

Agricultural transmission and gearbox components: reducing cycle times



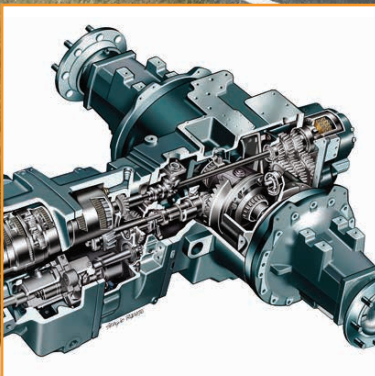
Eliminate scrap



Increase productivity



Save money



Overview

Company information	SAME DEUTZ-FAHR was established in 1927, in Northern Italy, by brothers Francesco and Eugenio Cassani.		
	8 production sites (in Europe and Asia), 13 sales subsidiaries (in Europe, Asia and North America), 1 joint venture in China and 1 in Russia		
	Sales network comprises 141 importers and over 3,000 dealers throughout the world.		
Products and services	World-leading manufacturer of tractors, harvesting machines, engines and agricultural machines.		
Industry accreditation	UNI EN ISO 9001	ISO 14001	OHSAS 18001
Company objectives	Supply customers worldwide with tractors, diesel engines and agricultural equipment of acknowledged reliability, quality and performance.		
	Develop agricultural machines with an increasingly competitive edge, featuring electronic and hydraulic components to enhance efficiency, safety and ease of use.		
	Focus on improving both productivity and product usability.		

Process

Four Mazak flexible manufacturing system (FMS) cells, producing (high value) transmission and gearbox components.

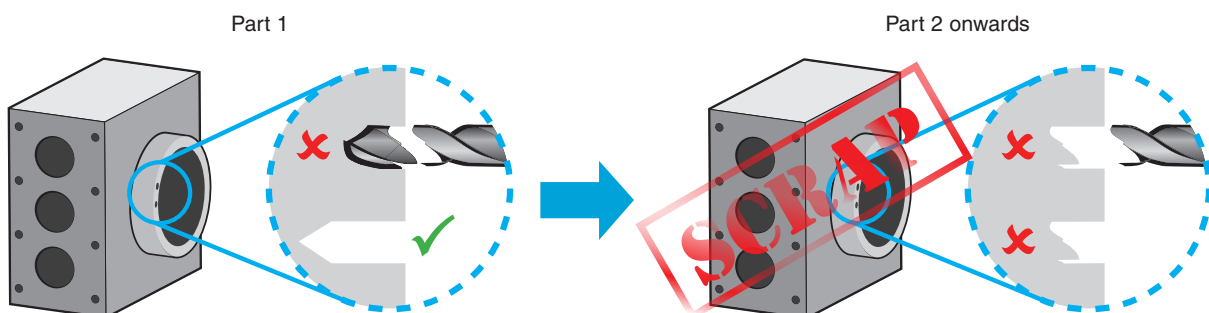
70% of machining time was devoted to drilling and tapping.

Essential, but non-productive, tool inspection was taking almost 12 minutes per component.

Challenges

1 Reduce scrap and costs

With large volumes of high-value components being produced, it was imperative that scrap rates were minimal. Due to the high frequency of drilling and tapping operations, tools – varying in size from M5 to M18 – were often broken. The fully automated machining cycles meant that broken tools went undetected, creating scrap and wasted machining time.



2 Reduce non-productive time

A tool monitoring system had been introduced previously in order to minimise scrap, however, it was taking an unacceptable 21 seconds to check each tool, which, with 34 tool checks required per finished component, resulted in significant non-productive time. A key focus for the company was to reduce this non-productive time, thereby reducing costs and increasing profits.

Process considerations

Renishaw engineers considered key elements within SAME DEUTZ-FAHR's process and production stages of manufacturing using Renishaw's **Productive Process Pyramid™**. This framework is used to identify and control the variations that can occur at key stages of the machining process.

For more information, please visit the **When do I probe?** section of the Renishaw website: www.renishaw.com/whendoiprobe

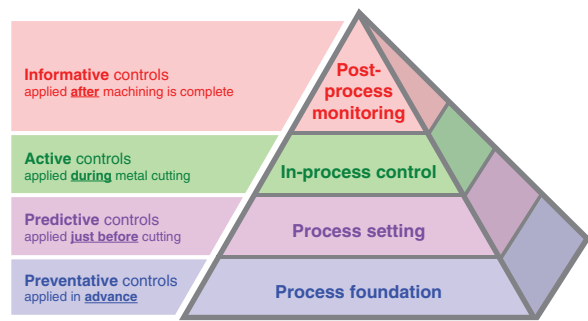
Solutions

Manufacturing process focus: in-process control

Focusing on **in-process control**, Renishaw engineers introduced measures to dramatically reduce non-productive time.

The use of fully automated machining cycles in the FMS cells meant it was important that the new system be both fast and reliable at inspecting tools. The introduction of a Renishaw TRS2 non-contact laser system dedicated to tool breakage detection produced an instant reduction in the essential, but non-productive, tool checking times.

