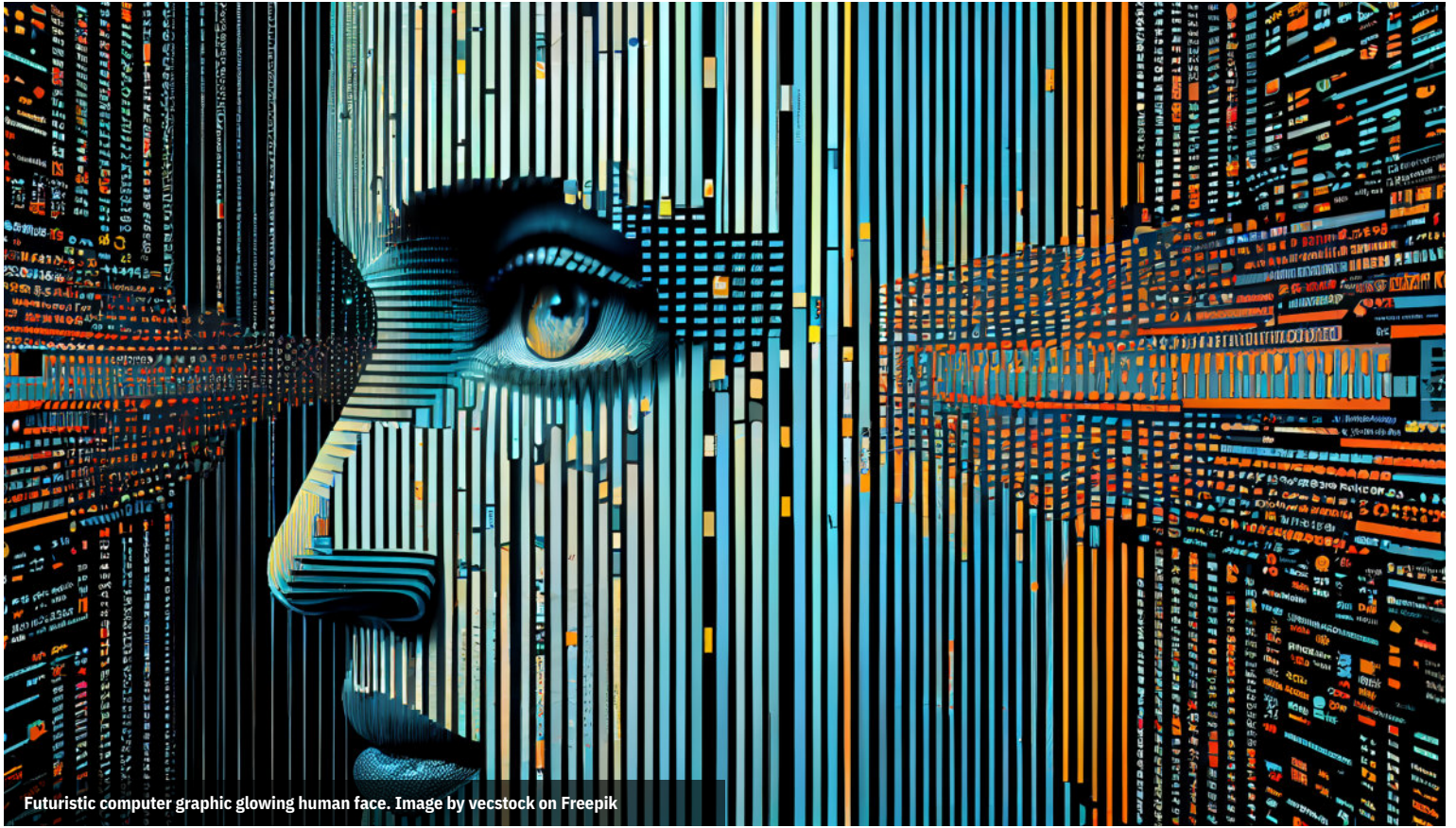


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Futuristic computer graphic glowing human face. Image by vecstock on Freepik

## Does Advent of Generative AI Also Signal the End of Specialisation?

**Generative AI can be seen as a tool that complements specialisation rather than replaces it, says Dr Ravi Prakash Mathur.**

Embracing the realm of generative AI opens doors to myriad personas and perspectives. As ChatGPT and other generative AI companions weave information into knowledge, one can effortlessly don diverse roles and inhabit numerous identities. They enable you to wear many hats and assume many avatars. One does not need to be a part of a profession to know about its inner workings or to have insights about the skill that comes from many years of experience any longer. Learnings and insights are available on the click of a button.

The marriage of AI and search engines

accelerates learning, sparks the contemplation: Does the rise of generative AI herald a departure from specialisation? An engaging proposition indeed, offering both disruption and amusement. One can fast track learning with the use of AI and search engines. Here is a light-hearted take on the subject.

Learning through AI can be an exuberating experience. In a world where everyone is looking for hacks to hasten up things, it is only logical to find hacks to use AI effectively. One hack that can be used for learning is to use AI and search engines to validate your intuitive observations. Intuition, when paired with reasoning and meticulous fact-checking, becomes a formidable tool in expediting the learning process. Intuition adds an element of quick comprehension, pattern recognition, and intuitive leaps that can guide efficient exploration and understanding of new concepts. It often operates in the background, providing hunches and insights that can be further validated through

reasoning and fact-checking. This combined approach allows learners to grasp information more rapidly, make connections between ideas, and develop a deeper understanding of the subject matter.

Yes, AI does tend to hallucinate, but combined with fact checking it can be fun and a fascinating journey. After a few attempts one can get the knack of it.

So, let's dive into the rabbit hole. Who knows where it might lead?

### Breaking bad

In the world of acting there is a term called 'Break Character', which means come out of a projected persona. So, with the help of ChatGPT I managed to take off my supply chain thinking hat and put on the hat of a movie script writer. Or take on a different avatar or persona, so to say, of that of an expert in movie script writing.



Abstract colorful splash 3D background. Image by maniacvector on Freepik

The distance between crafting film scripts and the skill set of a supply chain professional is vast. However, this divergence also presents an intriguing playground to test the hypothesis that AI tools can expedite learning.

I choose the script writing as the area because as audience we enjoy the outcome of a well-crafted script and often have our own observations and opinions of the same. If you enjoy movies and appreciate the craft of creating movies, I hope you enjoy the conversation.

Have titled it “Character Development in Script Writing Vs Character Tropes”.

You can also call it “use of Archetypes in script writing”.

Just one disclaimer – there is nothing here to learn about strategy or leadership; just some reflections. Here's what happened during my fun chat with ChatGPT.

## Character development in script writing Vs Character tropes

User – In the making of movies, character actors are sometimes used as cinematic devices that have predictable behaviours; sometimes also stereotypes.

Chat – Yes, that's correct. In the making of movies, filmmakers often use character actors as cinematic devices with predictable behaviours or stereotypes. Character actors are performers who specialise in playing specific types of roles and often embody certain traits or characteristics that the audience can easily recognise and relate

to. These predictable behaviours and stereotypes can serve several purposes in storytelling:

1. Establishing familiar archetypes: Character actors can embody archetypal figures, such as the wise mentor, the comedic sidekick, the supporting friend, the villainous antagonist, or the damsel in distress. These archetypes help the audience quickly understand the roles and relationships of the characters in the story.

## “AI enhances the learning journey and professionals contribute their deep expertise to guide and refine AI-generated insights.

2. Adding comic relief: Some character actors are known for their comedic abilities and are cast in roles that provide humour and levity to the film. These characters often have predictable behaviours that generate laughter and break tension.

3. Enhancing emotional impact: Stereotypical characters can evoke specific emotions from the audience because they resonate with familiar beliefs or cultural norms. For example, a nurturing mother figure or a stoic hero may tap into universal feelings of love and admiration.

4. Simplifying storytelling: Stereotypes and predictable behaviours can streamline the narrative by reducing the need for extensive character development. The audience can quickly

grasp the character's traits and motivations without requiring elaborate backstory or exposition.

In modern filmmaking, there is an increasing awareness and push for more diverse and nuanced portrayals of characters, moving away from one-dimensional stereotypes and embracing more complex, authentic, and well-rounded individuals.

User – It is as if script writers have a library of characters they can pick from and weave them in a story.

Chat – Yes, you've hit on a common observation about scriptwriting and character development in movies. Scriptwriters often draw from a vast "library" of archetypes and character tropes that have been established and recognised over time in storytelling. These archetypes and character types are like narrative building blocks that writers can use to craft their stories.

Using archetypes, scriptwriters can create characters with familiar traits and behaviours that resonate with audiences. This approach can be effective because it allows the audience to quickly understand and connect with the characters, saving time on extensive character development and allowing the story to progress smoothly.

However, while using established character types can provide a solid foundation for storytelling, it's crucial for scriptwriters to add depth and uniqueness to their characters to avoid falling into clichés and stereotypes. By giving characters individual personalities, motivations, and personal journeys, writers can make them more relatable and interesting.

User – Talk about situational archetypes in story telling through movie scripts.

Chat – Situational archetypes in storytelling refer to recurring patterns or settings that have been used throughout history in various myths, folktales, and movies. These archetypes serve as fundamental plot structures that resonate with audiences and tap into universal themes and emotions. Here are some common situational archetypes frequently used in movie scripts:

1. The Hero's Journey: The Hero's Journey is one of the most iconic situational archetypes, popularized by Joseph Campbell. It follows the



protagonist's transformative adventure from their ordinary world into a special realm, where they encounter challenges, mentors, and enemies.

