TULIP

Tulip Helps DMG MORI Digitize the Spindle Assembly Line

DMG MORI

INDUSTRY

Machine

CHALLENGE

Complex, high-mix assemblies with low process visibility

SOLUTION

Digital work instructions

RESULTS

↑ 20% production increase

↓ 10% reduction in failure rates

↓ 62% reduction in reported defects

ABOUT DMG MORI

DMG MORI is a leading international manufacturer of machines and machine tools. Serving customers in over 42 industries and 79 countries, DMG MORI strives to be "Global One Company" --leveraging the best of their German and Japanese heritage in our modern interconnected world.

DMG MORI builds cutting-edge innovation into each of its products. As digital technology becomes essential to manufacturing, DMG MORI is taking active measures to maintain its position as a leader in integrated digital innovation.

OUR PARTNERSHIP

After becoming a Tulip customer in the spring of 2019, DMG MORI joined Tulip as an investor and strategic partner. Together, we're reinventing the modern machine shop by developing end-to-end digital workflows, and redefining the on-machine experience for frontline workers.

"After all, digitization is human-centered. With the no-code platform, employees can autonomously create manufacturing apps. TULIP is the ideal entry into digitization."

- Christian Thönes, Chairman of the Executive Board of DMG MORI AKTIENGESELLSCHAFT

THE CHALLENGE

Improving Visibility & Efficiency on the Spindle Line

DMG MORI produces the spindles for many of their machines in-house. DMG MORI committed to improving visibility on spindle production line in their Deckel-Maho Pfronten facility. Here are the challenges they faced at the outset.

Complex, High-Mix Spindle Assemblies

Each spindle is the product of a complex assembly. Spindles move through a single-piece flow process spanning over a dozen stations.

Every station includes highly variable picking procedures and quality checks. While operators have access to paper schematics and standard work requirements, existing quality measures were time consuming and prone to error.

"Our spindle line assembly consists of over 16 stations. It's important that the operator knows exactly which task they need to perform to complete the job," said Reinhard Musch, Managing Director of DMG MORI's Deckel-Maho operations.

Paper Forms

Work was recorded on paper forms, making it difficult to track progress in real time. When defects arose, they were recorded on additional paper forms.

Without real-time data, finding patterns in production data was slow and prone to error.

Low Process Visibility

DMG MORI's lines adhere to strict Takt times. Without visibility into the work performed at each station, the company lacked the ability to identify bottlenecks and properly balance lines. Current workflows made it difficult to track works in progress through the line.

TULIP

Low Process Visibility

DMG MORI's lines adhere to strict Takt times. Without visibility into the work performed at each station, the company lacked the ability to identify bottlenecks and properly balance lines. Current workflows made it difficult to track works in progress through the line.

Requirements

Ultimately, DMG refined their digitization needs into a set of concrete requirements:

- Track WiP through a production line
- Improve visibility into the work done at each station
- Decrease reliance on paper work instructions
- Track defects in-line
- Digitize every station in the single-piece flow
- Automate defect escalation to resolve issues as fast as possible
- Track and optimize the amount of spindles produced in a day

"Tulip supports this 100%," noted Musch.

THE SOLUTION

DMG MORI elected to use Tulip to digitize their spindle line. Throughout the assembly process, DMG MORI leveraged a range of Tulip's capabilities to improve efficiency and visibility.

Spindle Assembly Apps

Using Tulip, DMG MORI's engineers built no-code applications to increase process visibility throughout their lines. They worked closely with their operators do ensure they built applications that reflected the nuances of their work.

"We implemented this system together with our operators," Musch said of the project, "Including them in the process from the start has been a great success"

Learn more at www.tulip.co

IIoT Gateways at Every Station

DMG MORI installed Tulip I/O Gateways at each station in the spindle assembly line. This allowed them to capture and aggregate critical production information in real-time, and to connect their applications to IoT devices at necessary points in the line.

