

Transformative data insight for manufacturers

Laboratory for Machine Tools and Production Engineering at RWTH Aachen University provides manufacturers with an efficient model for analyzing massive production data streams and making instant corrections



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Business needs

RWTH university's industrial research lab looked for a way to help manufacturers gain insight from real-time production data and adjust processes while keeping large data volumes and IT infrastructures manageable.

Solutions at a glance

- [Dell EMC Streaming Data Platform](#)
- [Dell EMC Isilon](#)

Business results

- Enables near-real-time analytics and corrective measures in production processes
- Allows the transfer and repurposing of data pipelines
- Simplifies IT administration and development efforts
- Offers a model for Industry 4.0 scenarios
- Supports manufacturing process optimization and waste reduction goals

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Dr. Daniel Trauth
CDO and Director for Digital Transformation
Laboratory for Machine Tools and Production Engineering, RWTH

Rheinisch-Westfälische Technische Hochschule Aachen (RWTH Aachen University) is one of Germany's leading universities for engineering and natural sciences. The RWTH Laboratory for Machine Tools and Production Engineering (WZL), the largest institute of its kind in the country, performs industrial research in close alignment with industry, including collaborations with manufacturers to explore use cases for analytics based on sensor data from the Industrial Internet of Things (IIoT).

Need to assess massive data volumes without complicating IT

Industrial IoT projects such as WZL's effort to gather data and enable analytics to detect and remedy variances in fine blanking, a machine stamping process, typically involve a large number of sensors mounted on production machinery. Specialized sensors for vibrations, acoustics and other conditions of manufacturing processes, can generate more than 1 million data points per second. Philipp Niemietz, head of digital technologies at WZL, says, "We wanted to use high-frequency data, together with the input from manufacturing simulations and other sources, to help manufacturers analyze changes in their processes, see how they affect output and process quality, and make adjustments in real time."

WZL found that conventional infrastructures are challenged to accommodate large volumes of high-frequency data and collate them with other information. Manufacturing companies often find it difficult to scale data storage or set up analytical pipelines. Traditionally used micro-batching cannot accomplish true data streaming. System latency and micro-batching forestall real-time responses to data findings and analyses. Manufacturers have to meet challenging requirements for IIoT infrastructures. At the same time, the availability of DevOps skills in these companies tends to be limited.

Foundation for manufacturing analytics

RWTH has a long-standing relationship with Dell Technologies, and the WZL researchers contacted a Dell representative to discuss their concerns. Soon, they were in contact with the team working on the Dell EMC Streaming Data Platform. WZL participated in the solution's alpha and beta programs. Dell Technologies specialists deployed it in WZL's on-premises infrastructure and in the cloud, and provide continuing support.

At WZL, sensors on stamping machines write their data to a message queuing system. From there, it travels to the Dell EMC Streaming Data Platform which facilitates real-time stream or historical analysis. The Streaming Data Platform integrates with Pravega data-streaming software and with Dell EMC Isilon long-term storage.

Garnering the power of data streaming

WZL can combine any number of IoT and image streams to develop new streams and analytical models. Dr. Daniel Trauth, CDO and director for digital transformation at WZL, says, "By following the Pravega model and ingesting and processing everything as a stream, the Streaming Data Platform makes it easy for us to use a unified processing model to create new analytics pipelines. The latency is far superior to the traditional methods we practiced before." The solution uses the same data structure in every stream, which simplifies analysis. "Once we establish a data pipeline for one sensor, we can easily use it for all sensors of that category in a manufacturing process," Trauth adds.

Minimizing administrative chores

The automatic scaling and load-balancing of the Streaming Data Platform are conveniences for WZL and great advantages for manufacturers, which may lack the IT expertise to manage the solution. "As long as we can ingest data from the message queuing

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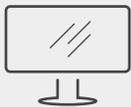
systems and the sensors, the Streaming Data Platform scales to ensure continuous processing,” Niemietz says. “No matter how many sensors we use, once we set up the analytics pipeline and the data streams, we don’t have to address any load-balancing issues.”

Delivering deep, near real-time IoT intelligence

The Streaming Data Platform’s ease-of-use will likely boost industry adoption. WZL’s collaborating manufacturers are excited about the potential applications in adjusting processes without production stoppages and avoiding material waste. “Many companies are used to superficial information about their processes,” Niemietz says. “Manufacturers can use the Streaming Data Platform to focus on analytics instead of administration. When we show them how the solution works, they see the huge potential of quantifying process variations in analytical models.”

For manufacturers preparing transformative Industry 4.0 initiatives—a high priority for them in Germany—the Streaming Data Platform offers a practical path. Niemietz comments, “Many companies look for one comprehensive solution for their Industry 4.0 efforts. The stamping processes to which we apply the Streaming Data Platform could make a strong, transferable use case for Industry 4.0 scenarios.”

In exploring the potential of the Streaming Data Platform for manufacturing IoT analytics, WZL increased its reach and visibility. “We made new, valuable connections within Dell Technologies,” Niemietz says. “We also began exchanging information with the leaders of the RWTH IT infrastructure team. They are interested in our specific application and promote WZL across the university. That could be very beneficial for us.”



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