**2. The Quest:** In the quest archetype, the protagonist embarks on a journey to find or achieve something of great importance. This could be a physical object, a piece of knowledge, or a resolution to a problem. The quest often involves trials, obstacles, and a series of adventures leading to the ultimate goal.

**3. Rags to Riches:** This archetype follows a character's rise from humble beginnings to great success or wealth. The protagonist typically faces adversity, overcomes challenges, and achieves prosperity or recognition.

**“AI enhances the learning journey and professionals contribute their deep expertise to guide and refine AI-generated insights.**

**4. Comedy:** The comedy archetype involves humorous and light-hearted situations, often cantered around misunderstandings, mistaken identities, and comedic mishaps. The story typically ends with a positive resolution and a sense of harmony restored.

These situational archetypes are not mutually exclusive, and many movies incorporate multiple archetypes to create complex and engaging narratives. By using these timeless patterns, scriptwriters can tap into the collective human experience and create compelling stories that resonate with audiences across cultures and generations.

User – Talk about scene archetypes in movies.

Chat – Scene archetypes in movie scripts refer to recurring types of scenes that have been used in storytelling to convey specific emotions, advance the plot, or explore character dynamics. These scene archetypes serve as essential building blocks in crafting engaging and impactful movie narratives. Here are some common scene archetypes found in movie scripts:

**1. Introduction Scene:** This is the first scene that introduces the audience to the main characters and sets the tone for the story. It often

establishes the central conflict or theme and hooks the audience's interest.

**2. Action Sequence:** Action sequences are high-energy scenes involving physical conflict, stunts, and intense moments. They are common in action movies and provide excitement and adrenaline to the audience.

**3. Dialogue or Character Interaction Scene:** These scenes involve characters engaging in conversations that reveal their personalities, motivations, and relationships. They are crucial for character development and audience connection.

**4. Flashback/Flashforward Scene:** Flashback scenes take the audience back in time to reveal crucial backstory or significant events that inform the present-day plot. Flashforward scenes create anticipation and tension.

**5. Climactic Scene:** The climactic scene is the high-stakes, intense moment where the central conflict reaches its peak. It often involves the protagonist confronting the main antagonist or facing a critical decision that determines the outcome of the story.

**6. Resolution Scene:** This scene comes after the climax and provides closure to the story's main conflict. It may include the resolution of character arcs, explanations for plot twists, and the restoration of balance or harmony.

**7. Chase Scene:** Chase scenes involve characters pursuing or being pursued by others.

**8. Training/Montage Scene:** These scenes show characters undergoing training, learning new skills, or preparing for a significant event. They are often accompanied by music and quick cuts, condensing time and highlighting character growth.

**9. Revelation Scene:** Revelation scenes involve significant plot twists or the uncovering of important information that changes the course of the story.

**10. Confrontation Scene:** Confrontation scenes involve characters facing each other in emotionally charged conflicts, arguments, or verbal sparring. They reveal underlying tensions.

These multiple archetypes can be combined and adapted to suit various genres and storytelling styles. Successful movies often feature a mix of

these scenes and tropes carefully crafted into a script to create a well-paced and emotionally resonant narrative.

## The Resolution Scene

Continuing with the cinematic theme of script writing, proving here the resolution to the initial discussion, and attempting to restore balance and harmony.

In the world of creative endeavours, such as scriptwriting for movies, generative AI offers new possibilities for ideation, brainstorming, and even generating initial drafts. However, the creative process, character development, and storytelling nuances still require the human touch to infuse depth, authenticity, and emotional resonance into the narratives.

Generative AI can be seen as a tool that complements specialisation rather than replaces it. It can serve as a source of inspiration, a means to validate ideas, and a platform for exploration. The marriage of AI and specialisation creates a symbiotic relationship, where AI enhances the learning journey and professionals contribute their deep expertise to guide and refine AI-generated insights. The advent of generative AI does not spell the end of specialisation but rather introduces a complementary force that accelerates learning and creativity.



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*and an Elite Member, CII Institute of Logistics. A supply chain and logistics professional with 30 years of work experience; 'National Thought Leadership' Awardee; expertise in handling Global Logistics, Digital Supply Chain Planning Systems and Procurement; proven track record in leading Supply Chain Transformation; published author with academic paper available on HBR stores; Visiting Faculty at Business Schools; Member of Academic Boards; Blogger, Speaker, Trainer, Digital Innovator and Influencer.*

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# ‘Microverse is now investing heavily in developing AI/ML predictive models’

**S**ameer Pikale, National Sales & Marketing Head of Microverse Automation.

**Microverse Automation with over 3 decades of legacy is among the pioneers of automation among home grown companies. How did this story begin?**

Microverse Automation was founded with a nationalistic mission of designing and manufacturing complex technology-related solutions like Distributed Control Systems, PLC and now IIoT for Process Industry in India. For far too long India has been dependent on foreign companies and importing automation technology in India.

When India can be a leader in Software Services, why can't India be a leader in Automation Technology? The industry is proud of 'using' foreign products; shouldn't we take pride in developing and manufacturing these solutions in India?

These were the questions that came to my mind when we started on our mission to Make DCS in India in 1989 said, Mr Girish Mehendale MD of Microverse Automation.

"You might have heard stories of Apple and Microsoft being started in a garage. We are proud that our journey too started in a similar fashion.

All the founders quit their MNC jobs when they were possessed by this mission to Make In India 34 years ago! Microverse was started from my balcony in Pune. We have grown over the last 3 decades and now operate out of a best-in-class manufacturing facility in Pune."

**What are the highlights or advantages of Distributed Control Systems customised by Microverse Automation for its clientele? What is the USP?**

Microverse has never relied on imported technologies to produce automation solutions. Our engineers have worked tirelessly to ensure that all feasible hardware and software solutions are indigenously developed and manufactured in India.



Sameer Pikale

Microverse is a solutions company. We have a process expert who provides consultation on enhancing operational efficiency, throughput, and safety. "Plant operators are not looking for generic automation solutions providers. They are looking for solutions that address their problems.

Companies usually try to force fit products onto specific problems that plants face. Microverse Automation instead designs customised solutions for every project.

Additionally, since we do all the development in-house, we provide customised solutions at cost-effective prices," explains Siddharth Mehendale – Director Projects, Microverse Automation.

**The company is competing successfully with global automation giants. To quote a cliché, is the company doing different things or doing things differently?**

At Microverse Automation we are very serious about 3 key aspects, Technology, Quality, and

Customer Support, said Sameer Pikale National Sales & Marketing Head of Microverse Automation.

Our R&D happens right here in India and the design IPs for both hardware and software lie with us. We don't have to look at some COE in the US or Europe for our technology.

We are an honest company. Our peer automation giants are charging exorbitant amounts for upgradation, and revamping. We do not believe in any such hidden charges for the entire lifetime of our products.

For example, we offer Windows upgrades free of cost. We also offer crucial features like conformal coatings, protections, and isolations as default rather than separately charging for them.

**What is the nature of your association with Hitachi? What are the products that are an**



**outcome of this association?**

Our association with Hitachi High-Tech has been established for joint R&D in the fields of automation, DCS, IIoT, MES, and predictive analytics and diagnostics. "With Hitachi, we have ensured that our electronics manufacturing and software development practices meet global standards. However, through the entire process, we have ensured that the electronics are still 100% manufactured in India – and proudly so," says Abhijeet Roy, Regional Head – East India Division.

What are the companies that form the bulk of the clientele? What segments of the market? Any more projects like the one with Total Energies? Our DCS/PLC systems have been implemented for power plants, oil and gas, chemical ferro alloy, pharmaceutical, IIoT applications, etc.

In the power plant sector, we have been working with the Dept of Atomic Energy's Heavy Water Board for the past almost 20 years. This is a supercritical DCS for a super critical application and we have offered triple redundancy. We are quite proud DAE has approved and is running its plant on our Indian technology.

The majority of our clients are from the Chemical and Specialty Chemicals verticals. We have worked with most of the major chemical companies and our solutions have been implemented at these companies for over 20 years. We are working on a project with Gharda Chemicals for a complex DCS with 16,500 IOs in completely redundant architecture.

In the ferroalloy segment, we are proud to have worked with Tata Steel for submerged arc furnace plants. Our ferro alloy solutions are implemented not just in India but in other neighbouring and Gulf countries as well.

O&G is a controlled market. We are proud to work with world #5 O&G company Total Energies. After successful implementation at their Mangalore plant, we have implemented DCS for 3 plants in South Africa.

**Microverse Automation builds technology indigenously or rather uses indigenous technology. Is too much emphasis on merely Making in India inadvertently hampering investing in our own R&D?**

Microverse builds technology indigenously. That's our mission from day zero. We strive to ensure the maximum percentage of components used in our systems is manufactured in India. We supply

these components to other companies to ensure we build an ecosystem of Indian products.

Necessity is the mother of invention. Until all companies cut imports and emphasize using only Make-in-India we won't be able to establish the ecosystem and drive up the quality. Sure, there is a lot of scope for improvement but the public and private sector companies need to rise up to the challenge and commit to developing an Indian ecosystem. It is time we take pride in Indian technology and only then can we expect the technology to rise up to our expectations.

**Apart from pure automation projects, Microverse Automation has also worked in developing complex engineering solutions for diverse industries and critical installations. Please elaborate on this aspect.**

We believe in developing innovative customised solutions that actually solve plant specific problems. Automation has to be people oriented and compliment organisational vision. As an example, in the past for a plant where the operators were non literate, we modified our SCADA to the local Devanagari script.

