



Metal processing industry

Increased production efficiency – thanks toii®

With the help of its Industrial Internet of Things (IIoT) platform toii®, thyssenkrupp Materials IoT succeeded in comprehensively automating and optimizing production processes at thyssenkrupp Materials Processing Europe (MPE).

The challenge for thyssenkrupp Materials IoT

MPE offers custom value added processing of raw materials at its Stuttgart site. Three cut-to-length machines cut narrower strips from the coils according to the customer's individual requirements. In order to prepare the company for future challenges, the aim was now to extensively automate the processes and digitalize the upstream and downstream processes.

What this meant for thyssenkrupp Materials IoT in real terms: The individual devices in the production line needed to be networked and their production data made available for other applications. The operator's handwritten inputs would be replaced by digital data in the future. This also applied to the measuring systems in use: Both the width and thickness measurements were to be digitalized and automated. The plan was also to integrate a SAP-based resource management system (ERP) into the digital environment.

The productivity goal for the facilities was to increase efficiency and also create a basis for the comprehensive optimization of similar production facilities. MPE also hoped to improve the flow

of information to the upstream and downstream roles in the company and use the acquired data in big data analyses in order to get more added value out of them in the future.

The solution design

The solution was developed by thyssenkrupp Materials IoT together with MPE. The process optimization was based on the implementation of the Industrial Internet of Things (IIoT) platform toii®. First the machines were connected with the help of the toii®.Collect module and the machine data were collected and prepared for use in the system. A total of 15 individual units were networked in this way.

In addition to the machines, analog measuring systems such as micrometers needed to be digitally connected. A radio module was used to integrate the measuring devices, which were integrated into the toii® platform through the toii®.PDC module.

The toii®.PDC software module ensures the digitization of manual production data. Machine operators also use the module to collect previously unavailable data. Terminals are set up with a web

interface for this purpose. Production workers can enter failure reports or other data directly into the database of the **toiï®** platform at these terminals.

Whereas upstream data previously needed to be entered manually via the operator terminal of the unit, the required data is now imported automatically to the machine control system via the **toiï®.Control** module, efficiently and with no errors. This includes data such as measurement values. The instruments used to measure the width and thickness of the cut metal bands have been replaced by automatic measuring systems. The thickness is measured by a radiometric sensor that needs to know the alloy content of the material in order to take an optimal measurement of the band thickness.

toiï®.Integrator was implemented as an interface for third-party systems such as SAP or another enterprise resource planning system (ERP). It opens up a universe of possibilities for further data use and integration.

This interface is also used to compare target values with the actual values of the measured parameters so that they can be shown in real time to the workers at the **toiï®.PDC** terminals. Measurement values are displayed as traffic lights, which allow the machine operator to immediately identify any deviations, in which case an automatic escalation can also be implemented.

Order data are provided automatically

In many stages of production, order data are required to set up the machines. This information is provided to the units directly from the ERP just in time. The ERP data are transferred to the **toiï®** platform via the **toiï®.Integrator**, where they are converted into the machine-specific data format.

Increased efficiency across the entire equipment chain

In addition to increased efficiency through automation, the efficiency of the entire equipment chain was also significantly increased with the help of the production data acquired from the machines and the enterprise resource planning system. Moreover, the overall equipment efficiency (OEE) is determined in **toiï®.Think**, which provides an overall view of the efficiency of the cut-to-length machine unit chain for the first time.

toiï®.Think also achieved other optimizations, for example, the sequence planning and the consolidation of customer orders in the packaging process. **toiï®.Think** uses up-to-date production data and production planning data from the ERP in real time to calculate the optimal sequence for packing and stacking the metal band rings that have been produced. These are also displayed in a graphic form to the machine operator on their **toiï®.PDC** terminal. The rings are finally validated through the connection of a bar-code scanner with **toiï®.Control**.

Visualization of all data

All production data and parameters are summarized via the **toiï®.Fusion** visualization module at the customer's request and displayed on a dashboard monitor. They are used by the production team as a basis for debriefing the production shifts. They also create the opportunity to identify additional areas for optimization within the scope of the company's own operational excellence initiative.

“With **toiï®.Control**, we can read production data in real time and take our process security to the next level. As a result, we are setting new quality standards and increasing our productivity.”

Michael Schappach

thyssenkrupp Materials Processing Europe
Head of Operations, Mannheim

Customer benefit

The digitalization of the facilities with **toiï®** enables the seamless integration of various components connected to each other and the environment. The automation alone resulted in a reduction of process-related downtimes by more than ten percent with no additional measures. **toiï®**'s user interfaces enable the machine team to operate the platform efficiently and ergonomically and have eliminated many handwritten procedures on paper from the process.

toiï® also delivers timely information for shop floor management that is fed back into the ongoing improvement of technology and processes. The project is the blueprint for a comprehensive rollout for further efficiency improvements within the group.



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