



TECH-ING IT FORWARD

INDUSTRY 4.0 IS THE ONGOING AUTOMATION ADVANCEMENTS OF TRADITIONAL MANUFACTURING AND INDUSTRIAL PRACTICES, USING MODERN SMART TECHNOLOGIES

BY LITTLE YADAV

IT IS NOT SURPRISING THAT MORE AND MORE companies are investing in Industry 4.0 and for the right reasons. It offers them faster manufacturing procedures, better margins, lower costs, optimizing processes, connected data, decisions made based on data—the list is endless. However, multiple legacy systems can hinder fast progress and bring in its own set of challenges. How companies truly maximize the power of Artificial Intelligence, Machine Learning and data analytics - all combined with deep domain expertise will prove to be critical in the age of Industry 4.0.

Industry 4.0 is the ongoing automation advancement of traditional manufacturing and industrial practices, using modern smart technologies. When an organisation with an existing legacy infrastructure makes a key decision to improve a process or line, lean improvements are

often the first step. This is an important first step to ensure additional automation and digitization of a recently improved process. Otherwise, automation and digitization will only produce more outdated outcomes faster. To embrace Industry 4.0, some companies feel the need to fully understand and design a comprehensive Industry 4.0 solution. This is noble but usually leads to analysis paralysis, over investment, and rework. Companies successful with Industry 4.0 improvements typically only have a basic appreciation of the basic technologies available and requisites in terms of digital minimum standards. These successful companies often just get started in a key process, line, or area and then grow and learn and accelerate from there.

Adopting Industry 4.0 principles includes challenges like facing complex processes and high costs due to dependent technologies that influence

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process inputs and outputs. Therefore, it requires a strategic view of the company's business model, products, operations and infrastructure. There is a need for a standard framework for companies planning to transform their businesses and operations towards Industry 4.0. This framework would involve performing a due diligence exercise in three steps –current state assessment; recommendations and prioritization; and implementation plan and approach. The company requires a partner who can guide them through the journey starting with the due diligence exercise.

Rajmohan N, Digital Head for South Asia, Middle East and Africa, Process Industries, ABB, explains, "Prima facie, Industry 4.0 is driven by automation. But automation is not the only driving factor. At ABB, we have been driving the development of autonomous technologies for over a century. The true change agent is the scale of automation and the emergence and ability today to create Cyber-Physical Systems. The key factor is 'Data'. Industry 4.0 is essentially about businesses revisiting their digital value chain, by unlocking the true potential of Data – how do we collect, contextualize and convert operational, engineering and information technology data into actionable insights to support decision-makers at various levels in an enterprise.



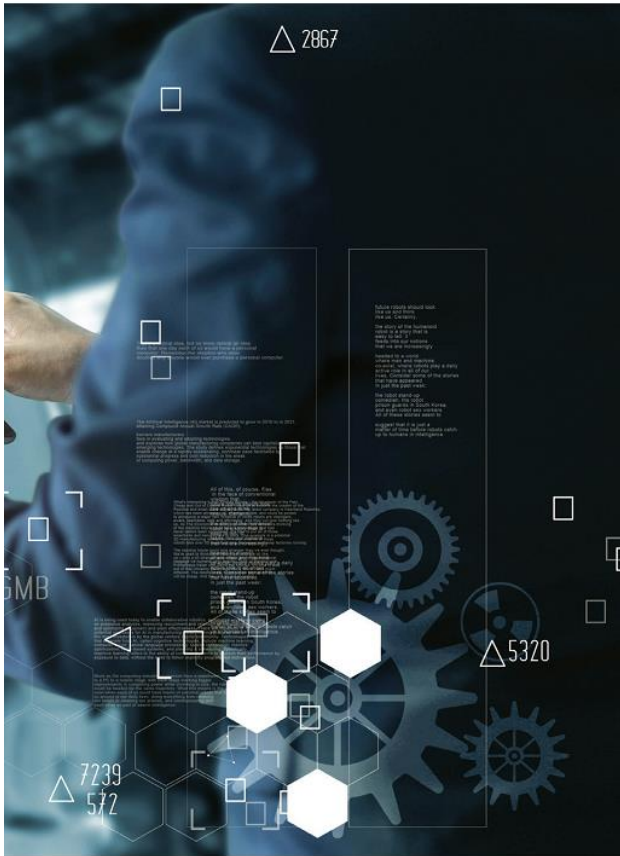
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MODALITIES AND SMART MANUFACTURING

When working on the approach for accelerating the digital transformation of an existing factory site, the most important thing is to follow a prioritized, structured, and waded approach focusing on high-impact use cases.