Similarly, for manual steps of the chemical batch process we developed voice-based SoP digitisation solution. A simple voice alert recorded in the voice of the shop floor supervisor to help the worker carry out their jobs perfectly and in line with laid down Recipes and SoPs. This not only improved plant productivity by almost 24%, but also ensured safe operations.

We have done high tech research to improve outdated technologies and enable the industry to leverage the latest. After thorough research in wireless technologies, MAPL has implemented numerous wireless protocols that transmit data over kilometres, reducing wiring and connecting remotest of plants assets. This data integrates with Microverse cloud platform that has advanced analytics, monitoring, predictive maintenance modules, etc., which can be made available over web as well as mobile applications.

Cell voltage monitoring systems have been around for decades but are still employing age-old wired mechanisms. Microverse implemented the latest wireless IIoT principles and developed devices that can wirelessly bring entire cell house data to the palm of the hand.

Microverse is now investing heavily in developing AI/ML predictive models and Advanced Process Control to integrate analytics with automation. As

said earlier, we at Microverse Automation strive hard to give custom solutions based on cutting edge technology to all our clients. This principle always propels our growth.

**How is the vendor/system integrator ecosystem evolving in India, especially when it comes to serving the smaller industries or MSME segment?**

First and foremost, there is a tremendous advantage to locally Made-In-India automation. As we manufacture in India, we are able to supply large systems within 4 to 6 weeks. This ensures that the smaller as well as large industries see a faster turnaround for their projects.

For other companies, most automation hardware is imported from China. During the Covid pandemic and border issues with China, the import supplies for these companies greatly suffered. However, Indian-manufactured products were able to keep our country running.

We understand that providing on-time services and support to our clients with their plants in really remote locations in India is a challenge. We have now created a Solution Partner ecosystem to address this geographical challenge. Not just in India we have established such partners who are trained on our DCS systems even in the Gulf and South Asia regions.

Murphy's Law says that things go wrong when you expect them the least – if a breakdown has to happen it most probably will happen in the dead of the night! At Microverse Automation we are geared up to support our clients by either remote support local resident engineers or local solution channel partners 24-7 and 365. We are proud that 90% of our clients have been with us for the last 20 years and that is not just because of the technology but because of the support we offer.

Especially with our MSME partners, support is the key to ensuring they get the maximum RoI from the least possible investments. We are there for them.

*Sameer Pikale is Passionate about Digital Technologies, IoT, Analytics, Big Data, Cloud, SaaS & PaaS technology solutions. He has 24 years of extensive experience in Industrial Automation (DCS & PLC), Manufacturing & Infrastructure IT Solutions Sales, Business Development, Advance Analytics and Asset Performance Management Solution Sales.*

# ‘Renewable energy is a key element of our commitment to sustainability’

**N**aivedya Agarwal,  
Chairman MRPL, CEO &  
Co-Founder, Runaya.

**What are the innovations MRPL is bringing to the mining sector in India? What are the specific products for underground tunneling and other support solutions?**

Minova Runaya is dedicated to fostering sustainable growth and driving innovation. Our extensive product portfolio from friction bolts, hollow bolts, self-drilling anchors to lock set resin capsules transform the safety performance of tunnels and underground mines while also reducing import dependency.

Our groundbreaking technology is not only highly efficient but also tailored to solve the most critical challenges faced across various sectors, whether it's the demanding terrains of tunneling, the infrastructure demands of rail and road networks, or the robust need of hydropower projects.

Our solutions stand out due to their unique engineering features. The threads meticulously crafted by our bolt threading machines ensure a high level of precision and reliability. Deformations, induced by paddling machines, enhance performance characteristics, and our press technology ensures high productivity and precision in bearing plate manufacturing,

**What is the contribution of Minova to this JV in terms of technology that fills the gaps?**

Minova's legacy of over 140 years in ground support solutions, coupled with Runaya's commitment to innovation, sustainability, and efficiency, forms the backbone of our collaborative effort. Together we are transforming the safety landscape in India by outperforming all our peers in terms of the support that our products are able to provide. We have already supplied our self drilling anchors to L&T to enable the construction of a tunnel for RVNL.

Both partners working together provides fast-tracked innovation, localised customisation, alongside a continuous feedback loop, ensuring that the products and solutions provided are not



Naivedya Agarwal, Chairman MRPL, CEO & Co-Founder, Runaya.

only technologically advanced but also finely tuned to meet the specific needs of the industry. The collaboration also enables the introduction of proven solutions that tackle geotechnical challenges across various domains. This synergy allows us to create advanced products and solutions that elevate safety, efficiency, and sustainability in the mining industry.

**How dependent is the Indian mining sector on imported technology? How does this venture with Minova seek to address this issue for greater self-reliance?**

Historically, the Indian mining sector has relied heavily on imported technology, with everything from small safety equipment to large smelters being imported. By introducing cutting-edge, domestically manufactured solutions that were previously unavailable, we are playing our small

role in enabling an Atmanirbhar Bharat. Moreover, we are also targeting to export 30% of our capacity to global markets allowing us to Make in India for the world.

**Mining is energy intensive as well as environmentally degrading activity conventionally. Are things now changing for the better?**

As a supplier to mining companies in India and abroad, we have seen a large push from our customers for more sustainable solutions that allow them to meet their ESG goals. At MRPL, this is at the core of our DNA with 65% of our current production being done via renewable energy sources with a target to reach 100% in the next 2 years. We are also now going to start sourcing Green Steel to further reduce our carbon footprint.



**What role does renewable energy play at MRPL? Is there a captive production of solar power or is it procured from external sources?**

Renewable energy is a key element of our commitment to sustainability. We currently generate 85% of our power requirement through rooftop solar and will reach 100% in the next 2 years. We believe that generating our own green energy will have a greater impact on society, allowing existing capacities to be used by companies who may not have the ability to generate their own.

**Automation is a game changer today along with the use of AI. How automated are the works of MRPL in its production facilities?**

Our operations extensively integrate Industry 4.0 technologies such as AI to automate various aspects of our plant to enhance productivity, quality, and safety.

Automated processes are seamlessly woven into various stages of production, ensuring uniformity and efficiency. We have automated various stages of the production process, including raw material processing, quality assurance, and packaging. These automated processes boost not just productivity and accuracy; they also contribute to enhanced safety performance at our plant.

One of the key differentiators that sets MRPL apart is our integration of AI-driven insights. AI algorithms analyse data from our production processes in real-time, allowing us to identify patterns, predict potential issues, and optimise



Women on the shop floor at MRPL.

The MRPL plant at Bhilwara.



operations. This predictive approach enables us to carry out timely maintenance, minimise downtime, and maximise efficiency. Additionally, AI enhances our quality control by identifying deviations and anomalies that might be missed by traditional methods.

**Runaya has a track record of recycling waste in aluminium smelting. Can this be replicated in processing other metals?**

Runaya's success in waste recycling within the aluminium sector is a testament to our commitment to sustainability. While the specific processes may vary based on the properties of different metals, the underlying principles of waste recycling can certainly be replicated. We are now expanding our recycling activities by processing both smelting and mining waste from the Zinc value chain, not only recovering Base Metals but also minor metals such as Nickel, Lithium, Cadmium, Cobalt and Silver.

*Naivedya Agarwal is the Co-Founder and CEO at Runaya where he leads the Manufacturing Technologies vertical. As an advocate and a firm believer in technology and innovation leading to business growth, Naivedya also drives the digitisation journey and strategic growth roadmap for Runaya. Prior to founding Runaya, Naivedya worked with organisations such as Boston Consulting Group, JP Morgan, and Vedanta Resources – where he was Vice President, Business Development – and at Hindustan Zinc.*

*Naivedya holds an MBA degree from London Business School and is a qualified scuba diver and has trained as a pilot on the Cessna 172 aircraft. In the six years since its inception, Runaya had established itself as a trusted partner to all stakeholders, including customers, employees, and society, with a strong focus on governance and sustainability.*

# An Automated Way to Assemble Complex Real-World Objects

**P**lanning for mechanical assemblies necessitates more than simply sketching up rough drawings, says Nivesh.

The manufacturing industry has widely embraced AI. Planning for mechanical assemblies necessitates more than simply sketching up rough drawings. It is a multifaceted challenge that involves working with intricate 3D shapes and addressing the stringent motion constraints inherent in real-world assemblies.

It is comprehensible that human engineers are required to actively engage in the process of designing assembly plans and instructions before transmitting the components to assembly lines. However, this manual approach is associated with elevated labour expenses and possible mistakes.

## Dataset

The researchers generated a comprehensive dataset consisting of numerous industrially relevant assemblies and motions designed to evaluate the efficacy of their proposed strategy. The method under consideration demonstrates a high level of effectiveness in addressing a wide range of challenges, mainly exhibiting superior performance compared to prior methodologies, particularly in the context of rotational assemblies such as screws and puzzles. Moreover, this software has remarkable computational efficiency as it can solve complex 80-part assemblies in minutes.

## Disassembly planning

The method aims to determine the optimal assembly strategy for attaching a screw to a rod. This process involves two distinct stages: disassembly and assembly. The technique for disassembly planning aims to identify a path free from any potential collisions, hence facilitating the removal of the screw from the rod.

The algorithm applies diverse forces to the screw by employing physics-based simulation and subsequently observes its resultant movement.



Thus, supplying torque at the rod's central axis causes rotational motion, which moves the screw down the rod. Providing a linear force outward from the rod separates the screw from the rod. During the assembly stage, the algorithm reverses the disassembly path to obtain an assembly solution by reassembling the individual parts.