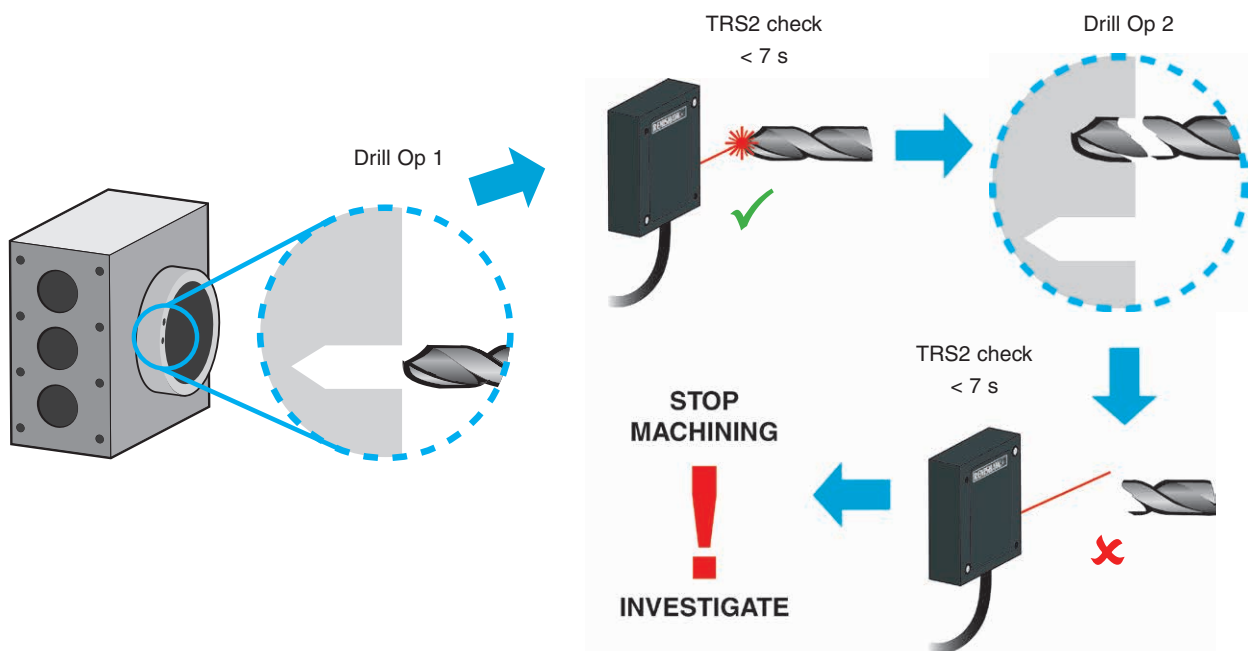
With the TRS2 units now providing the machine tools with a layer of intelligence, the condition of a rotating tool during a machining cycle can be automatically and efficiently identified. When a broken tool is detected, the machine will stop, preventing potential damage to subsequent components.



Productive Process Pyramid

Renishaw tools in use

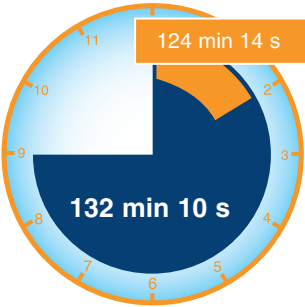
The image below shows the Renishaw TRS2 tool recognition system successfully inspecting a tool on a Mazak machining centre.




Results

These charts provide a typical illustration for this industry application where a tool recognition system has been introduced.


Reduced cycle time

		Without TRS2	With TRS2	Saving
	Tool checks per component	34	34	
	Tool detection time	21 s	7 s	66.6%
	Tool detection time/ component	11 min 54 s	3 min 58 s	7 min 56 s
	Total component cycle time	132 min 10 s	124 min 14 s	7 min 56 s

Increased savings (1st year)

		Without TRS2	With TRS2	Saving
	Saving €	N/A	150,000	

Payback period

		Without TRS2	With TRS2	Saving
	Time	N/A	5 months	

Summary

The introduction of the TRS2 has added a new layer of control to the metal-cutting process and significantly improved manufacturing performance. Due to this fast and reliable system, scrap caused by broken tools has been eliminated and non-productive tool checking time has been dramatically reduced. With 34 tool checks required per finished component, the time previously spent on checking tools is now used to machine further components.

Key facts:

- **66% reduction in the time it takes to check one tool**
- **Component cycle times reduced by approximately 8 minutes**
- **A saving of more than €150K in the first year**
- **A return on investment (ROI) in only 5 months**

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Customer comment



After a detailed analysis, based on the cost to run machines, we know this equates to savings of more than €150K in the first year. This is because most of the non-productive machine time taken to check tools has now been released to machine components. We have paid back the initial investment in the TRS2 units in a matter of just 5 months.

When we started we had several options for improving machining productivity, but this was by far the best, the others would have taken much longer to pay back.



 **SAME DEUTZ-FAHR**

Best practice

Productive Process Patterns™ from Renishaw provide guidance on best practice and the implementation of a wide range of probing solutions.

For more information regarding job set-up and other applications, visit www.renishaw.com/processcontrol



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A worldwide network of subsidiary companies and distributors provides exceptional service and support for its customers.

Products include:

- Additive manufacturing and vacuum casting technologies for design, prototyping, and production applications
- Dental CAD/CAM scanning systems and supply of dental structures
- Encoder systems for high-accuracy linear, angle and rotary position feedback
- Fixturing for CMMs (co-ordinate measuring machines) and gauging systems
- Gauging systems for comparative measurement of machined parts
- High-speed laser measurement and surveying systems for use in extreme environments
- Laser and ballbar systems for performance measurement and calibration of machines
- Medical devices for neurosurgical applications
- Probe systems and software for job set-up, tool setting and inspection on CNC machine tools
- Raman spectroscopy systems for non-destructive material analysis
- Sensor systems and software for measurement on CMMs
- Styli for CMM and machine tool probe applications

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