NETWORKED EFFICIENCY

Digitalization leads to shortened time-to-market

A company's economic power, productivity and market success depend substantially on how intelligently and efficiently that company uses data produced in its operations — and what data are even available. The fourth industrial revolution, Industry 4.0, can be described as the consistent and automated use of all available facts, data and forecasts to control the operational processes necessary for engaging in the market in the best possible way. Key objectives include taking advantage of upcoming market and business opportunities as quickly as possible, enhancing flexibility and increasing quality.

The product and process optimization methods are software driven and are mostly also supported by simulations. The transfer of simulation results to the real world, in turn, has effects on the processes in the company, which results in its maturing into a Digital Enterprise. The current industry megatrend is therefore called the "digitalization of industry"; the concept applies not only to series production but also to shopfloor-oriented production companies.

Crucially, it is not a revolution — it is an evolution. Only through an evolutionary process supported by experience can the opportunities provided by digitalization be developed further — while also using successive innovations to keep risks within controllable economic and technical limits. That is why successful digitalization in production uses proven technology that is designed to be forward-thinking and used innovatively.

As a leading automation partner for industry, Siemens began very early on to drive forward the digitalization of its products, systems and solutions. Now an integrated portfolio of industry software and automation technology is available for discrete manufacturing with machine tools; machine manufacturers and manufacturing companies can use that portfolio to reduce time spent developing and bringing products to market, while simultaneously increasing the flexibility and efficiency of their production.

The portfolio is based on technology from a single source — with transparent data flows through every level, consistent data handling throughout a product's lifecycle, functions that are perfectly coordinated and unified operating philosophies.

DIGITALIZATION FROM DEVELOPMENT TO COMMISSIONING

A crucial question for machine manufacturers is how machines can be developed more efficiently so that companies may react quickly and flexibly to market and customer requirements. To that end, they increasingly seek to visualize and parallelize the development phases for new machines. This requires consistent implementation of all digitalization options — from the first idea through to the production machine's commissioning.

Thanks to the digitalization of the development process, the machine manufacturer has access to all required data in the form of a virtual machine model very early on. This provides a digital twin for the machine, which makes it feasible for customer requests and new options to be tested and optimized simply and directly. Using integrated software and hardware solutions with a common data foundation in NX Mechatronics Concept Designer, Siemens also helps machine manufacturers shorten the machine development process considerably.

With virtual machine commissioning, the real-life commissioning process can be made less capital intensive. The virtual machine model is also connected to Sinumerik, the actual control system. This allows one to test, and further optimize, the machine's functioning under near-real conditions. This procedure offers machine manufacturers maximum security, as companies can avoid potential damage to the real machine during commissioning and run-in.

SIMPLE AND EFFICIENT — FROM DESIGN TO WORKPIECE

Machine operators benefit considerably from having a virtual machine image in addition to the real machine. The virtual machine image offers a virtually identical work preparation area where all stages of production can be planned and optimized. For example, the machining strategy for a new workpiece can be inspected and run in using the virtual machine while the real machine is still producing other parts. This reduces set-up time and contributes to higher profitability for the business.

Another advantage is machine operators can test their parts production programs early on under almost real conditions in a virtual environment. This shortens time-to-market and increases machine productivity.

OPTIMIZED PRODUCTION PLANNING

The virtualization process uses the original Sinumerik software, known as the Virtual NC Kernel (VNCK), which enables advance machining simulation under conditions almost identical to reality. This has advantages for machine operation: production planning and machine use can be optimized, while workpiece costs can be perfectly calculated over the computed primary processing time of the machine.

Siemens thereby provides a solution that can considerably increase machine availability and raise profitability: the CAD/CAM-CNC sequence for production planning, including control system–specific, high-precision simulation. Processes from product development through to production can be designed efficiently and faultlessly. NC programs created in this way can be transferred directly to the machine and executed.

NETWORKED PRODUCTION — ALSO SUITABLE FOR JOB SHOPS

Sinumerik Integrate provides the industry with a comprehensive range of solutions for networking machines and connecting them to higher-level IT systems. This horizontal and vertical integration is combined with innovative solutions for cutting, connecting robots directly to the CNC and additive manufacturing.

Networked machines, innovative operating concepts with multi-touch displays, and production monitoring with mobile devices allow shopfloor-oriented businesses to optimize their production workflows, too. "Smart operation," which consists of applications for computer-based production planning and promotes paperless manufacturing, represents a pioneering package for job shops that wish to take the first step toward digitalization.

Operators use the machine to view directly many graphic formats, as well as pdf and dxf files. All the data required for production — including parts programs — can be accessed and executed by Sinumerik CNCs on the company network. Flexible machine and staff deployment enables monitoring of the current machine status using a smartphone or tablet via a protected web server.

THE CHALLENGE OF THE DIGITAL ENTERPRISE

In the end, productivity and quality of parts produced are what count, and the field of digitalization is no exception. The contribution that the integrated portfolio of Siemens industrial software and automation solutions makes to the entire value added is as important as Siemens' expertise in the various technologies.

Multitasking technologies such as mill-turning, turn-milling, or the combination of milling or turning with grinding technologies are a particularly good example of this. With this clear focus, digitalization in machine tool manufacturing from Siemens offers the complete solution for the manufacture of and production with machine tools: digitalization — automation — technology. IMD

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SIDEBAR

Benefits At A Glance

- *Reduction in development time and time-to-market*
- *Higher productivity and efficiency of machine development*
- *Shorter machine set-up times*
- *Greater machine availability*
- *Increased profitability of operation and machine*
- *Increased flexibility and efficiency of production*