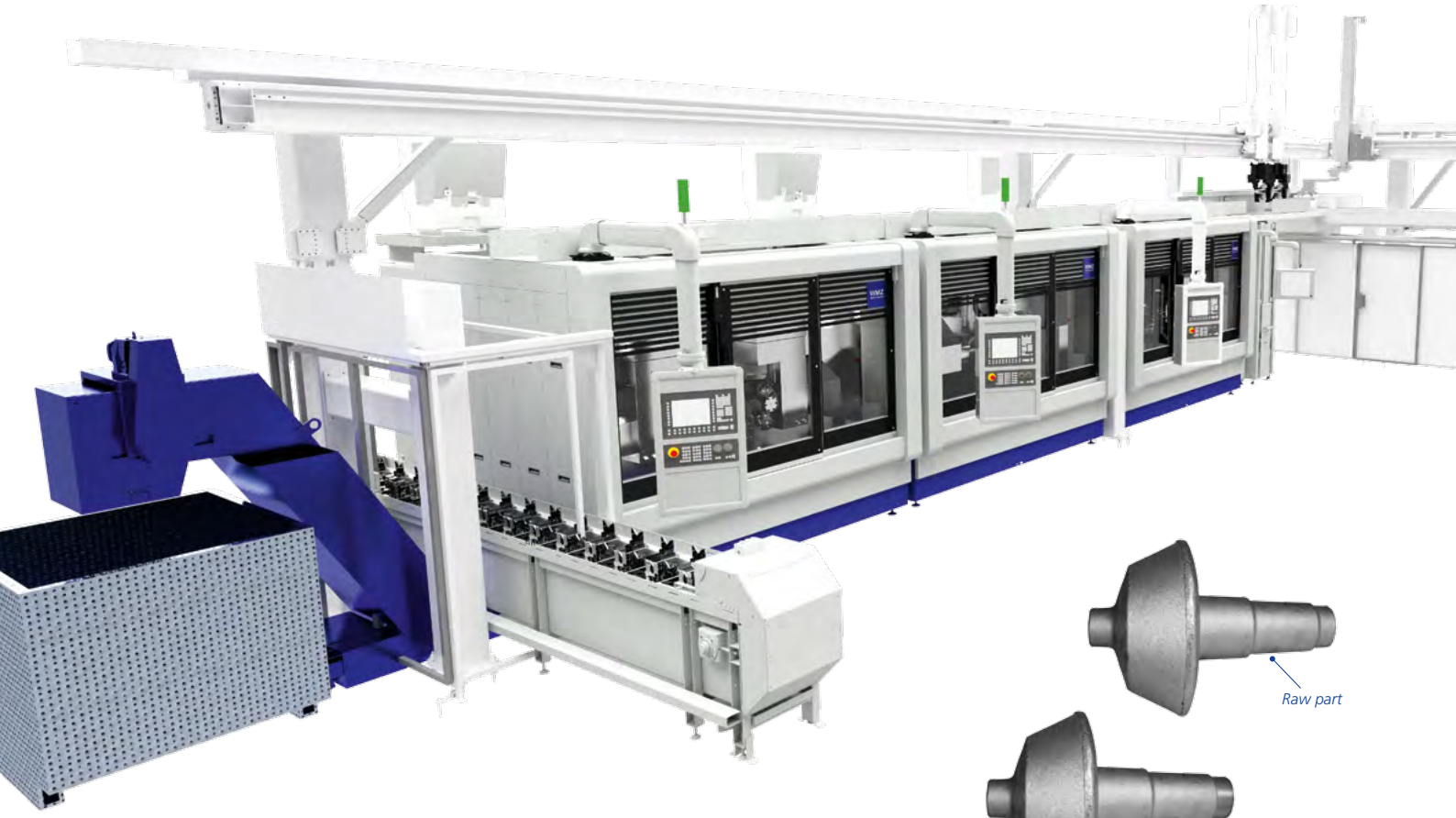
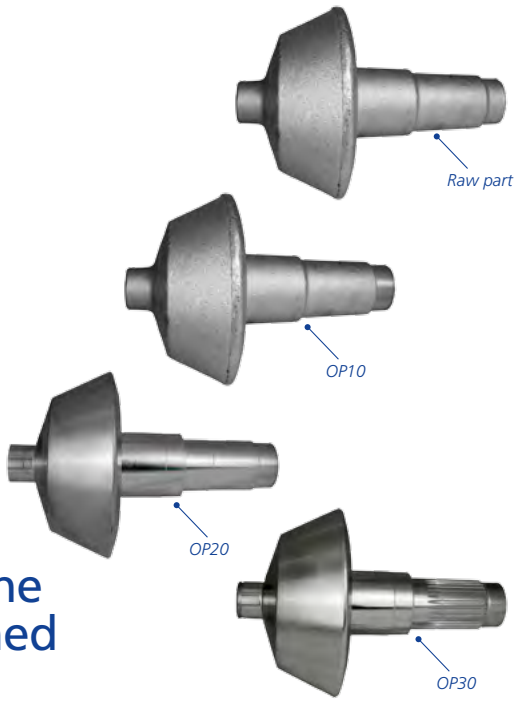
WMZ
WERKZEUGMASCHINEN





