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THE BUSINESS OF INFOTECH

FROM SWEAT TO SMART: THE RISE OF INDUSTRY 4.0 AND THE CONNECTED FACTORY

A new era has dawned, driven by the transformative power of Industry 4.0. This industrial revolution leverages the Industrial Internet of Things (IIoT) to create intelligent, data-driven factories, forever changing how we manufacture.





Manufacturing not only seeks to enhance operational efficiency, product quality and customization options, reduce downtime, production costs and time to market, but also address plant safety, sustainability goals and environmental concerns.

- **Poornima B**, General Manager and Head of Industrial and Manufacturing, Happiest Minds Technologies

Manufacturing aims not only to enhance operational efficiency, product quality, and customization options but also to reduce downtime, production costs, and time to market. Additionally, it seeks to address plant safety, Sustainability goals and environmental concerns. Aiyappan elaborates, “IoT enabled systems work in an intelligent closed loop feedback cycle, thus allowing optimal and precise use of energy, raw materials and other resources, which constitute a large part of their expenses.”

THE RISE OF THE MACHINES

Advanced robotics and automation are another hallmark of Industry 4.0. Robots excel at repetitive tasks with unwavering accuracy, freeing human workers to focus on higher-value activities.

“Robots provide flexibility in deployment to various tasks, enhancing productivity and product quality,” says Suraj Nair COE Leader of IoT and Telematics at Quest Global. However, challenges remain. The initial investment in technology can be substantial, and workforce reskilling is crucial to ensure a smooth transition.

Advanced robotics and automation are significantly transforming production lines, bringing both benefits and challenges. Marc Jarrault of LAPP India, highlights that “robots excel at handling repetitive tasks with unwavering accuracy and tireless operation,” allowing human workers to focus on higher-value activities. This shift results in increased production output, improved efficiency, and safer work environments.



An early definition of IoT by IEEE states that ‘it is a network of items – each embedded with sensors – which are connected to the Internet.’ The International Telecommunications Union (ITU) defines IoT as ‘a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies.

- **Aiyappan**, Founder of Congruent Services and Senior Member of IEEE

However, he cautions that “the initial investment in technology, equipment, and worker training can be significant,” and integrating new technologies with legacy systems can be complex.

Benjamin Lin, President of Delta Electronics India, states that advanced robotics “allow for seamless 24/7 operations, reducing human error and increasing output consistency.” This real-time adaptability improves operational efficiency and positions manufacturers to compete more effectively in the global market.

Subramaniam Thirupathi, Director ISC at Zebra Technologies, notes that automation “boosts production rates and output significantly by operating 24/7 without fatigue,” ensuring continuous manufacturing and reducing cycle times. This leads to higher product quality and substantial long-term cost savings.

While advanced robotics and automation present challenges, their benefits in efficiency, safety, and productivity are undeniable. With careful planning and investment, manufacturers can harness these technologies to achieve a more efficient, productive, and safer future in manufacturing.

HUMAN-MACHINE COLLABORATION

Industry 4.0 doesn’t replace human workers; it empowers them. As Poornima B and Abhijit Roy explain, “The role of human workers is evolving significantly. Advanced robots handle repetitive tasks, allowing human workers to focus on supervision, strategy, and innovation.” This collaborative approach fosters a more dynamic



Automated Work: Advanced robots handle repetitive tasks, allowing human workers to focus on supervision, strategy, and innovation.
Collaborative Work: Humans collaborate with robots to enhance productivity and safety, leading to upskilling and reskilling, and opening new opportunities for meaningful work.

- **Abhijit Roy**, Director and Global Head of Energy and Utilities and IoT at Happiest Minds Technologies



focus on areas like empowering workers, enabling human-machine interactions, and upskilling with digital devices & automation.” This phase will also emphasize sustainability by minimizing waste, reducing environmental impact, and adopting alternative energy sources.

Generative AI and Digital Twins: Technologies such as generative AI can streamline production by providing simplified responses to queries, while digital twins will optimize manufacturing processes through virtual replicas of physical assets.

Preparing for Transition: Companies should integrate these emerging technologies with their current Industry 4.0 solutions. Poornima and Roy advise, “Start planning and implementing these technologies with Industry 4.0 implementations, considering future expansion to Industry 5.0.” Embracing these technologies through pilot projects ensures competitiveness and sustainability.


ROLE OF GOVERNMENTS

Governments play a crucial role in supporting this transition by investing in infrastructure, providing incentives for technology adoption, and enacting clear regulations. By embracing Industry 5.0 advancements and staying agile,

manufacturers can lead the way in sustainability, efficiency, and customer experience. “Strong infrastructure is essential for seamless data transmission and effective IoT implementation.” Government grants and tax breaks encourage technology adoption and clear regulations ensure data privacy and security.

Staying Agile and Adaptable: Staying agile and adaptable is key. By embracing Industry 5.0 technologies, supported by robust infrastructure and clear regulations, manufacturers can lead in sustainability and customer experience.

In Conclusion, Industry 4.0 and the impending arrival of Industry 5.0 represent a transformative era for manufacturing. By embracing these advancements, manufacturers can unlock a new level of efficiency, sustainability, and customer focus. The marriage of human ingenuity and cutting-edge technologies like IoT, AI, and robotics paves the way for a smarter, more agile, and dynamic future for the manufacturing industry.

Industry 4.0 is not just a buzzword; it’s a revolution reshaping the future of manufacturing. Are you ready to join the journey? 

aanchalg@cybermedia.co.in