

**Industry: Mechanical engineering**

**Products: Servo drives, frequency inverters, controllers**

# Precision Cutting: Automated Cutting-off Machine for Materials Testing Applications

Dipl.-Ing. Hans Silbermann GmbH, a German mechanical engineering firm based in Mosbach, builds automated cutting-off grinding machines with advanced cutting technology in robust housings. Applications for the grinders include materials testing and cutting workpieces to length. Controller and drive components from Mitsubishi Electric ensure reliable automated operation of these high-precision automated machines.



In recent years a growing number of industrial users have opted for the wet cutting-off process, because it is particularly efficient and economical and places lower stresses on the material. The coolant lubricant used in wet cutting increases the life of the grinding wheels and speeds up the process by continuously removing the cuttings. This process can cut samples for metallographical structural analyses with a completely smooth, burr-free surface and without thermal damage.

The flagship in Silbermann's latest line of machines for materials testing applications is the VN300, which is an automated wet cutting-off grinding machine. It is specially designed for cutting metal and ceramic samples for testing with minimum damage to the material, and it is the company's most popular model. The machine has a 4-kilowatt variable-speed drive and can accommodate grinding wheels with diameters up to 300mm. A compact Mitsubishi Electric FR-E500 frequency inverter enables the cutting speed to be adjusted continuously from 1,000 to 3,200 rpm so that the optimum speed can be set for the various cutting wheel types and sizes.

The machine supports a wide selection of cutting methods, including chop, traverse and oscillating cutting, with which even the more difficult cutting tasks can be handled efficiently. Separately controlled servo drives for the table advance mechanism and the cutting-off wheel movement make it possible to automate a wide range of cutting operations. Up to ten different cutting programs can be stored for every cutting method under user-definable names in the programmable logic controller (PLC). Automatic pressure regulation prevents wheel breakage and workpiece burns.

The automation systems for these products must deliver high precision and reliability in a compact package, and they must also be economical enough to be viable in the smaller machines in the Silbermann range. The company's engineers opted for the small FX1N compact controller, which controls all machine functions, and also diminutive servo amplifiers from the MELSERVO MR-C range, which measure just 40mm wide and 130mm high, and HC-PQ servo motors – all from Mitsubishi Electric. A high-performance absolute position encoder enables the perfectly-tuned servo systems to achieve very high precision. Control terminals from the GOT1000 series with high-resolution graphical touch-screen displays provide information on important cutting machine parameters like cutting wheel speed, feed rate and the currently selected cutting program.

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**The compact dimensions of the Mitsubishi Electric automation components and their good cost-benefit ratio were the decisive factors for our choice. We are also impressed by Mitsubishi's competent support and reliable delivery, and by the easy installation of the well-matched components.**

Hans Silbermann

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