Maximum productivity right down the line

WMZ sets up innovative production line for bevel gears on behalf of a renowned commercial vehicle manufacturer

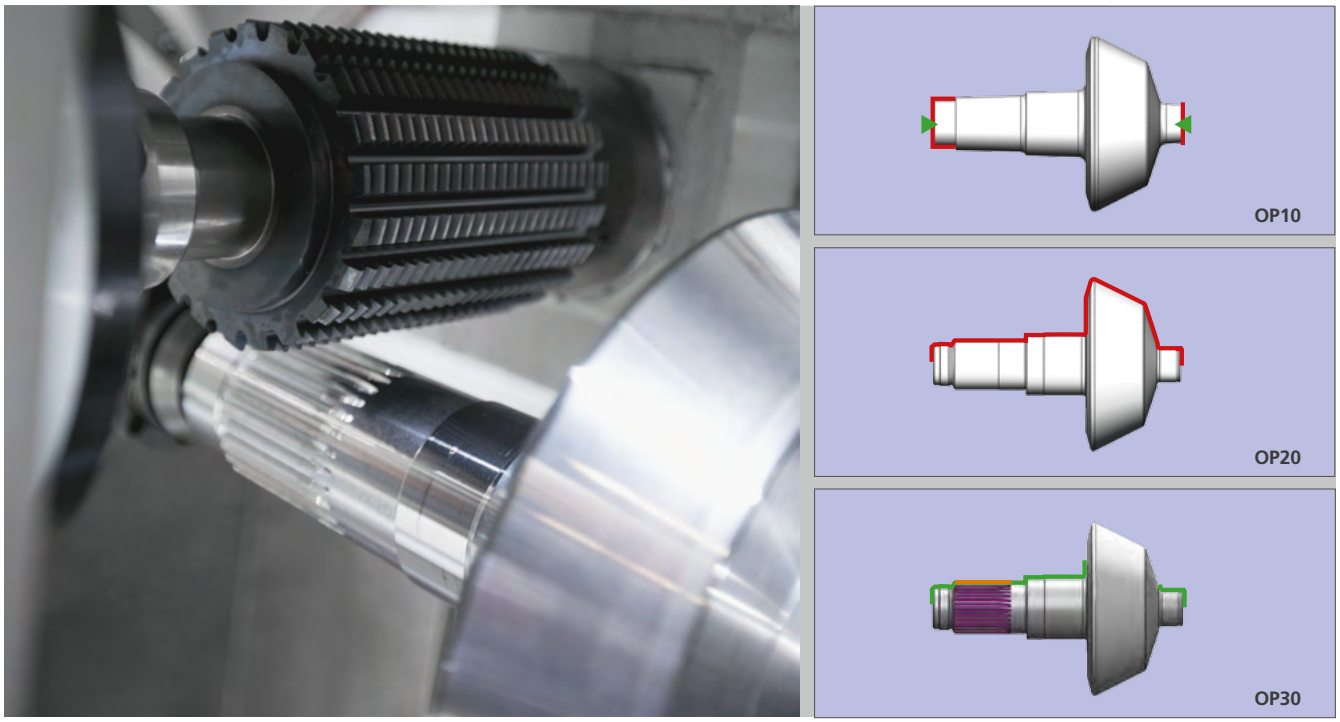
Werkzeugmaschinenbau Ziegenhain (WMZ), the DVS TECHNOLOGY GROUP's specialist when it comes to special machines for complete and combination machining of shaft-shaped components, has implemented an innovative production line for integrated machining of bevel gears on behalf of one of the world's leading commercial vehicle manufacturers. Thanks to intelligent combination of several machines for individual machining processes, integrated measuring system and maximum automation, the WMZ solution reduces total lead time by 30 %, giving the user maximum productivity.