Now, DMG MORI captures data about each operator's performance at every station, creating complete end-to-end process visibility.
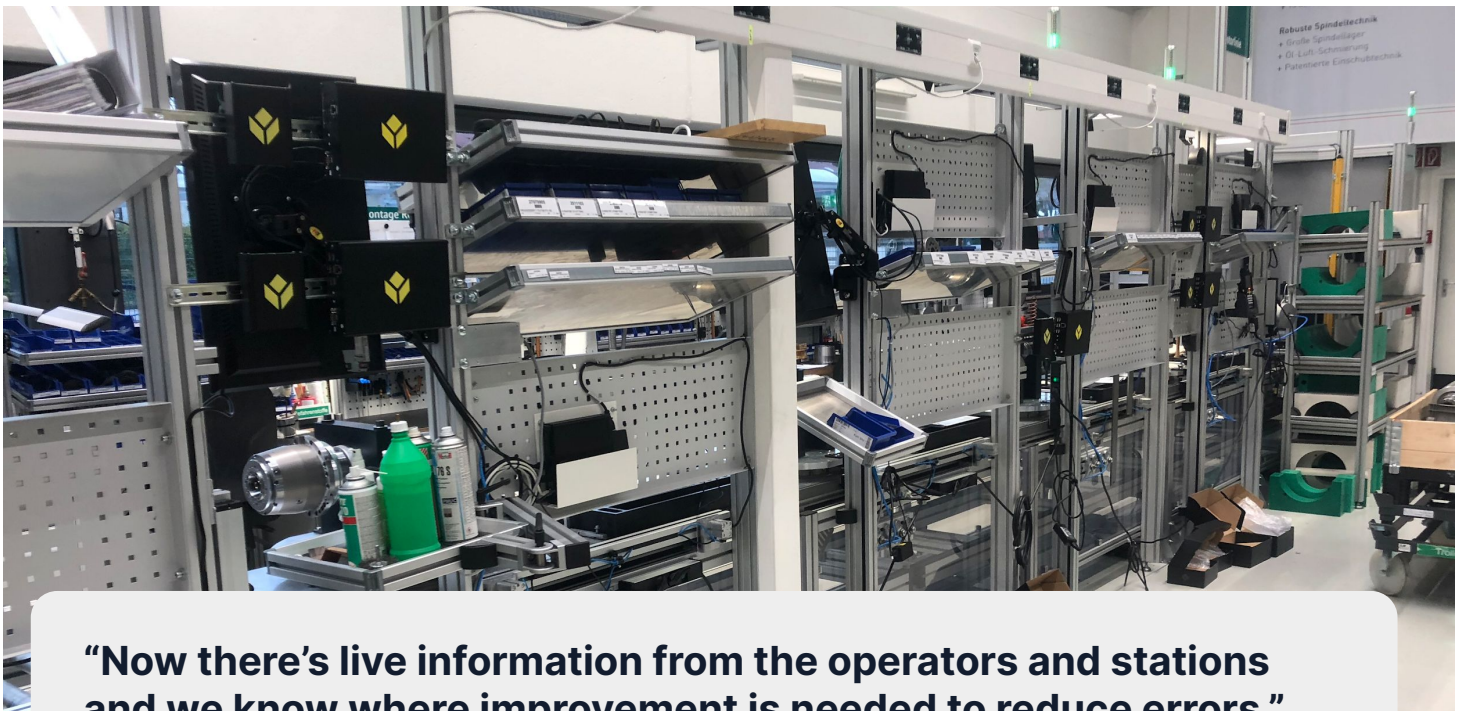
"Now there's live information from the operators and stations and we know where improvement is needed to reduce errors."