## The process of disassembling and assembling

In contemporary manufacturing processes, particularly in factory or assembly line settings, it is customary for all operational instructions to be pre-programmed fixedly. To successfully construct a given product, it is essential to exercise exact control over the instructions for the assembly and disassembly of said object. Which component should be assembled initially? Which component should be assembled subsequently? Furthermore,

**“The manufacturing industry has widely embraced AI”**

what is your plan for the process of assembling this?

Previous endeavours have predominantly focused on elementary assembly pathways, characterised by a straightforward conversion of components, without delving into intricate complexities. The team employed a physics-based simulator to progress beyond the current state, a widely utilised tool for training autonomous systems such as robotics and self-

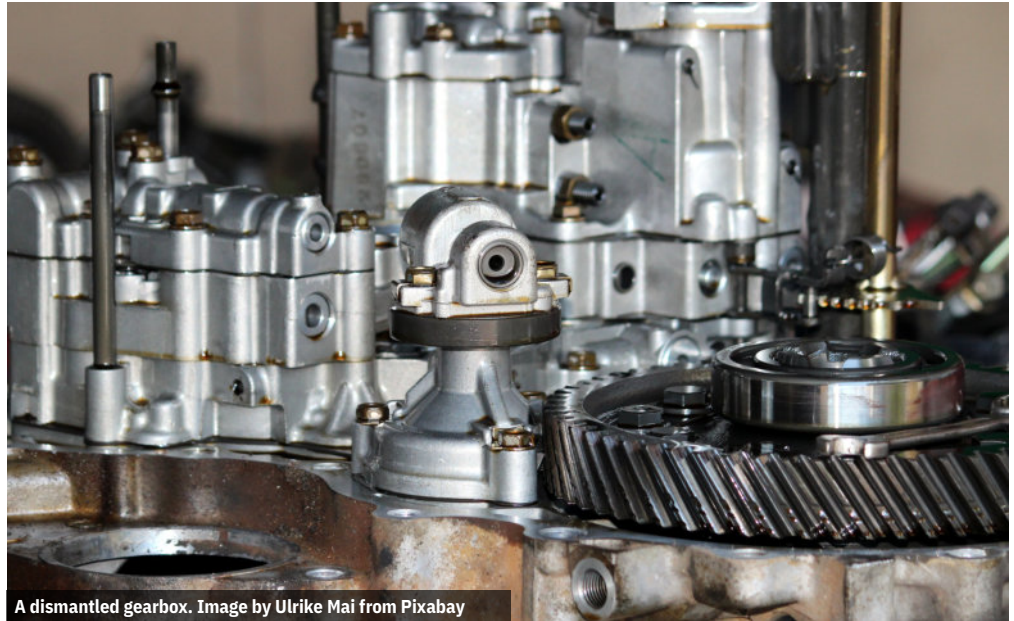


driving automobiles. This simulator facilitated the exploration of assembly paths, enhancing the process's ease and generalisability.

**“Researchers have devised a method for planning physically plausible assembly motions and sequences for real-world assemblies. This new product assembly algorithm is precise, efficient and generalisable to various complex real-world assemblies”**

#### Implementation

Implementing their technique, which involves disassembling and reassembling, restricts the assemblies to a state of rigidity exclusively. Nevertheless, geometric-based methodologies need to be improved in their ability to effectively handle deformable objects due to their inability to represent the physical deformations accurately. Hence, the researchers find it intriguing to delve deeper into physics-based planning to investigate its potential for generalisation in deformable assemblies, such as the snap-fit assembly. Furthermore, utilising geometric data and tactile feedback is imperative while devising assembly plans. In contrast to the exhaustive search strategy employed by their technique and



baseline methods, humans can rapidly deduce probable disassembly sequences and motions based on visual cues. It enables them to avoid spending unnecessary effort attempting to disassemble obstructed pieces or moving parts in directions that lead to dead ends.

#### Conclusion

To enhance research efforts in robotic assembly, a promising avenue for future exploration involves incorporating robotic arms into simulation environments.

This integration would enable the manipulation of assemblies by the predetermined paths generated by the proposed approach. The research team posits that there is promise in expanding the capacity for autonomous and flexible execution of intricate assembly tasks on tangible robotic systems.

Furthermore, the researchers are considering creating a physical robotic system to assemble diverse things. The successful integration of automatic control and planning into the team's system necessitates additional effort, serving as a crucial step towards their overarching objective of developing a fully autonomous assembly line capable of adaptively assembling a wide range of products without human intervention.

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1. <https://arxiv.org/abs/2211.03977>
2. <https://www.industrialautomationindia.in/article/itm/13628/Building-a-Smart-Factory-I:-From-Automation-to-Autonomy%C2%A0%C2%A0-%C2%A0/articles>
3. <https://news.mit.edu/2022/automated-way-assemble-thousands-objects-1207>

#### Gaia-X data space: ARENA2036 to supply parts to Kaiserslautern

In June, PILZ delivered a handling station to ARENA2026, a research campus for the production innovation in Stuttgart. In the coming weeks it will be integrated in the Gaia-X data space at SmartFactory Kaiserslautern (SF-KL). At which time, the station will become part of the Production Level 4-ecosystem. This cooperation represents the first practical outcome of the Memorandum of Understanding between SmartFactory-KL and ARENA2026 signed at the Hannover Messe. Currently, model trucks are being built using shared production at three locations in Kaiserslautern. In this research scenario, customers design and build their truck using a product configurator. The PILZ module is planned to become part of the future production infrastructure in Stuttgart. Production starts in ARENA2026 as soon as the option "yellow cab" is clicked on the truck configurator. The first step is printing the driver's cab in the colour of the PILZ Company (yellow). Next, a robot arm grips and holds it at various angles in front of a quality control camera. An AI algorithm checks for possible defects and clears it for release. Now it is ready for transport to Kaiserslautern, where it is mounted on the model truck. The basis for the cooperation between the locations is a secure data space. In the words of Susanne Kunschert, managing partner at PILZ, "The reason we decided to participate in this project is because the data space ecosystem supports people: It creates the opportunity to try out, test, and demonstrate. As a result, we gain new knowledge about safe automation – entirely in the sense of Manufacturing-X. Data spaces are a valuable foundation for digital collaboration. When linked together, they contain information from a variety of production environments about what services are available." The example application carried out in ARENA-X illustrates the successful combination of different approaches within the data space. "The exchange between the different players as well as the standardization within Gaia-X, Catena-X, and other 'X-initiatives' forms the technical basis required for such innovation. All those who want to participate are welcome to actively try it out with us," said Johannes Diemer of ARENA2026.

# INDUSTRIAL AUTOMATION

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# Wow! Is God

**Utpal Chakraborty elaborates on the significance of the mind in the realm of quantum consciousness.**

Have you ever felt a sudden spark of happiness, a thrilling sensation, a moment of enlightenment that left you speechless? Those moments where something quite ordinary, but suddenly gives a feeling of something extraordinary? That is what we call a 'Wow' moment.

And believe it or not, this simple experience could have profound connections to the way our minds work, how we understand the universe, and even our relationship with what we might call 'God'. Confused? Let's dive in!

## The 'Wow' moments

Imagine watching a breathtaking sunset, hearing a piece of music that resonates with your soul, or even tasting food so delicious that it seems to transport you to another world. These experiences leave us mesmerised, and we often feel a sense of connection to something greater.

Could these 'Wow' moments actually be glimpses into a higher realm of understanding or kind of a transcendent connection with the universe?

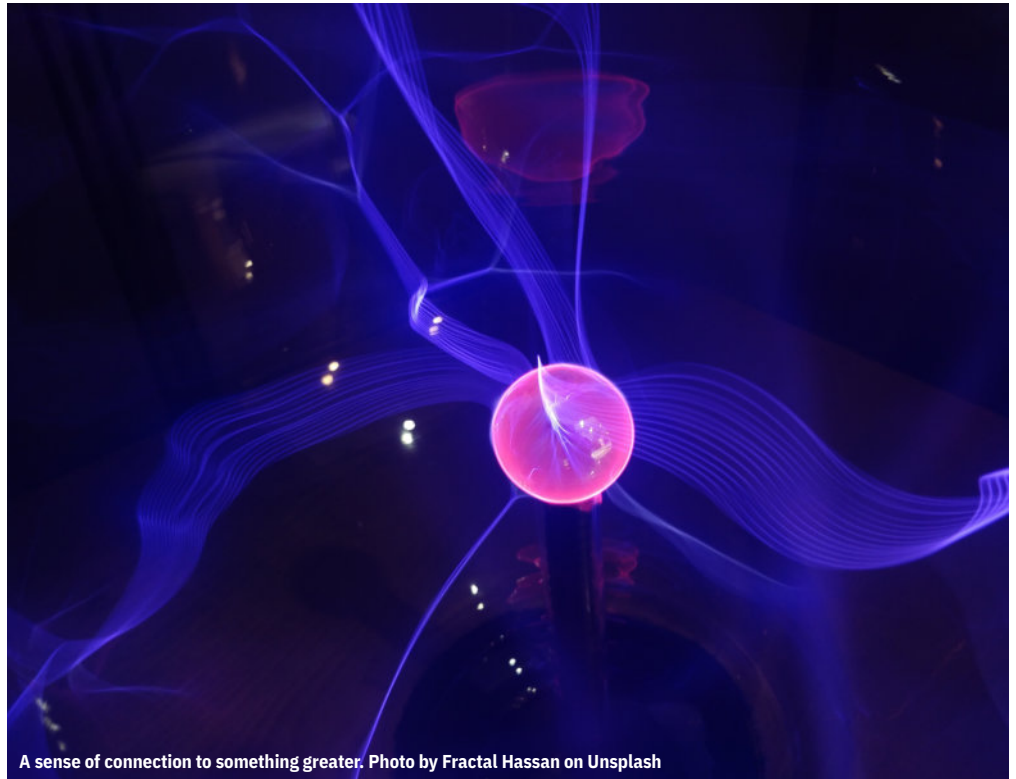
## The mind and brain connection

Our brain is like a highly sophisticated computer called a neurosynaptic computer, but it's our mind that's the real star of the show. It processes thoughts, feelings, and experiences. While our brain deals with physical reality, the mind seems to touch something far beyond.