Pierre Carpentier, AVP, Technologies and Partnerships, Digital, Cyient, said, "We try to break it down and recommend one of two approaches, either a network approach where each use case is taken across multiple sites or a deep dive approach where the transformation of one site is completed in parallel. The deciding factor comes down to how the business needs to be operated across sites and the goal and objective of each site, as well as a discovery-led assessment of the IT and OT readiness and the level of understanding of data and process flow throughout the backbone systems. When you can visualize how the process, data, and hardware flow across a value chain, only then can you see which methods would be most effective and in what order."

Bireswar Roy, Country Business Unit Head-Customer Services, Digital Industries, Siemens, said, "For someone making a greenfield investment, the toss-up would be between the conventional manufacturing shop-floor and the Smart



manufacturing shop-floor. While the investment in the former one might be lower, the latter may provide dramatic improvement in time to market for the product and the cost of iterations in the manufacturing process. The possibilities are made available by having the digital twin of the production

process and the performance can provide this edge.”

He further added that in the same manner, for an existing production line, a digital transformation may be the only option to dramatically improve the quality of the products produced, reduce downtimes by predicting failures or even providing traceability for defects right up to the component vendor.

The factory software landscape has evolved significantly over the years and has helped in overcoming many pain points for factories, namely, time-consuming reconciliation of production progress, lack of visibility of output against plan; WIP levels, discrepancies in data recording due to manual processes, and the problem of quality issues which result in material and time loss.

Dhruv Kapoor, CTO & Co-Founder, Zilingo, elaborated, “We’ve witnessed this first hand with our software Zilingo Factory, which has enabled manufacturing lines to increase efficiency, reduce costs & wastage, and track production in factories.”

Citing an example, he said that their input devices are operated by staff members such as quality and production managers who today use pen and paper. For factory management, it becomes clear quickly that their MES software does not require any additional staffing. Instead of pen and paper, staff members (quality & production managers) can use their input applications. This saves them time and makes them more efficient. This data is then shown in real-time on TV dashboards in the form of efficiency and wastage metrics, progression towards daily targets, shift status, etc. The data is also available in a much more detailed format on a deep-dive dashboard, along with reports. Their MES software integrates with ERP software as well, in



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case factories are unwilling to part with their existing legacy systems.

CAPTURING VALUE

The best solutions are the innovative ones and balance value and cost. It is often a struggle to justify investing in the technologies required to realize Industry 4.0 goals. There is not much scope for fact-based risk analysis and decision making as these technologies provide limited historical data for benchmarking which is traditionally utilized for RoI calculation.

Elaborating on this, **Satish Pala, SVP, Digital Solutions, Indium Software**, said. "So, to gather an approximate RoI, it is required to focus on use cases that have proven RoI like solving a business or an operational challenge that influences the profitability. RoI on Industry 4.0 projects can vary widely. For example, productivity gains could vary from 30% to 70% depending upon the level of implementation and the size of the company."