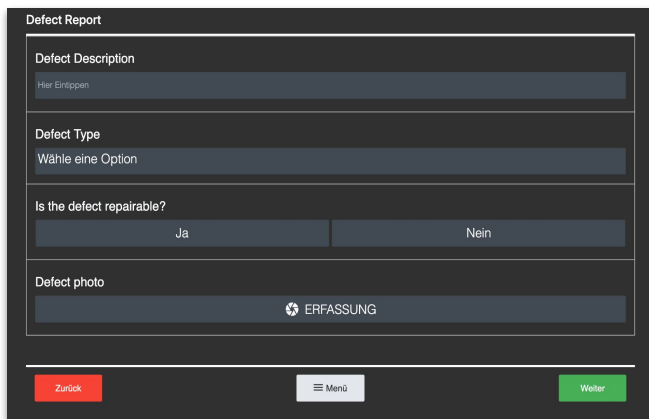- Reinhard Musch, Managing Director, Deckel-Maho

Standard Work at Your Fingertips

For each step in the assembly, DMG MORI embedded the schematics necessary for operators to correctly understand and execute their work. Instead of paging through static, paper forms, operators can immediately access the correct drawings and instructions. Further, they are able to rotate, zoom, and expand instructions as necessary, improving the accuracy and speed of each step.

Digital Checklists at Every Station

The spindle assembly application presents operators with a digital checklist of tasks to be completed for each spindle. After scanning a work order, operators select a step in the application, and mark it as complete as they finish it. This enables DMG MORI to track exactly which stations work most effectively. The data helps them balance lines when bottlenecks occur.

When specifications or product lines change, DMG MORI's engineers are able to update the applications quickly. "Tulip is easy to configure, with no programming skills required," Musch continued, "This helps us reflect daily changes to requirements."
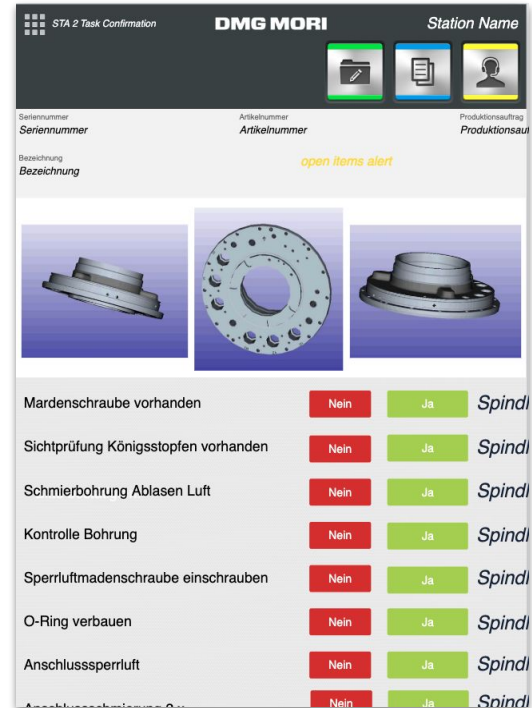
In App Defect Reporting

Should defects arise, each step of the application gives operators the option to create a defect report. These reports are customized to the specifics of the spindle line. When a defect is reported, a message is automatically sent to a shift supervisor, who is able to initiate the proper corrective action.

> **"Tulip helps us determine the root cause of problems with absolute certainty."**
>
> \-   Reinhard Musch, Managing Director, Deckel-Maho

Learn more at www.tulip.co

THE RESULTS

DMG MORI achieved real results fast with Tulip. With stated goals of reducing Takt time by 20% and reducing errors in high-mix environments, they were able exceed their initial benchmarks.

- **Digital work instructions drove a 62% reduction in reported defects**

- **20% increase into production**

- **10% reduction of failure rates**

- **Production visibility into before and after metrics proved ROI/performance**

- **The team nearly eliminated spindle routing mistakes with washing line routing**

- **4 week time to value**

What's next?

DMG MORI have already implemented Tulip in additional facilities, and have plans to expand their usage of the platform within their product line.

"During the next month, we're going to integrate the entire supply chain, from information provided by suppliers to the final assembly of our machines."