Some believe that the human mind has an intrinsic connection with a quantum level of consciousness. That's a fancy way of saying our minds might be linked to the fundamental workings of the universe!

## The Quantum connection

Quantum physics is a branch of science that studies the smallest particles in the universe. These particles act in ways that are mysterious and often counterintuitive.



A sense of connection to something greater. Photo by Fractal Hassan on Unsplash

Imagine if our minds, like these tiny particles, were part of a grand cosmic dance. What if the joy and amazement we feel during 'Wow' moments were actually tuning us into this cosmic rhythm? Kind of like finding a secret radio station that only our souls can hear!

Some ancient traditions speak of meditation practices that help to align the body and mind with spiritual energy. This connection, they say, can lead to greater understanding, joy and enlightenment. Just like those 'Wow' moments might be a way to tap into a higher level of consciousness and feel more in tune with the universe.

## The God factor

So where does God come into all this? Whether you think of God in religious terms or as a symbol of the ultimate truth and unity of existence, these 'Wow' moments might just be brief glimpses into the divine.

If our minds are indeed connected to the very fabric of the universe, then experiencing joy, love and awe could be seen as touching the face of God, however you choose to define it.

'Wow is God' is a simple statement, but it encapsulates a profound idea. Our minds and

brains are not just tools for navigating everyday life. They might be keys to unlocking a greater understanding of ourselves and the universe.

So next time you experience a 'Wow' moment, take a second to marvel at the complexity and beauty of what it might mean. You are not just feeling joy; you might be tapping into the very essence of existence.

*(Views expressed above are personal opinions of the author.)*



Utpal Chakraborty, AI & Quantum Scientist, Chief Technology Officer, IntellAI NeoTech, Gartner Ambassador, is Chief Digital Officer at Allied Digital Services Ltd.

A former Head of Artificial Intelligence at YES Bank, he is an eminent AI, Quantum and Data Scientist, AI researcher and Strategist, having 21 years of industry experience, including working as Principal Architect in L&T Infotech, IBM, Capgemini and other MNCs in his past assignments.

## Xelity 10 TX IP67 Managed Switch



With the new Xelity 10 TX IP67, Murrelektronik offers a line of robust, space-saving switches designed for the heavy traffic that comes with today's installations. The ten port switches are available in three models: 10 x 100 Mbit/s, 10 x 1000 Mbit/s, and 2 x 1000 Mbit/s + 8 x 100 Mbit/s. Each model can also be ordered specifically for a ProfiNet system.

Developed in-house, Xelity 10 TX IP67 is Murrelektronik's response to the desire on the part of machine builders to replace classic control cabinet solutions with IP67 components in the field. The growing trend of decentralised wiring offers advantages that include significant space savings in the control cabinet as well as shorter cable runs.

Its L-coded M12 power connectors (4 or 5-pin) ensure fast connections as well as the ability to daisy chain several devices as long as the combined power usage does not exceed 16A. Each model uses the same drilling pattern and power connector connection. There are no specifications for grounding thanks to the free grounding concept. The Xelity 10 TX IP67 can also be combined with Murrelektronik's other M12 power modules to create a single source power concept.

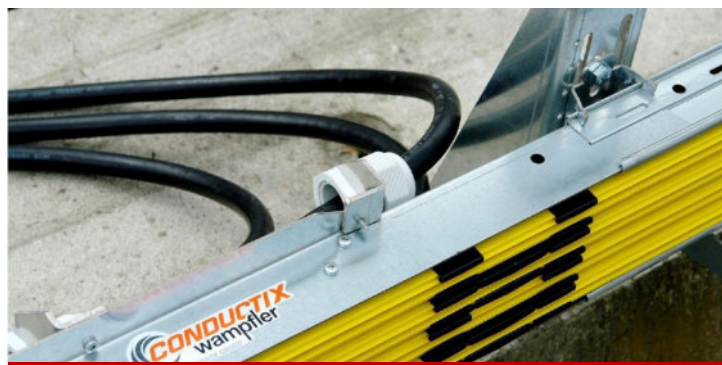
The IP67 rated metal housing allows the switch to be used in harsh industrial environments. Faster and simpler fault detection, full topology flexibility as well as fast scaling and easy commissioning round off the features of this impressive switch.

The range of models and simple installation and configuration make the Xelity 10 TX IP67 extremely versatile. The switch is ideal for machine builders, plant engineers and component manufacturers alike.

Thanks to its various expansion levels, users can easily adapt the Xelity 10 TX IP67 to specific applications. Numerous configuration adjustments, such as port mirroring or port granular shutdown, can be made via the integrated web server. Configurations can also be saved for recurring installations or in the event device replacement is required. High flow rates shorten the clock rates in applications.

**Murrelektronik Pvt Ltd, Bangalore. Tel: +91 80 40936259/41264962.**  
**Email: [info@murrelektronik.in](mailto:info@murrelektronik.in)**

## Smart Installation System for Warehouses, ProShell



ProShell from Conductix-Wampfler is a smart installation system for conductor rails that offers generous suspension spacing for high-bay warehouses and protects the conductor rail system. Ideal for AS/RS systems and horizontal movement of stacker cranes, it is designed for maximum standardisation and flexible installation of the proven and reliable conductor rail systems 0831 MultiLine or 0812 SinglePowerLine optional quick-mount barcode integration is available. Covers 32 A to 400 A in a single design with scalable performance while maintaining cost control through right sizing! ProShell is available in two sizes: up to 5 poles, and up to 8 poles.

Intralogistics systems are a vital part of operations, with growing importance in today's competition – Conductix-Wampfler offers tailor-made solutions for energy and data management, having extensive knowledge of the market's requirements and trends, including decades of experience with most leading OEMs, system integrators and end-users. Automated warehouses for electronic commerce, retail, food & beverage, fast moving consumer goods, micro-fulfilment, healthcare, electronics, fashion, and other industries are no more at the fringes of the value chain, but at its' heart, guaranteeing quick fulfilment of customer orders. Receiving and storing, space efficient high-bay storage, order picking, dispatching, and shipping, they all require a costeffective, powerful, sustainable, scalable, and flexible mix of technologies:

- i. Automated Storage & Retrieval Systems
- ii. Shuttles
- iii. Electric Monorail Systems
- iv. Sorters
- v. Automated Guided Vehicles
- vi. Autonomous Mobile Robots
- vii. Rail Guided Vehicles
- viii. Pallet Wrappers
- ix. Extendable Conveyors, and
- x. Very Narrow Aisle Forklift Trucks.

Conductix-Wampfler has extensive experience working with intralogistics system OEMs worldwide. From our large product portfolio, we can recommend the optimum solution for individual applications across many different industries without bias towards single technology.

**Conductix-Wampfler India Pvt Ltd, Pune. Cell: +91 91580 01575.**  
**Email: [info.in@conductix.com](mailto:info.in@conductix.com)**



## Edge AI Inference Computer



Neosys Technology, an industry-leading provider of rugged embedded systems, has announced its latest edge AI inference computer, Nuvo-9166GC. By supporting Intel® 13th/12th-Gen processors and an NVIDIA® L4, the

platform delivers excellent CPU

computation prowess and AI inference capabilities. And thanks to its flexible camera connectivity, Nuvo-9166GC is ideal for multi-camera applications requiring real-time responses, such as industrial AI inspection, robotic guidance, and advanced autonomous machines. In response to the growing demand of smart manufacturing and smart cities, Neosys strives to revolutionise edge computing by collaborating with Intel® and NVIDIA®. By supporting an Intel® Core™ CPU up to 24 cores/32 threads, Nuvo-9166GC provides up to nearly twice the CPU computing performance compared to 11th/10th Gen Platforms. The system also supports NVIDIA® L4, a data centre grade GPU powered by NVIDIA® Ada Lovelace architecture for energy-efficient AI acceleration applications. It offers up to 30.3 TFLOPS in FP32 or 485 TOPS in INT8 to set new benchmarks for industrial edge AI computing.

**Dynalog India Limited, Mumbai. Tel: +91 22-42330000.**

**Email: sales@dynalogindia.com**

## Aluminium Clevis Forks



WDS Components Ltd, has released a range of aluminium clevis forks. The fork attachments create a strong linkage for applications that need a lightweight design. The black anodised forks are easily installed to any

rod connection and are available in diameters ranging between M4 and M12. The new aluminium range extends WDS' existing line of heavy-duty steel clevis forks. The new aluminium clevis forks have been launched following demand from WDS customers for a more lightweight version of the brand's existing heavy-duty range. The aluminium design makes the clevis forks suitable linkages for aviation and automotive applications, and the aluminium construction also saves significant weight for OEM machine builds. Significant weight saving can be made, especially when larger thread sizes, such as M12 diameters, are required. The lightweight linkage is also ideal to optimise go-cart design and build, as well as other hobbyist applications. The steel range includes robust zinc-plated designs.