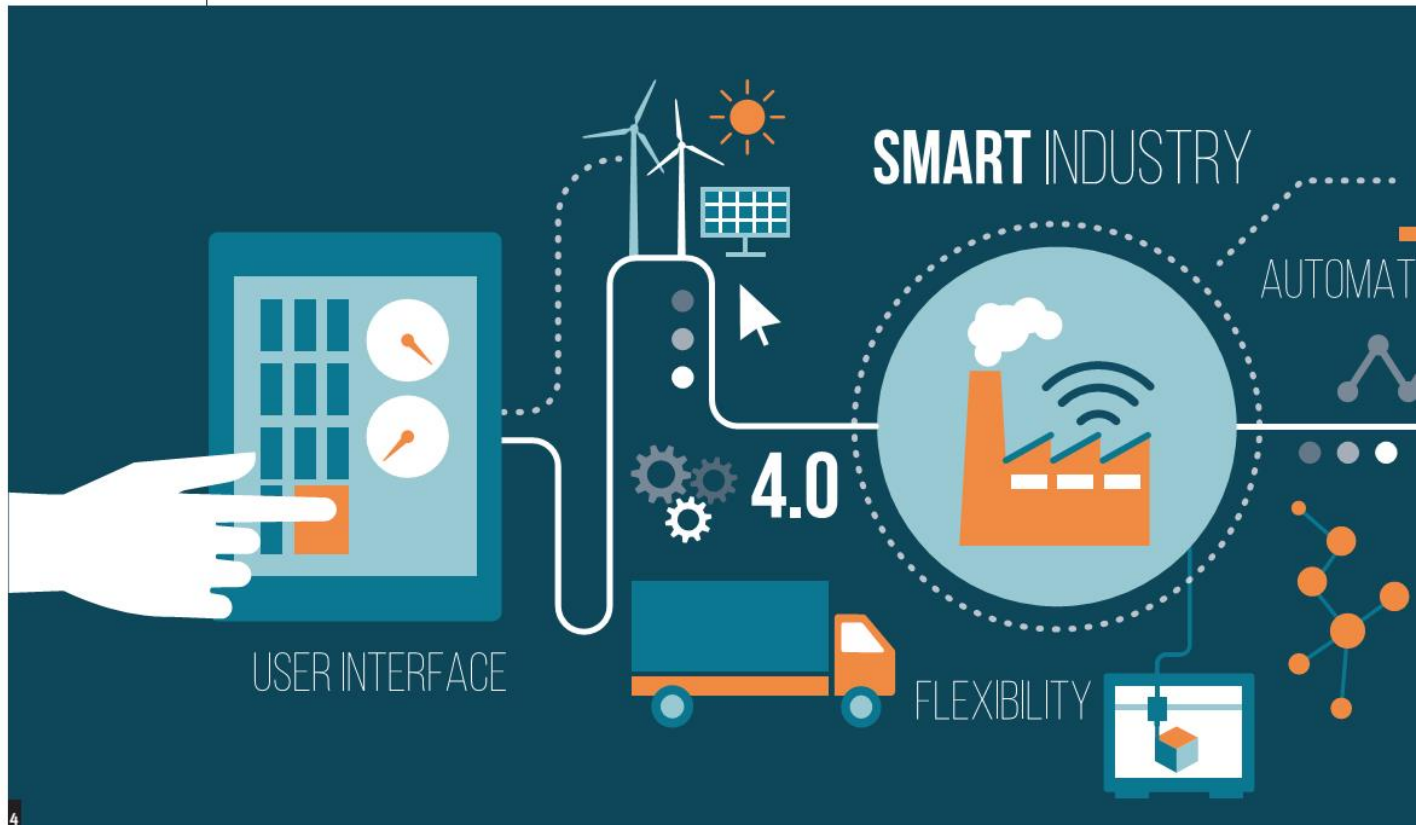
He further added that some of the key returns are improved quality control; increased availability and reduced repair costs; optimised labour costs, and optimised supply chain costs.

Todd Ashley, Vice President, Industrial Solutions, QuEST Global, stated, "Many organizations have set up long-term cost

depreciation of assets and are unwilling to dispose of these assets from their books. Retrofitting the legacy machines with new digital control systems often provide a shorter RoI of 6 months or less for mass production industries. This can often be as simple as adding a new processor with new communication and software capability. However, large scale control retrofits for complex machines and low volume producing industries usually takes two years to recover the investments."

Arun Rao, Senior Director, Geo Sales and Strategy, India, Dassault Systemes, said that any technology deployment has aspects of tangible and intangible benefits in terms of RoI. For example, in two Indian cases of Sandhar Technologies and Suprajit Engineering, business agility, cost benefits, transparency and data security were enhanced and the return on investment was much greater than the OPEX and CAPEX investments on the 3DEXPERIENCE platform."

Vendors offer different solutions and they have to continuously provide the best that works for them to keep up with the competition. One of the key aspects that are considered in the selection process is their adoption of technology, future-readiness and appetite for innovation. Companies unceasingly look for solutions that are progressive while being scalable and sustainable.





Ajay Kapur, CEO - Aluminium and Power and Managing Director - Commercial, Vedanta, said, "At Vedanta, we believe in delivering high-quality products to our customers. Even our product portfolio is dynamic to cater to fluid customer needs.



