

By Nisha Shukla

ENSURING A SENSE OF SECURITY

The advent of Industry 4.0 technologies and the gradual digitisation of manufacturing processes has explicitly exposed the industry to cybersecurity challenges. In an interview, **Mahesh Wagle, Co-Founder & CEO of Cybernetik**, talks about why automated manufacturing facilities should prioritise cybersecurity and how they can avert the threats caused by it. He also spoke about the consequence of digital twin and lights-out factories on the Indian manufacturing sector, new technologies and innovations launched by his company and other plans.

Tell us about the new trends shaping the food, agro, pharmaceutical, chemical, and other manufacturing industries.

Manufacturing will be more data-driven than ever before. It will shift from automation to autonomy as Industry 4.0 technologies such as artificial intelligence (AI), machine learning (ML), virtual reality (VR), industrial internet of things (IIoT), predictive data analytics, augmented reality (AR), and others will become more sophisticated. The data-driven model will not improve production operations but also the supply chain, enhancing resource usage and associated efficiencies.

What, according to you, are the cybersecurity challenges faced by the manufacturing industry? How can these be tackled?

Prior to the advancement of technology, manufacturing businesses were only connected within the network of a single organisation, with restricted internet access, making it difficult to communicate with other organisations or individuals in general. However, technology has evolved, and the archaic ways of communicating within the manufacturing industry are obsolete. Threat actors can access a system undetected, move laterally, mine information, and exit before anyone notices they were there.

Phishing attacks are highly widespread in the manufacturing industry, and it is one of the areas that receive the most phishing attacks each year. IBM released a report detailing how ransomware and other vulnerabilities disrupted supply chains, with manufacturing being the top targeted industry. Another challenge is Supply chain attacks. There are three types of supply chain attacks: Software, Firmware, and Hardware attacks.

The failure to change default passwords, disable security measures, and lack of firewalls give access



Mahesh Wagle

opportunities for threat actors. Simply removing passwords and user controls that encourage the use of poor security settings can help keep manufacturing organisations safe and prevent the deployment of vulnerabilities.

New products and services are integrated into the manufacturing process as a part of automation, thereby exposing it to vulnerabilities. How can they be safeguarded?

Automation, for the sake of it, is counterproductive. What's required, is customised automation that addresses the issues specific to a set-up. This should be the guiding principle when opting for automation. Implementing this principle requires establishing the process and operational sequence for Greenfield projects. For introducing automation in existing systems, the process needs to be stabilised.

A detailed feasibility study is essential to evaluate



whether full automation is possible or if semi-automation is more appropriate. Often, it is the nature of the process and the product that heavily influence the level of automation.

Handshake is the number one concern when introducing equipment in an existing set up for automating it. It is not only the capacities of the newly introduced equipment must match those of its upstream and downstream machines, but also important technical specifications must match for a seamless transition.

The Human-Machine Interface (HMI) of automated systems are normally user-friendly. Besides, the automation providers will usually train the plant personnel and may even be involved with handholding. Nevertheless, operating these sophisticated systems requires trained and skilled operators.

Automation systems need specialist personnel to conduct repairs in case of unscheduled downtimes. Plant owners will do well to negotiate the appropriate service package with the automation provider so that the response to breakdown visits is rapid. This will also ensure that specialised spares and consumables are immediately available to resume production at the earliest.

Can a lights-out factory be a reality for the Indian manufacturing sector?

In a method like “lights out manufacturing,” fully automated technology is employed to manage a production plant with little-to-no human involvement. To enable this, a variety of technologies including machine learning and high-frequency data collecting are required. Consequently, workplace accidents, maintenance costs, and labour expenditures would be reduced significantly. While having a system where machines could be turned on and left about is the essence of manufacturers’ dreams, it also has its share of drawbacks. Initially implementing completely automated processes can be a massive technological challenge that may involve

considerable financial investment. Second, it may be more difficult to adopt automation or perceive a sufficient benefit for more complex jobs as well as smaller production runs and operations. Furthermore, no matter how much a process may be automated, human intervention will still be essential if something goes wrong in a manufacturing setting and damages raw materials, physical property, machinery, or equipment. However, these problems can be avoided with remote monitoring and automatic machine failure detection. Lights-out factories must perform

scheduled preventive maintenance.

How is the digital twin transforming the manufacturing industry? Elaborate with a case study.

The digital twin is now attainable due to the digitisation of production processes. It aids the discovery of physical flaws earlier, anticipates outcomes more precisely, and creates better products by offering a full digital twin of systems. An oxygen tank on board the Apollo-13 spacecraft exploded, seriously injuring three astronauts on 13th April 1970. NASA mission controllers tinkered with the 15 training simulators and, despite the zero margins for error, quickly came up with fool-proof procedures that brought back all three astronauts safely to earth. Moving forward, Deloitte used digital twins to reduce changeover time for their industrial clients by 20 per cent. Using digital twins, Boeing increased first-time part quality by 40 per cent. GE’s digital wind farm claims to increase power output by up to 20 per cent, allowing a single wind turbine to generate an additional \$100 million throughout its lifespan.