**WDS Components, UK. Tel: +44 (0)333 043 5443.**

**Email: sales@wdscomponents.com**

## Raman Rxn5 Process Analyser



The Raman Rxn5 process analyser is an industry-leading, turn-key, laser-based analyser powered by Kaiser Raman technology. It provides quantitative chemical composition measurements using Raman spectroscopy. The design of the Raman Rxn5 incorporates customer requirements for serviceability and hazard-area certification, provides a compact footprint, and minimises utilities consumption. The high optical efficiency of the analyser makes it ideal for typical gas-phase sample measurements.

### Process measurement

**points:** Steam methane reformers; Gasifiers (coal, petcoke, waste, biomass);

Shift converters; Hydrotreaters; Hydrocrackers; CO<sub>2</sub> removal; and Finished product synthesis loops.

**Typical industries:** Hydrogen production/purity, HyCO, Hydrogen recycle; Methanol production; Ammonia production; Gas turbine fuel feed; Synthetic natural gas/IGCC power plants; and LNG baseload customer transfer, LNG rundown to storage tanks, LNG mixed refrigerant optimisation.

**Benefits:** Non-destructive analysis of gases, including homonuclear diatomics (H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>) Compact, smaller than most wall-mount GCs; Can replace up to four traditional analysers with a single base unit and four probes; Rugged with minimal utility requirements, no sample transport, and no consumables (columns, valves, gases, pumps); Minimal analyser technician time with maximum technician safety (no toxic gases are transported to the analyser); Measures four streams simultaneously for fastest multi-channel results; and -20°C to + 50°C operating environment.

**Brief specifications:** Measuring principle – Raman spectroscopy; Laser wavelength – 532 nm; Spectral coverage – 150-3425 cm<sup>-1</sup> (532 nm); Spectral resolution – 5 cm<sup>-1</sup> (532 nm); Channels – Up to four channels; Unit dimensions – 457 (W) x 834 (H) x 254 (D) mm; Weight – 612 kg; and Hazardous area certifications – ATEX, CSA, IECEx.

**Endress+Hauser (India) Pvt Ltd. Email: Poonam.poladia@endress.com marcomm.in.sc@endress.com**

## High-Voltage Servo Motors, Goldline



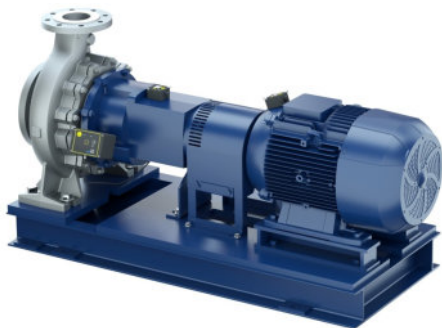
Kollmorgen, a global leader in motion control systems, has announced ATEX certification and IECEx/cETLus listing for the explosion proof Goldline EBH 480 Vac servo motor. These new explosion proof approvals for the high-voltage Goldline EBH servo

motor exemplify Kollmorgen's commitment to advancing the state of the art in motion control and meeting the most demanding application requirements. The high-voltage Goldline EBH servo motor joins a broad selection of Kollmorgen explosion proof motors certified and listed according to UL, ATEX, IECEx and/or CSA standards. Explosion proof motors are required in hazardous locations where flammable gases, mists or vapors may exist in explosive or ignitable concentrations. Such environments are often found in mines, oil & gas refineries, textile mills and industrial paint booths. For high-voltage applications in hazardous locations, Goldline EBH servo motors offer speeds up to 7,500 rpm with exceptionally high torque density for maximum performance in a minimal installation footprint.

**Kollmorgen India, Mumbai. Tel: 022-42270300.**

**Email: snehal.ambre@kollmorgen.com**

## Chemical Pump Series



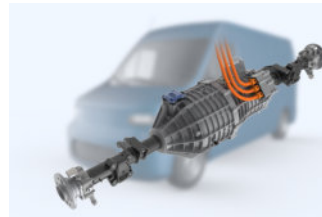
KSB has expanded its MegaCPK type chemical pump series by adding 19 sizes to its MegaCPK type series for its users. The pump users can now choose from 55 sizes with more than

78 hydraulic systems for these standardised chemical pumps. The available materials of grey cast iron, nodular cast iron and cast steel, stainless steel as well as duplex and special alloys, such as titanium and Hastelloy, result in a very wide range of applications. Fluids that require heating or cooling can also be handled. The pumps are characterised primarily by their high output per size and their low energy consumption. It not only saves electricity consumption but also reduces the user's initial investment costs. The developers have placed emphasis on good suction behaviour with a low NPSH value to minimise the risk of cavitation. This enables smooth and stable pump operation even under difficult operating conditions and ensures a high degree of reliability.

**KSB Pumps Ltd, Pune. Tel: 020-27101000/202.**

**Email: marketing.mil@ksb.com**

## Electrified Axle Solution

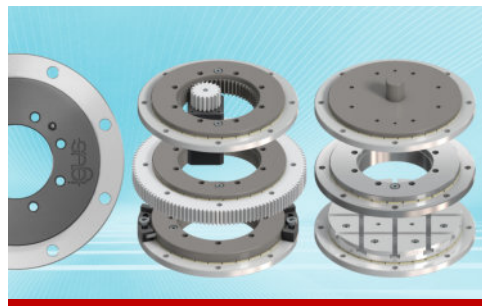


Hofer Powertrain, a technology and engineering partner and provider of innovative powertrain solutions, has announced the latest addition to its ULTEVATE portfolio – the ULTeBEAM electrified axle. Designed to push the electrification of Light Commercial

Vehicles, the ULTeBEAM enables vehicle manufacturers to seamlessly convert their existing internal combustion engine (ICE) powered trucks, vans, and other types of light- and medium-weight vehicles into battery-electric vehicles. The ULTeBEAM's modular architecture supports both 400V and 800V configurations, offering maximum flexibility for original equipment manufacturers (OEMs) and pickup truck customers. This innovative electrified axle solution consists of a transmission and an e-motor connected to an external inverter, ensuring enhanced safety and performance. Hofer powertrain offers engineering, design, and integration of such cutting-edge solutions, specifically tailoring them to unique customer requirements. Through close collaboration and adaptation, Hofer powertrain is dedicated to ensuring optimal outcomes. As the commercial vehicle market grows, there is an increasing demand for electrified and low-carbon solutions.

**Hofer Powertrain, Germany. Email: info@hofer.de**

## Slewing Ring Range, 16 mm



They are compact and lightweight and show how things are done. They have been developed specifically for movement in tight spaces and give igus an entire PRT-04 modular system. The

lubrication-free slewing ring bearing system comes in eight sizes. They feature outer tooth drive and angle stop (optional), and now also inner drive teeth and a locking function. This allows the design engineer to find the product needed for applications with very little installation space. igus slewing ring bearings rotate assembly units, control panels and indexing tables, even at high speeds. In order for them to turn whilst remaining maintenance-free, igus uses sliding elements that work radially and axially between the bearing's inner and outer races. The slides made of the high-performance polymer iglidur J ensure that friction and wear are minimised, without lubrication. Introduced as a new product in 2019, igus is now launching an entire modular system for its PRT-04 compact slewing ring bearing range.

**igus (India) Private Limited, Bangalore. Tel: 080-45127827.**

**Email: sgeorge@igus.in**



## dataFEED OPC Suite with Enhancement



Version 5.30 of dataFEED OPC Suite from Softing Industrial offers two new features: an OPC UA tunnel to increase security for OPC Classic communication plus support for InfluxDB databases. The dataFEED OPC UA Tunnel is a new

component of Softing Industrial's dataFEED OPC Suite. It enables easy and secure access to OPC Classic servers across network boundaries and firewalls. A DCOM configuration is no longer required. Configuration of the two tunnel ends is quick and easy using Export/Import. The security mechanisms of the OPC UA standard, which include authentication of users by means of certificates as well as signing and encryption of data, ensure maximum protection. The suite currently supports up to 50 OPC UA tunnel connections. Process data storage in Influx DB databases: With version 5.30 dataFEED OPC Suite offers the possibility to store process data in an InfluxDB for subsequent processing and analysis.

**Softing Industrial Automation GmbH. Mobile: 91-9886137102.**  
Email: KJG@softing.com

## TL50 Andon Tower Light



Industrial automation manufacturer, Banner Engineering, has introduced the TL50 Andon Tower Light, designed to enhance and improve industrial workstations. Andon lights are crucial for maintaining productivity and reducing downtime. Often used to provide workstation status in call-for-parts and part-picking applications, the Andon can be

used to signal changes in status so others can quickly respond to and identify issues. The TL50 Andon Tower light is locally operated to give operators complete control. Unlike other color-lensed tower lights, the TL50 Andon's translucent grey segments show no color when off, eliminating false indication from ambient light. An omnidirectional audible alarm is available to alert workers to various conditions. Pre-assembled to a control box for easy-to-see status, these three- or four-segment tower lights are rugged, easy to install, and simple to operate. The control box uses status LEDs to mimic the tower light status color and animation. The TL50 Andon comes with three options.

**Banner Engineering India Pvt Ltd, Pune. Tel: 020-66405624.**  
Email: info@bannerengineering.com

## Line Monitoring Relays, SIRIUS 3UG5



Siemens has launched a new generation of line monitoring relays. The SIRIUS 3UG5 line monitoring relays combine proven technology with new functions and applications. The relays are the easiest way to

monitor standards-compliant grid stability and quality, ensuring proper system operation and a long service life of components such as motors or compressors. Grid monitoring relays are used in critical areas such as hospitals or the process industry, which require a high-quality, fail-safe supply of power. Other areas of application include cranes, elevators, air, and air-conditioning compressors, as well as the timber industry. The new SIRIUS 3UG5 line monitoring relays provide maximum protection for mobile machinery and equipment or in the event of unstable grids. This ensures that grid and voltage faults can be detected and reported at an early stage before major subsequent damage occurs. Creeping changes that indicate a need for maintenance, for example, are recorded as well.