Hence, we look for solutions from our business associates that are aligned with this vision of unmatched quality and value. We prefer to partner with suppliers and associates who are global leaders in their area of business, and this strategy is at the core of our business excellence."

Kapoor said, "With regard to a good guesstimate of ROI, a bevy of Zilingo Factory clients have primarily mentioned how they've witnessed a surge in efficiency up to 12% driven by a reduction in rework time, better incentive structures, and operator training through operation-wise defect tracking, up to a 50% reduction in repeated defects and maintenance of a stipulated quality level, and completely paperless reporting and operations with automated reports which has made the process less cumbersome."

SMART MANUFACTURING

Smart manufacturing has played a significant role in helping customers maintain business continuity in 2020. Many businesses are considering how they can make their operations smarter with industrial leaders thinking more about harnessing the power of data that already exists. Manufacturing generates a huge amount of data, which could be useful to an organization. However, it is still the case today that most will not be analyzed and used.

Talking on this subject, Rajmohan said, "ABB India is playing its part in bridging this gap. With our deep domain knowledge, we are helping to drive the factory of the future across industries through flexible processes and digital transformation. Our customers are beginning to manage end-to-end manufacturing



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operations that not only control costs but also boost their entire manufacturing value chain, giving them a competitive edge."

When it comes to smart manufacturing, data plays an important role. All of the data can be used. The challenge is not to try to digest and understand all of it from the start. IIoT driven industries collect terabytes of raw data from various sources in the form of text, log, voice, and signals, etc., for analytics. Stratifying useful and non-useful data is an important task for producing essential and vital insights. This is required for validation, mapping, merging, and enriching these massive data for proper usage.

Ashley explained, "Practice shows that only 20 to 30% of primary data generated/stored in IIoT are used to monitor and manage the set key performance indices (KPI's) of assets. Successful IIoT deployments develop, analyze, and use data for a process improvement, which is then connected and merged with subsequent enhancements. Ideally, over time, all of the data can and will be used. Working with a digital partner to help layout a roadmap with initial deployments and subsequent improvements can help prevent rework and selection of architecture and technologies to ensure ROI is maximized and realized along the way."

Further elaborating on the importance of data,

Rao said, "Data analytics allows companies to understand, participate, and develop insights to make better business decisions and improve performance. Analytics uncovers hidden data relationships and brings better visibility of issues to PLM stakeholders and C-Level executives. A platform approach to digital manufacturing and unlocking the power of the virtual twin concept is the base for any manufacturing strategy. Virtual twins bridge the information gap between the physical and virtual worlds, helping businesses quickly identify and execute the innovations needed to thrive. Virtual twins when data is communicated via a scientifically accurate 3D models – are among the most powerful digital transformation innovations for bridging the information gap between real-world operations and remote workforces."

Carpentier asserted, "There is a significant difference between a process collecting and generating data vs. understanding how the data is being used and ensuring its availability for effective decision making. Depending on the use case, the percentage of actual data captured vs. used can be low. Understanding the frequency required for data access and the format in which it needs to be consumed is the driver here. Simply storing the data in transactional systems adds no value."






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service delivery models. To achieve end-to-end integration of their data, businesses / industrial enterprises must first take the fundamental step of connecting their assets to the digital world. The raw data produced by plants, machines, systems and products cannot be comprehensively analyzed without first being linked, captured and managed.

"Therefore, the data-driven digital platforms like MindSphere, a cloud-based, open IoT operating system developed by Siemens, allows manufacturing enterprises to connect plant, processes, systems, machines and products to not only collect data but also analyze this data with powerful advanced analytical tools. The insights gathered from this analysis can be fed back into the product and production process of the manufacturing plant thus achieving a closed-loop powerful decision environment for the enterprise," he concluded. 

He further explained that an analytics layer, complete with data flow, transformation rules, and consumption rules, when well implemented, ensures the successful ROI from having transformed an existing site. Companies that focus on manufacturing as a legacy often struggle here and leveraging Industry 4.0 vendors to help structure, implement, and scale analytics is typically the preferred approach.

Roy said that open cloud-based Industrial Internet of Things (IIoT) platforms are fast emerging as game-changers for developing novel products, ideas and

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8. The pandemic has ensured that most companies and plants adopt digitalisation.