# Industry 5.0: Adding the human edge to industry 4.0

**Industry 4.0 – or the Fourth Industrial Revolution – brought "smart" technologies such as artificial intelligence (AI), cloud connectivity, and real-time data analytics to the world of industry and manufacturing. At the core of the Industry 4.0 revolution is a drive toward efficiency, productivity, and cyberphysical systems.**

And where Industry 4.0 put smart technologies at the center of manufacturing and supply chains, Industry 5.0 is about augmenting that digital transformation with a more meaningful and efficient collaboration between humans and the machines and systems within their digital ecosystem. The partnership of humans and smart machines marries the accuracy and speed of industrial automation with the creativity, innovation, and critical thinking skills of humans.

Modern businesses are facing unprecedented levels of competition and ever-rising consumer demands for speed and customization. Industry 5.0 technologies help to derive the best of both worlds by supporting human creativity and mechanized efficiency.

## Industry 4.0 and Industry 5.0

Each of the first three Industrial Revolutions was powered by a disruptive new technology: the power of the steam engine, the efficiency of the assembly line, and the processing speed of the computer. These industrial eras were known as "revolutions" because the technologies that powered them were game-changers and revolutionized business and manufacturing.

The Fourth Industrial Revolution – Industry 4.0 – is powered by smart technologies. It underpins any and all Industry 5.0 advancements and is, by definition, comprised of nine critical "pillars":

So, Industry 5.0 does not so much represent yet another Industrial Revolution but rather serves to augment Industry 4.0 technologies by strengthening the collaboration between humans and robots. With Industry 5.0, the nine pillars of Industry 4.0 are expanded upon by a drive to place human creativity and well-being at the center of industry – to merge the speed and efficiency of machine technologies with the ingenuity and talent of human counterparts.

The following concepts are the central pillars of Industry 5.0:

> A **human-centric industry** puts human needs and interests at the center of the production process. Instead of asking what workers can do with new technology, Industry 5.0 asks what the technology can do for workers. While robots are tireless and precise, they're literal and lack the capacity for critical and creative thought of their human partners.

Working together with people, robots can fulfill their designated purpose of providing assistance and making our lives better.

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- A **sustainable industry** helps businesses reduce their environmental impact by developing circular economy processes. Other sustainability shifts include reducing energy consumption, greenhouse emissions, and waste, as well as avoiding the depletion and degradation of natural resources.
- Industrial production in a **resilient industry** has a high degree of robustness. It is well-armed against disruptions and able to support critical infrastructure in times of crisis. The pandemic served to highlight industrial vulnerabilities and the importance of increased agility and resilience in supply chains and other manufacturing components.

## Integrating Industry 5.0 into Industry 4.0 technologies

With Industry 5.0, value-driven, human-centric initiatives overlay Industry 4.0 technological transformations to create a more seamless interplay between humans and machines. Below are some of the specific technologies that accomplish this:

- Human/machine interactions can be customized by making use of embedded sensors, actuators, and machine learning technologies to facilitate the adaptation of collaborative robots.
- AI-powered human/robot collaborations are being developed to help reduce waste, increase sustainability compliance, and improve efficiency around the use of invested resources.
- Advanced data management and analysis systems leverage AI and machine learning to help minimize waste and inefficiency and optimize human talent.
- Simulation models and digital twins minimize wear on real-world systems and streamline the learning and efficiency of human users. This allows for maximum innovation and creativity with minimal operational risk.
- Collaborative robots and experiential tools like virtual reality (VR) can help businesses double down on the efficiency of smart automation and the creativity and problem-solving skills of human/robot partners.

## Factories of the future: Lasting benefits of Industry 5.0

The long-term advantages of adopting Industry 5.0 align with its core values. For instance, better talent attraction and retention, greater energy savings, and increased general resilience. The following benefits help to improve competitiveness and relevance by successfully adjusting to a changing world and new markets.

- **Talent attraction and retention:** Every year, it becomes harder for companies to attract and retain the kind of skilled and talented workforce they need to compete. When workers are simply machine operators, they are denied the challenge and creative input that drives human accomplishment. Industry 5.0 principles and technologies provide a more progressive and interesting working environment, which can help lead to increased employee satisfaction and loyalty.
- **Sustainability and competitiveness:** In today's business world, sustainable practices are no longer an option but an expectation from stakeholders. This is especially true in resource- and energy-intensive industries. A forward-looking business with sustainability in mind will be more attractive to potential investors, employees, and consumers. The adoption of Industry 5.0 practices will promote the economic performance of industries while ensuring environmental sustainability.
- **Resilience:** The ability to react to disruptive changes, like trade wars, pandemics, and impacts of climate, has become an essential component to running a business. Industry 5.0 technologies are playing an important role in the development of industrial agility and resilience, through data gathering, automated risk analysis, and enhanced security.

## Collaborative robots (cobots) and human workers

The adoption of Industry 5.0 as a complement to Industry 4.0 can meaningfully enhance the workforce. In particular, Industry 5.0 brings highly skilled workers and collaborative robots (cobots) to work side-by-side – increasing the value that each brings to production. This evolved generation of machines is equipped with sensors, actuators, and AI-powered controllers that allow them to work next to humans in a safe and nonintrusive fashion. Cobots are versatile, easily programmable, safe, and intuitive to use.

**What is a cobot?**

A collaborative robot, or "cobot," is a robot that works alongside a human as a guide or an assistant. Unlike autonomous robots which – once programmed – work independently, collaborative robots are designed to respond to human instructions and actions. The cobot/human relationship is a synergistic one in which the innate strengths of both humans and machines are brought together to accomplish specific tasks or processes.

The collaboration between humans and cobots can help unlock innovation. For instance, in designer <u>fashion</u>, cobots can be in charge of collecting, cutting, holding, or even sewing fabrics while designers sketch and drape them on a 3D model of a mannequin in a computer or VR set – in real time. This could make the same-day delivery of personalized designer garments a reality.

Additionally, the automotive sector was an early adopter of cobot technologies, using them as critical components in assembly lines. By automating repetitive and dangerous tasks such as welding, assembly, and painting, humans are freed up to attend to more complex tasks in addition to operating and maintaining the robots. This includes pairing humans and cobots in quality assurance tasks, where "robot vision" can autonomously spot defects or flaws not immediately visible to the human eye.

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Cobots in factories can enhance efficiency and the experience of their human counterparts.

## Factory 5.0: Industrial automation gets personalized

The integration of cobots and humans bring the potential to personalize and customize goods at an industrial level. As cobots execute repetitive tasks with exacting and predictable efficiency, humans can oversee the process to ensure that real-time requests for customization are understood and realized. The following Industry 5.0 tools are helping to advance customizable manufacturing:

- Unified data management platforms collect, store, and analyze customer inputs – transforming them into insights for manufacturers.
- Digital twins and simulations help to maximize prototyping of solutions to help realize customers' requirements with minimal costs.

- Smarter AI and machine learning systems serve to understand and learn about customer preferences and needs, and to support the manufacturing of custom components.
- More accurate sensors, actuators, 3D scanners, VR, and other tools make the customization experience more accessible for the workforce and customers.

Industry 5.0 is helping to open the doors on a new era of personalization for both customers and workers.

Industry 5.0 will make the factory a place where creative people can come and work, to create a more personalized and human experience for workers and their customers.

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