Maximum productivity takes absolute priority for final users of machine tools in the mass production of passenger car and commercial vehicle components. Machine tool companies worldwide are therefore currently confronted with correspondingly complex and diverse requirements and challenges, particularly in view of the constantly increasing demand for integrated production solutions that combine several machining steps and technologies with tailored automation concepts and high-precision measuring systems.

In the context of this overall development, the DVS company Werkzeugmaschinenbau Ziegenhain, WMZ for short, was

Highlights

- Holistic production line including measuring system from a single source
- High level of automation reduces overall processing time by 30%
- High-performance WMZ motor spindles enable cutting depths of up to 10 mm

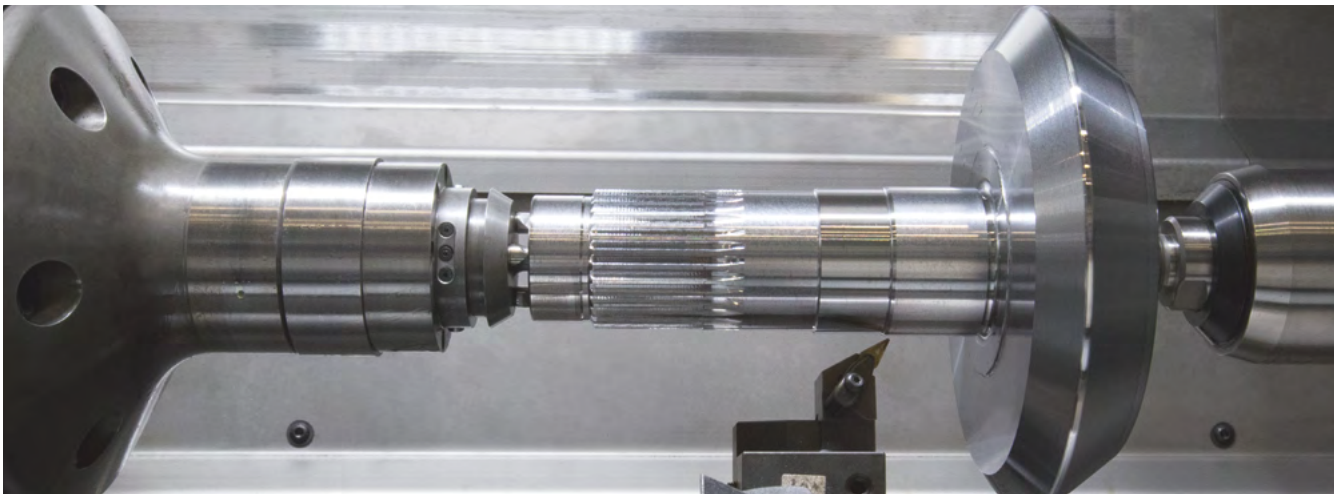


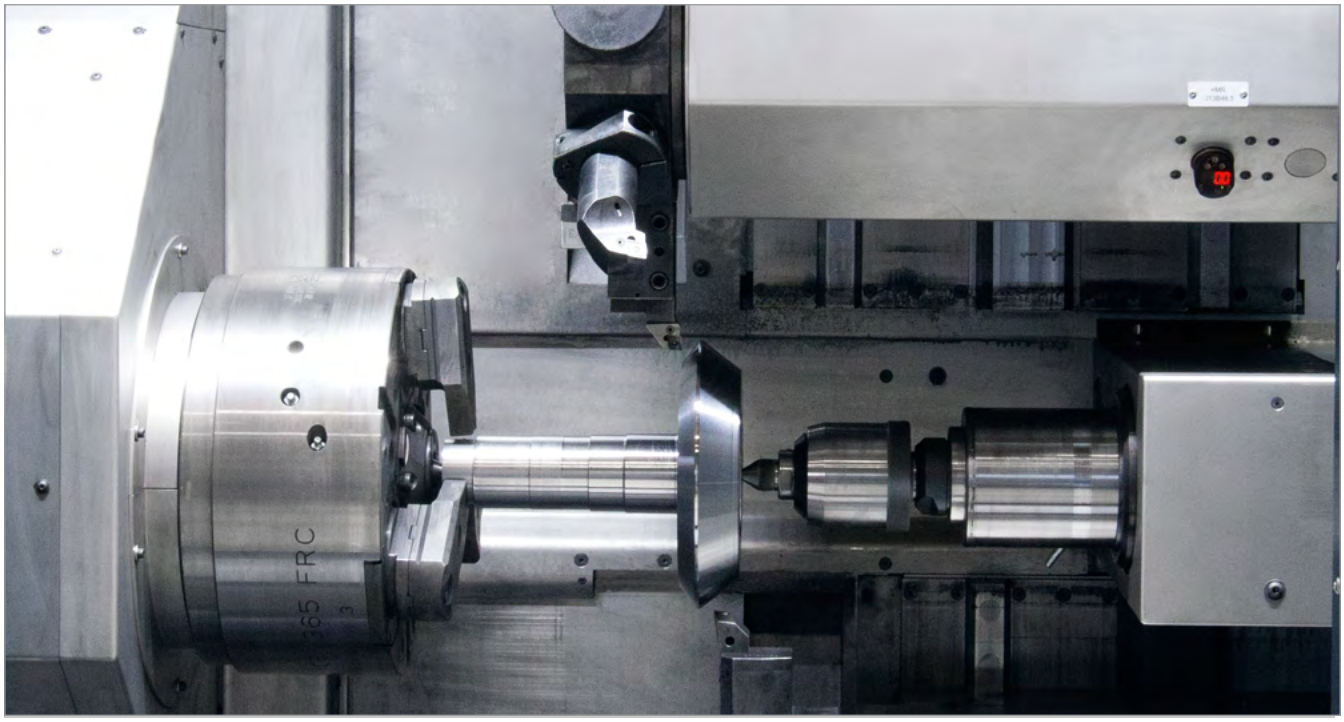
recently entrusted with the demanding task of devising and implementing an integrated production solution for the complete machining of bevel gears in all different geometries on behalf of a successful German commercial vehicle manufacturer. The prime requirement consisted in maintaining a line cycle time of three minutes from forging blank to finished part.

Three concatenated WMZ machines, one highly efficient production line

The DVS company worked closely with the customer to solve this task in the form of an integrated production line including automation and measuring system, consisting of three concatenated machines from the proven V300 series whose modular design permits flexible implementation of many different soft and hard-fine machining processes. The individual machines were rated for their specific machining task in the overall process by selecting suitable tools. "The possibility of having a customised solution devised specifically for the application with everything from a single source was one of the main reasons why the customer opted for WMZ", summarises Mario Preis, Managing Director of the DVS company based in Schwalmstadt-Ziegenhain, North Hesse/Germany.