**Siemens Ltd, Industry Sales, Mumbai. Tel: 022- 39677000.**  
Email: Krishnamurthy@siemens.com

## Motion Control Platform, Automation1



Aerotech Inc., a global leader in precision motion control and automation, makes the Automation1 motion control platform more powerful and user friendly with every release. Version 2.5 brings a TCP socket interface

(beta), Automation1 MachineApps HMI developments, new motor setup helper modules, Machine Setup improvements for galvo laser scan heads and more. Recent developments in the Automation1 motion control platform include: the TCP socket interface (beta) that allows users to communicate between the Automation1 controller and other devices over TCP; Access Control feature now allows users to customise access to specific MachineApps, making it easy for developers to create different MachineApps and limit access to specific HMI screens based on users or groups; the Motor Hall and Signal Status module helps users visually verify proper hall sensor operation; and users can now change galvo calibration and galvo power correction files without resetting the controller. Support for higher-derivative feedforward control was added with snap feedforward.

**Aerotech India, Bangalore. Mobile: +91-9008307575.**  
Email: jbala@aerotech.com

## One-Box Tester, R&S CMX500



Rohde & Schwarz is first to submit 5G Next Generation eCall (NGeCall) protocol test cases to the 3GPP Global Certification Forum (GCF). The company is also launching a new 5G NGeCall application option that simulates the public safety answering point (PSAP) functions required for the end-to-end conformance tests that verify the interoperability of the equipment under

test for the complete communication exchange. Both additions to the Rohde & Schwarz eCall portfolio now support early testing of new 5G Next Generation eCall systems with the R&S CMX500 one-box tester, contributing to a timely introduction of 5G NGeCall. eCall was introduced in 2015 and has been a mandatory requirement for all new cars in the EU since 2018. eCall systems currently make use of 2G/3G circuit-switched cellular networks. As these networks will be phased out in just a few years, emergency call systems will be adapted to the newest 4G/5G packet-switched cellular networks.

**Rohde & Schwarz India, Bangalore. Tel: 080-41780400.**  
**Email: [services.rsindia@rohde-schwarz.com](mailto:services.rsindia@rohde-schwarz.com)**

## Fieldbus Gateway, New SD



The Schmersal Group has launched a new version of the SD Gateway for its SD bus. Users will be able to take advantage of the improved fault diagnostics offered by the new SDG Fieldbus Gateway. This in turn will help to increase machine and plant

productivity by minimising downtime and simplifying commissioning and maintenance. The device is also user friendly and easy to install. Electronic safety sensors and interlocks with SD interface can transmit comprehensive status and diagnostic data to a higher-level machine control system. Data from the serially connected switchgear is sent via the SD bus to the SDG fieldbus gateway and then passed on via the fieldbus to the machine control unit – enabling the forwarding of error messages such as overtemperature warnings, faulty actuator warnings and invalid actuator combination messages. The diagnostic information is transmitted separately from safety signals. Warning notifications enable controlled process shutdown and targeted maintenance so as to prevent process interruptions.

**Schmersal India Pvt Ltd, Pune. Tel: 02138-614700.**  
**Email: [info-in@schmersal.com](mailto:info-in@schmersal.com)**

## Diagnostic Industrial Switches



InduSol provides condition monitoring and network diagnosis with intelligent industrial switches. PROMesh represents the first product series of high-performance 'diagnostic industrial switches'. For the

first time, the symbiosis of network performance, diagnostics and monitoring unites the demands of modern electro-construction and effective, predictive maintenance of automation and industrial plants. Discover the advantages of PROMesh: integrated network monitoring functions with notification; keep an eye on the status of your system or network section - seamlessly, traceable at all times; integrated diagnostic functions; localise fault sources – without additional measuring devices or loss of time due to manual measuring efforts; performance-oriented industrial switch technology; ready for future-oriented requirements for the increasing data volume in ever more complex machine/hall networks; integrated web interface; and enjoy full access to monitoring and diagnostic data – even without additional software. The company provides system planners, installers, maintainers, and engineers peace of mind.

**VIPA Automation India Pvt Ltd, Bangalore. Tel: 9845203047.**  
**Email: [sales@vipaindia.com](mailto:sales@vipaindia.com)**

## Radar Sensor, VEGAPULS 42



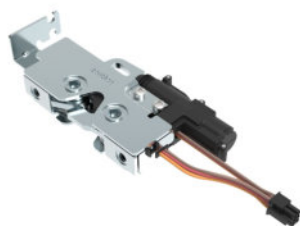
With VEGAPULS 42, VEGA brings its extensive experience with radar measurement technology to factory automation. Equipped with IO-Link and versatile hygienic adapters, the new level sensor meets the key requirements of modern industry: to perform complex measuring tasks

faster, be simple to use and more cost-effective. VEGA has launched a new radar level sensor especially for highly automated processes with stringent demands on hygiene and capable of following fast level changes. By introducing VEGAPULS 42, the instrumentation specialist completes its IO-Link portfolio, which now offers a range of solutions for level measurement, point level and pressure. Since the various automation technologies in many factory environments are increasingly converging, VEGA's IO-Link portfolio is now able to offer optimal solutions for applications that extend beyond the boundaries of primary processes. This means that VEGAPULS 42 is designed specifically for medium measuring distances of up to 15 metres and temperatures of up to max 150°C.

**VEGA India Level and Pressure Measurement Pvt Ltd, Pune.**  
**Tel: 020-67314000. Email: [info.in@vega.com](mailto:info.in@vega.com)**



## Rotary Latches, R4-25



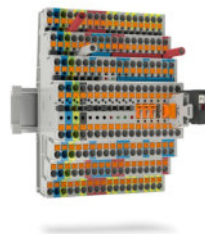
Southco continues to expand its rotary latch portfolio with new versions that can enable electronic actuation and provide an electronic door status signal. These new products offer increased security and access control in rugged environments. A symmetric design allows the same product to be used either in right and left hand positions, simplifying integration and inventory

management. Southco's new R4-25 products are a response to customer requests for electronic control and monitoring in demanding applications. A 12 volt actuator can actuate the latch with a signal from the customer's control system or a Southco controller. The R4-25 pairs well with Southco's Bluetooth™ controller for wireless operation. An integrated sensor communicates when the door striker is present to indicate that the door is closed. The R4-25 latches feature a symmetric design that enables them to be used in either right and left hand positions. This reduces stock requirements, speeds assembly, and improves inventory management.

**Southco India, Ranjangaon – Pune. Tel: 02138-670558.**

**Email: info@southco.com**

## Terminal Blocks with Accessories



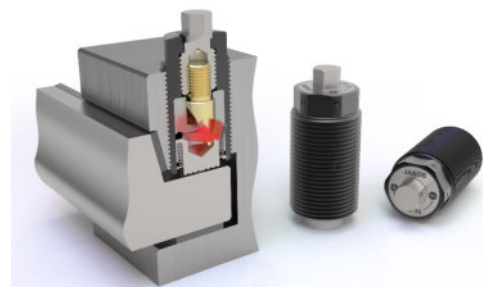
Phoenix Contact offers a particularly compact terminal block family with the new PT 2,5-4L... four-level terminal blocks. The front connection and the four levels enable wiring in a confined space. They are just 5.2 mm wide and feature a Push-in connection. The new terminal blocks therefore use the uniform system accessories of Cliqueline to complete and

reduce logistics costs. The new product family consists of several four-level terminal blocks with Push-in Technology. In addition to feed-through versions, these also include function versions such as disconnect and knife-disconnect terminal blocks or sensor/actuator versions with and without LED indicator. The four-level terminal blocks have a function shaft on each level. This function shaft enables both vertical and horizontal potential distribution, thus achieving a high degree of flexibility. Furthermore, the function shaft is suitable for accommodating various test accessories so that the individual terminal points can be tested quickly and easily.

**PHOENIX CONTACT (I) Pvt Ltd, New Delhi. Tel: 011-30262800.**

**Email: in-info@phoenixcontact.com**

## Power Clamping Screw, SC 2023



Jakob-Gruppe offers Power Clamping Screw, SC 2023, with 130 Nm of tightening torque that generates 25 tonnes of clamping force.

The optimised power clamping screw SC from JAKOB Antriebstechnik is used in a variety of ways. It has proven itself among others in presses, stamping, and machine tools as well as in fixture construction and equipment design. There are 4 standardised series of different sizes and graduated thread diameters available, as well as a special series with particularly high clamping forces. The power clamping screw SC contains a special inner working, which acts as a mechanical power amplifier. This results in particularly high clamping forces at comparatively low torques and the greatest possible operational reliability. The self-locking wedge clamping system in every position offers a clamping stroke of up to 3 mm. In addition to the proven sizes of M36, M48, M64 and M80, JAKOB also offers a special version SC 100.

**Jakob-Gruppe, Germany. Tel: +49 (6022) 22080.**

**Email: info@jakobantriebstechnik.de**

## Flow Meters



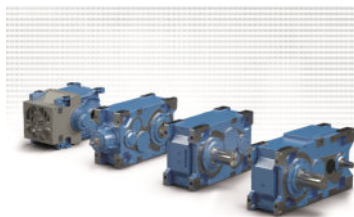
BROIL is one of the leading manufacturers of Flow Meters. The range comprises mainly of oval gear flow meters and sensors for fuel and high viscous liquids; turbine flow sensors and meters for low viscous liquids; helical rotor plastic and metal digital flow meters and sensors; electromagnetic flow meters for waste and clean water; vortex flow meters for steam, gas and

liquids; digital pressure gauges, process control instruments, software and related accessories. Established in 2006 in India based at Mehsana in Gujarat, the company has its own technical team for R&D and software development. BROIL provides help to customers for identifying application areas, solving the problems with quick services through QC and marketing departments as well as attending customer complaints on time. The company is professionally managed with experienced technologists and a dedicated team of dynamic technocrats and experienced staff in the field and management is continually striving for better products and services.