Digital twins first caught the mainstream in 2017 when technology consulting research firm Gartner, Inc. named it among the top ten trends for strategic technology. The firm repeated a similar rating in 2018. This explains why the global market for digital twins is predicted to jump from \$3.1 billion in 2020 to \$48.2 billion by 2026. Today, Power Generation Device operators can better schedule maintenance operations for locomotive engines, jet engines, and turbines. Manufacturing Operations churn out improved products because all stages from design to manufacturing are streamlined. Town Planning makes use of real-time, 3- or even 4- D spatial information as well as augmented reality. Health Services employ digital twins to virtually model patients to track health parameter data and analyse the same. This transformation is possible because of the digital twin.

How do you ensure a smooth and error-free assembling of EV battery packs? Kindly elaborate on the entire process of automated assembling.

Customisation, traceability, virtual commissioning, precision systems, pre-set operational sequence, testing, and error code system are the tools for smooth and error-free assembling of EV battery packs.

By customising the assembly line for the specific EV battery pack, we ensure overall compatibility and establish the correct operational sequence. Virtual commissioning and digital twins allow design validation before manufacturing begins. Any possible design errors are nipped in the bud. SCADA and Automated Bar Code Scanners are important for traceability via which similar cells are batched into modules. Traceability helps point the source of an issue during the manufacturing process and is important for safety as well.

Precision Systems include sensors, vision systems, transducers, fixtures, XYX gantry, and servo actuators. The vision system checks for cell orientation when forming cell stacks. Another vision system locates the precise weld coordinates. The XYZ gantry positions the weld head at the correct location. The robotic dosing system dispenses the correct amount of structural adhesive, insulation foam, and thermal paste at the correct location. Laser sensors check these adhesive beads. Servo Actuators accurately position the battery pack for insertion in the housing and employ the correct magnitude of force during insertion. Fixtures hold the parts in the proper position during testing or the respective operation.

Testing is carried out at various stages. Individual cells are checked for internal resistance – OCIR, ACIR, and DCIR – at the very beginning. Weld joints are subjected to rigorous resistance tests given their critical role in the safety and performance of battery packs. End-of-Line Testing further examines the battery pack after full assembly by subjecting it to customised charging and discharging cycles.

Error Code Systems pinpoint the exact location and nature of errors, thereby simplifying and accelerating the detection and fixing of errors. For e.g. conveyor alarm, gripper alarm, and process alarm.

Given that start-ups are apprehensive about embracing automated technologies. What steps and actions are you taking to tap into this aspirational segment?

Startups are concerned about how much of the promised benefits the automation solution will deliver. Experts are more accessible to larger, wealthier companies than MSMEs. Automation is an ecosystem and functions best when all facets of the system operate cohesively.

Startups are often forced to adopt piecemeal

automation solutions that increase cost and complexity over the long run. However, these days Indian businesses have realised that innovation in manufacturing is as important as innovation in the final product. Through a phased manner, wherein organisations must plan their cash flows and invest according to their capabilities, automation can be effectively implemented in MSMEs as well. Startups that are integrated with automation will make sure that the company's time and resources are employed for relationship-building, networking, and the development of fresh ideas.

What are the new innovations and technologies to be launched by your company?

We have forayed into a new area of automated solutions including the extraction of organic materials for cosmetics and bio-products through the company. This goes in line with our vision to expand our business into numerous markets as a growing company. With the recent focus on EVs, we have been actively collaborating with automakers to develop battery packs that could address safety concerns and are tailored to Indian conditions. Recently, we have also ventured into wind energy automation solutions. Our robotic machining system performs multiple operations to hike accuracy, reduce cycle time, and eliminate rework for root end machining of windmill blades.

What are the new segments you are planning to tap into?

Considering our presence in a broad range of industries from wind to pharmaceutical packaging, we can cross-pollinate a wide range of ideas and concepts to deliver out-of-the-box solutions for tech problems that aren't addressed by standard machines.

In the future, we intend to make greater use of augmented reality (AR) to hasten the virtual commissioning process. This is only one part of a wider plan to simplify the entire process from design through commissioning. Among the most crucial aspects of this endeavour is the quicker and more accurate integration of data from process simulation into design.

Going ahead, what's in the pipeline for Cybernetik for the long and short-term future in India?

Cybernetik is looking to expand steadily in the international markets. We are actively onboarding sales partners in South America, while also looking to open offices in other locations globally. We are also researching and pre-emptively developing solutions for future technologies that will dominate the manufacturing industry. Our goal is to establish Cybernetik as a global leader in the manufacturing automation space. 