The forging blanks weighing between approx. 6 and 40 kilos are placed on a conveyor system where they are collected by an automated gripper with subsequent fully automated passage through the entire production line, which replaces several hitherto individual machines in the customer's factory. In the first machine, in the course of OP10, workpieces are cut to length and centred. The machine's two flexible crown turrets with HSK 63 interface guarantee maximum rigidity and drive power, while the centring clamps used to hold the workpieces securely offer a wide clamping range to extensively eliminate the need for retooling. A gantry

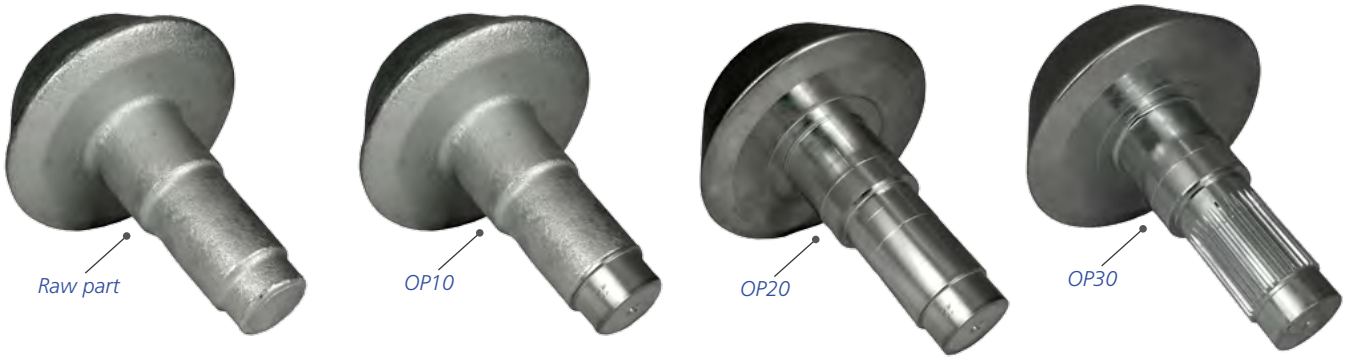


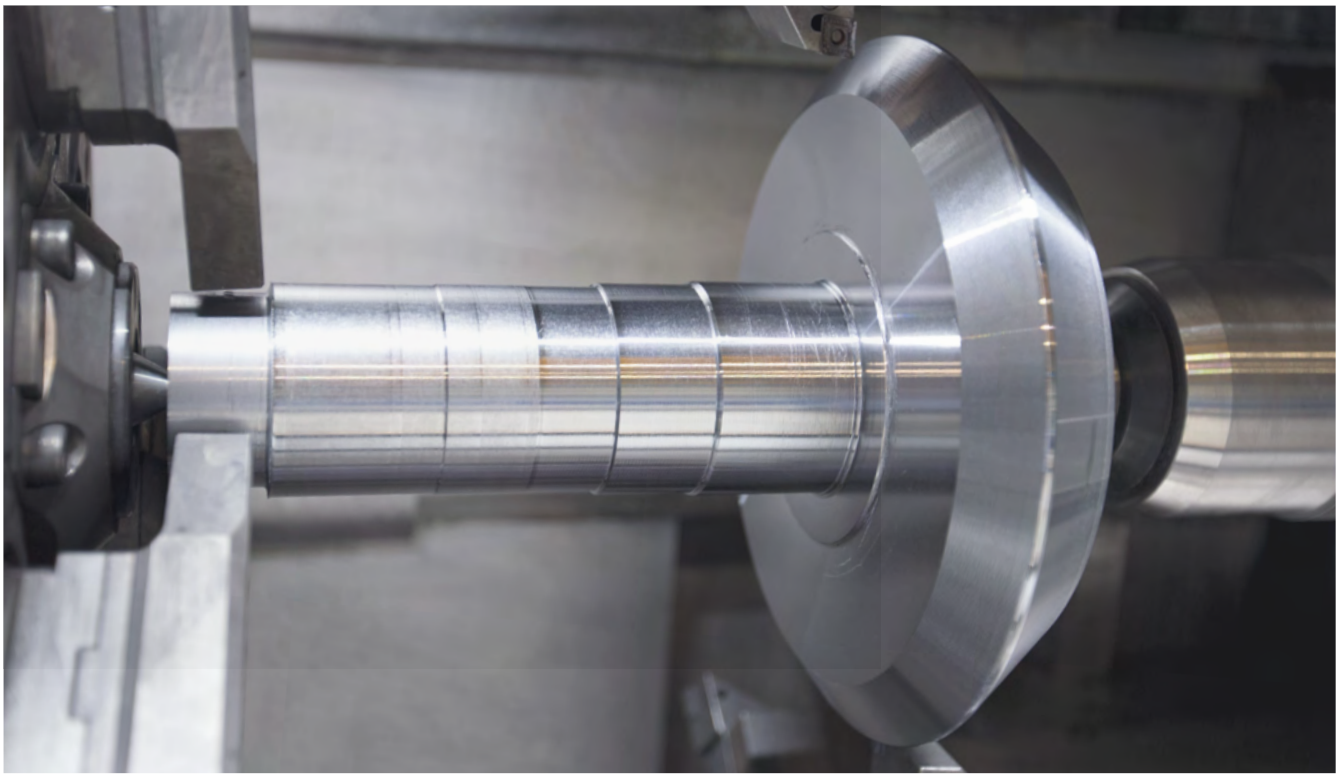


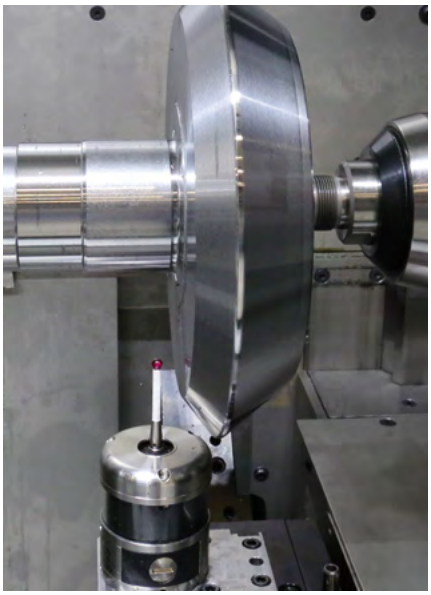
loader is responsible for transport to the second machine for OP20 where the bevel gears go through roughing in four axes as well as subsequent finishing of the tapered head. The integrated heavy-duty motor spindle also made by WMZ and specially rated for the specific application warrants drive power of up to 124 kW for dealing with high cutting depths of even 10 millimetres without any difficulties. Shortest cycle times are warranted throughout the entire production line by using extremely powerful, individually rated WMZ drive spindles. Finishing and gear cutting of the bevel gear journal in the hobbing process then takes place as part of OP30 in the third and final machine of the line. The combination of turning and hobbing in one single clamping ensures maximum gear cutting precision and efficiency. While the bevel are of almost perfect concentricity of less than 10 µm after finishing, the opposite hobbing unit specially developed by WMZ permits reliable production of splines with tolerances of less than 10 µm over balls. The hobbing unit with its high shift path of 140 millimetres makes maximum use of the hobbing cutter. Thanks to the combined use of hydraulic shaft chuck and dolly with SK 30 holder it can be changed with a changeover accuracy of 3 µm for easy retooling.

Integrated measuring system with measured data feedback and dimensional correction

Once the bevel gears have run through all three machines, they are completely measured in an integrated measuring system also devised by WMZ with measured data feedback and automatic dimensional correction. The commercial vehicle manufacturer is thus able to reduce the rejects rate many times over. One positive side effect of the measurement functionality for the user is that there is no need at all for the production line to run up to speed in preparation for mass production.







After measurement, the bevel gears are brought automatically to the final production process which is spiral tooth cutting in the customer's two existing tooth cutting machines. The bevel gear emerging from this final phase is then ready for installation.

The great increase in automation lets the customer minimise the number of manual steps, as the bevel gears do not have to be moved or stored in box pallets between the individual machining steps. This boosts output while making the process more ergonomic. The intelligent design and combination of individual V300 machines together with a high level of automation without any need for retooling as well as the included measurement system thus gives the customer an innovative, integrated production solution that reduces the total lead time for bevel gears by 30 % compared to the previous infrastructure – a result that is fully in line with the customer's objective for maximum productivity. ■

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