**BROIL Sensotek Industries, New Delhi. Cell: 91-9654107153.**

**Email: info@broiltech.com, vipul@broiltech.com**

## Drives for Crane Applications



Crane tasks require special drives: Loads must be safely lifted, precisely positioned and gently set down, also with simultaneous movements of cranes and trolleys. NORD Drivesystems has the right drive solutions for this. For all types of cranes and load ranges –

whether building, bridge or floating cranes, NORD offers perfectly matched drive components from a single source: gear units, industrial gear units, electric motors and drive electronics. The flexible NORD modular system allows for the configuration of the optimum drive solution for various requirements of crane applications. All of them allow for energy efficiency and precise positioning, and are easy to service and maintain. Particularly for lifting gear applications in cranes, NORD also developed the MAXXDRIVE® XD series. Thanks to the extended centre distance of the gear unit, the economic and tailor-made dimensioning of lift drives for crane applications is further improved. The installation space is used optimally, reducing weight of the drive by up to 60 percent.

**NORD DRIVESYSTEMS Private Limited, Pune. Tel: 020-39801217.**

**Email: india@nord.com**

## Linear Direct Axes, SLD Series



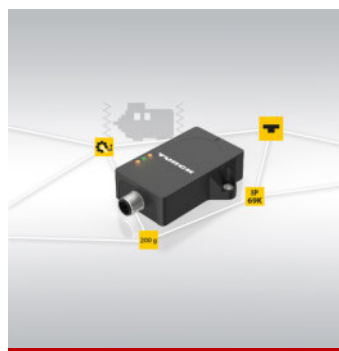
SCHUNK is introducing a new generation of linear direct axes with the SLD series. The dynamic, heavy-duty axes with electric linear direct drive ensure short cycle

times and more productivity in high-speed assembly and handling processes for the electronics manufacturing, e-mobility or life science sectors. The SLD series was developed as a dynamic all-rounder that can meet the requirements for higher basic load ratings and a longer service life. At the same time, SCHUNK the automation expert is expanding its portfolio of linear direct axes with this series, and due to its modular design also enables an attractive price/performance ratio. For a wide range of applications, two sizes are currently available that have four different motor sizes each and that provide driving forces up to a maximum of 2,4 kN and load ratings of up to 106 kN. Additional versions will follow.

**SCHUNK Intec India Private Ltd, Bangalore. Tel: 080-40538999.**

**Email: info@in.schunk.com**

## Combined Vibration/Temperature Sensor with IO-Link



Turck has expanded its product portfolio with the CMVT, a robust vibration sensor with integrated temperature measurement for condition monitoring applications. Vibration and temperature are the key characteristic values for detecting machine faults early on, such as those caused by the imbalance of rotating parts. The CMVT detects vibration on three axes and evaluates them

internally. It outputs a warning signal directly if the set limit values are exceeded – either via IO-Link or as a switching signal. The switching output is particularly suited for setting up retrofit and standalone applications since it can be used directly as a trigger for an indicator light – without the need for integration in existing control systems. Commissioning the sensor is easy thanks to the Turck Vibration Monitor. The tool visualises the vibration and temperature data live in any web browser and can be used easily via any Turck IO-Link master – without any additional software required.

**TURCK India Automation Pvt Ltd, Pune. Email: india@turck.com**

## Electric Rope Hoist



ZASCHE handling, a leading provider for load handling technology, presents its new range of rope hoists, the ZASCHE-Rope Hoist Electric (Z-RE). Designed for safety, reliability, and performance, the Z-RE enables operators to position loads with great sensitivity, offering assistance with complex assembly tasks. Available in four load capacities (60kg, 80kg,

100kg, and 250kg), the Z-RE has a lifting height of 2,000mm and a lifting speed of up to 24m/min. Unlike traditional chain hoists, Z-RE can be seamlessly integrated with articulated arms and lifting axes or fitted onto rail systems. Its plug-and-play functionality eliminates the need for a high voltage supply. The Z-RE is a powerful and versatile rope hoist that is ideal for a variety of lifting applications. Featuring a quick-change coupling on the hook, it allows for swift load adjustments and offers stepless speed control, enabling precise load handling, as well as swift lifting and lowering movements for enhanced efficiency. Its infinitely variable up/down function provides end-users with precise control for handling loads.

**ZASCHE Handling, Germany. Tel: +49(0)9081/8017-0.**

**Email: info@zasche.de**



## Engine for Heavy-Duty Operations



FPT Industrial has recently reinforced its C16 engine to suit the needs of 4WD tractors. This new 16-ltr C16 TST top-of-the-range engine, with market leading compactness and power to weight ratio, features proven Cursor

engine reliability with robust and lean design and EGR-free combustion, and has been extensively tested for more than 20,000 hours both on the bench and in the field. To guarantee increased performance required by the new Steiger 715 tractor, the C16 TST has been reinforced in a number of aspects. The EGR-free combustion chamber was improved to allow for an increased maximum pressure up to 220 bar; intermediate cooling together with high torque availability ensures fast load response; while the 2nd generation Common Rail injection system, operating at up to 2,500 bar ensures high engine efficiency and low fluid consumption. Last but not least, a maintenance-free aftertreatment system without DPF, as well as 600 h oil service intervals, help keep the machine's operating costs down.

**FPT Industrial. Email: [press@fptindustrial.com](mailto:press@fptindustrial.com)**

## Megawatt Charging System (MCS)



As more EVs hit the road in long-distance and heavy-duty applications, charging these larger capacity batteries within a reasonable time has been a significant challenge. To overcome this obstacle, the global association Charging Interface Initiative e.V. (CharIN) has been working with industry leaders, including Stäubli, on developing the Megawatt Charging System (MCS) standard, to promote interoperability as the global standard for

charging commercial vehicles of all kinds. Stäubli's MCS has been designed as per the CharIN task force specifications, with a strong focus on durability and ease of use. The use of a liquid cooled cable enables faster charging times and greater flexibility, making it a crucial element in sustainable transportation. Delivering up to 4.5 MW of charging power, with a rated current of up to 3000 A and 1500 V, the Stäubli MCS effectively eliminates the challenges associated with commercial vehicle charging. The Stäubli MCS connector can be used to charge a wide variety of heavy-duty vehicles.

**Stäubli Electrical Connectors AG, Germany.**

**Email: [ec.marcom@staubli.com](mailto:ec.marcom@staubli.com)**

## Solution for Connecting Multi-Port Valve Blocks



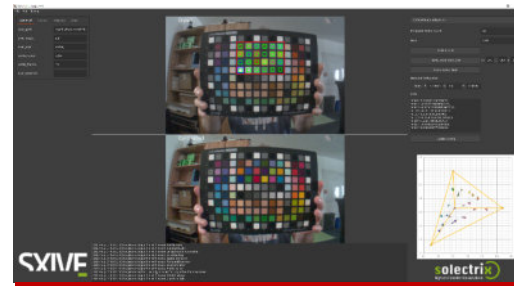
The first solution means that it is now possible to control the pneumatic locking of the valve block via locking cylinders thanks to a valve block sunk into the skid surface. The second solution consists of using a valve block placed onto the skid surface,

where the valve body is manually connected to the actuator unit via a detachable hand lever. This second type offers greater flexibility for the spigot layout. The connection between the actuator and the diaphragms welded onto the valve block is created reliably within a few seconds using the familiar clamping principle of the GEMÜ SU40 SUMONDO. The blocks themselves are produced by machining and can therefore be tailored to each specific application. There are several benefits to using single-use technology: Eliminating the need for conventional cleaning cycles and the associated costs for power, cleaning media, waste disposal and peripherals while increasing protection against cross contamination between different manufacturing drives.

**GEMÜ Gebr. Müller Apparatebau GmbH & Co KG, Germany.**

**Email: [info@gemue.de](mailto:info@gemue.de)**

## Calibration of Image Sensors



Solectrix GmbH, an established innovator in the embedded electronics field, has announced the expansion of its highly acclaimed SXIVE Rapid

Imaging Prototyping System with the introduction of the new SXIVE Calibration SDK. This powerful software-based solution empowers customers to calibrate their image-based systems effortlessly, while also ensuring seamless compatibility with a large number of image sensors. Key features include: correction of the incoming image regarding color, lense distortion and lense shading to produce a flawless picture; and streamlines the calibration process, making it intuitive and accessible to users of all levels of expertise. With the SDK's user-friendly interface, calibration becomes a one-click operation, eliminating the complexities typically associated with image reconstruction and calibration and enabling users to save valuable time and resources. Scheduled for release in early 2024, the SXIVE Calibration SDK is a cutting-edge tool that simplifies complex tasks and unlocks the full potential of your imaging system.

**solectrix GmbH, Germany. Email: [info@solectrix.de](mailto:info@solectrix.de)**

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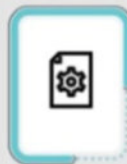
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Start



Closure

**Stage - II**  
**Full Technical Paper  
Submission**



**Full Technical Paper**

Submission



Presentation

**Stage - III**  
**Project  
Demonstration**



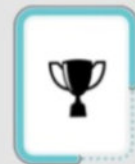
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