5 Trends for Industry 4.0: The Factory of the Future (2020 and beyond...)

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As factories look to become more profitable, sustainable and future-ready, they need to consider not just how they will look in 2020 but in 2025 or even 2030. There are some trends that can help us foresee where the shop floor is headed; consumer demands for more customization and individualization, and a drive to more consciously handle resources as we start thinking about our impact on the environment and the planet.

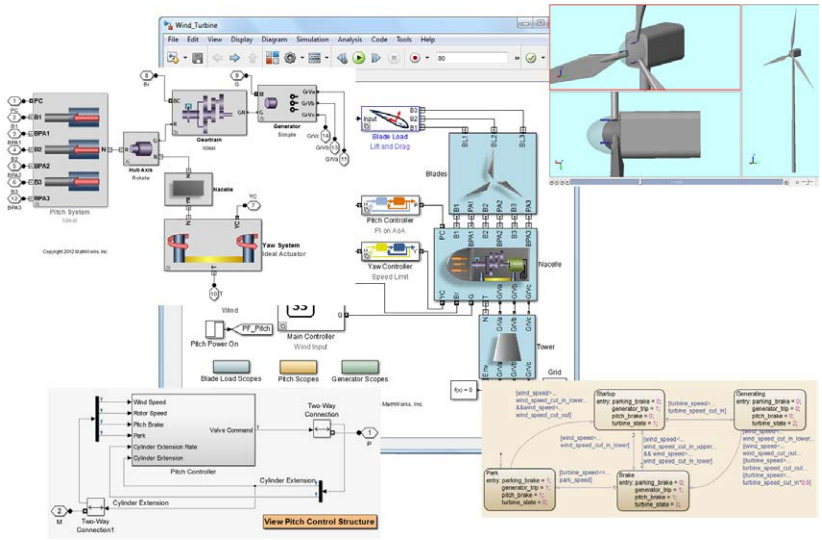
While offering personalized goods and at the same time optimizing the use of energy, water and other resources can seem like a contradiction, here are five ways to start moving towards this future reality.

1. Cobots and AI becoming flexible production enables

For the last several years, the automation industry has been discussing the vision of "sample size one" – how can production lines produce one of a kind, without running into long changeover-times or other inefficiencies. With Industry 4.0, this vision must eventually come true to meet the requirement of full individualization in production. To meet this, machines cannot be set up in a fixed, inflexible manner on the shop floor, where they are commissioned, parameterized and tuned for one specific product that is produced over and over again for months or even years. Tomorrow's production lines must be flexible – built from multiple mechatronic modules that can easily be rearranged, with more and more robots or "cobots" (collaborative robots working hand in hand with human workers), and an AI that parameterizes and tunes the machines according to the next – individualized – good that is manufactured on the line.

2. Virtual commissioning becoming a reality

As software complexity and the number of possible combinations of modularized software components grows, performing comprehensive tests on the physical machine gets harder and more time consuming and will eventually become impossible. Given this, it will be vitally important to perform virtual commissioning of the software to verify the absence of errors and to validate if requirements are met based on simulation models before the physical production line is even in place. Innovation leaders like Krones, the leading manufacturer of bottle filling lines worldwide, are already using multidomain simulation models for virtual commissioning today.



Img 1: Virtual commissioning using the example of a wind turbine

3. Emergence of industry-wide standards for connected machines

With machines and modules being dynamically rearranged in the factory, it will be important to ensure interconnectivity. Standardized protocols like OPC UA TSN will play a key role in ensuring that equipment from different vendors interoperates seamlessly. Inflexible cables will disappear and be replaced with wireless protocols like 5G and its successors. But machines will not only be connected with each other but also to cloud systems where flexible calculation power is available for running powerful algorithms on business and engineering data.

4. Edge computing helping AI and predictive maintenance evolve

The rapidly increasing calculation power of industrial controllers and edge computing devices as well as the use of cloud systems are paving the ground for a new dimension of software functionality on production systems. AI-based algorithms will dynamically optimize the throughput of the entire production line while minimizing the consumption of energy and other resources. Predictive maintenance will evolve and consider data not only from one machine or site but across multiple factories and across equipment from different vendors. Depending on the requirements, the algorithms will be deployed on non-real-time platforms as well as on real-time systems like PLCs as Beckhoff recently demonstrated at Hanover Messe in Germany.

5. More opportunities for smart engineers

The biggest impact, however, will affect the people working in the factory of the future. By relying on technology and tools from companies like MathWorks, more engineers and scientists, not just data scientists, will work on AI. The factory of the future requires engineers who can build models, dealing with large data sets and handling the respective development tools in order to address the above trends. Therefore, companies building and operating industrial equipment need to change their job postings and hire skilled engineers with a completely different profile to be ready for a future in which Industry 4.0 is merely the beginning.