

## Peer2Peer Production System

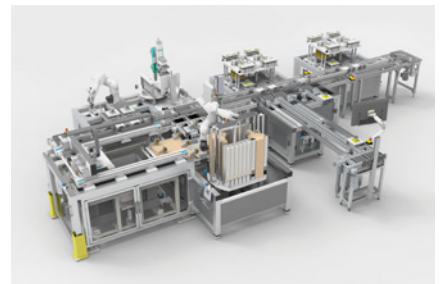
Cyber-physical production systems brought to life.  
Pioneering work from Austria.

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Productivity requirements and the ability to respond flexibly to fluctuating volumes are more relevant than ever for production in high-wage countries, especially in light of increasingly optimized production. The method of centrally managed and hierarchically organized production lines that has been in use for over 100 years is increasingly running up against its limits. Optimizations are now only possible through paradigm shifts.

In science, cyber-physical production systems (CPPS) are being treated as the future successor that will make it possible to overcome the challenges associated with Lot Size One. Modular production cells with decentralized and networked controllers manage the ever growing requirements for production complexity and variability. With this modular and decentralized architecture, individual production cells can be scaled or reconfigured for entire production lines, which for example makes it possible to respond flexibly to changes in demand on the market.

The Siemens competency center for SITOP industrial power supply and production in Vienna has, together with the research department of Siemens AG Austria, completed the implementation of a CPPS in an operational production environment with a focus on economic efficiency: the Peer2Peer Production System.



# Cyber-physical production systems – the next level of digital production

## CPPS and Digital Twins – rethinking industry digitally

Products and solutions from Siemens AG have gone into the design and development of the Peer2Peer Production System which help to digitalize the entire value chain in industrial firms.

Using simulations, the **Digital Twin of Product** avoids the time-consuming construction of prototypes and model devices in development and keeps a current, digital construction plan of the product ready at all times. Thanks to its **Digital Twin of Production**, the Peer2Peer Production System is both physically abstracted and also fully represented digitally by software and can interact with the Digital Twin of Product. The data that the products and production resources deliver is used in the form of a **Digital Twin of Performance** for further optimization of development and production to increase productivity and reliability.

The product being assembled is conveyed on a conveyor belt using a product carrier. Production cells specialized for individual production steps are arranged around the conveyor belt and provide the process steps needed to complete the product. The product uses its digital construction plan to look for the next free production cell that can perform the subsequent work step.

## Flexibility and economic efficiency thanks to the Peer2Peer Production System

### Flexibility:

**... with products:** Different versions of a product can be produced in different iterations in the system.

**... in production:** Individual production cells can be deactivated for maintenance and if necessary replaced with a highly flexible manual work station with one worker. In case of problems with cycle times, an additional similar production cell can be added at production runtime ("Plug-and-Produce").

### Economic efficiency:

**... of production:** With its digital construction plan, the product to be assembled looks for a free production cell that can perform the next work step.

### ... of the production system:

A "standard cell" can be adapted to the required process step, thus transforming into a special production cell: packing, laser labeling, electrical function test, etc.

Instead of a control computer, the system uses networked production cells with equivalent rights that are in communication with each other. This is where the Peer2Peer Production System gets its name.

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