

m&h MESSTASTER-SYSTEME UND SOFTWARE

Hofmann & Engel GmbH, Moritzburg, Germany



Mould complete with
measuring protocol

by Karl-Heinz Gies

Measuring workpieces on the machine has become standard practice at the Saxon milling service provider Hofmann & Engel. The possibility to log work directly on the machine has helped win several orders from mould making and single component manufacturers.

“With 3D Form Inspect, good things have been achieved which I didn’t expect would work, even on older machines,” Sven Böer enthuses about on machine measuring. He is the master craftsmen in charge of manufacturing at Hofmann & Engel in the Saxon town of Moritzburg near Dresden.

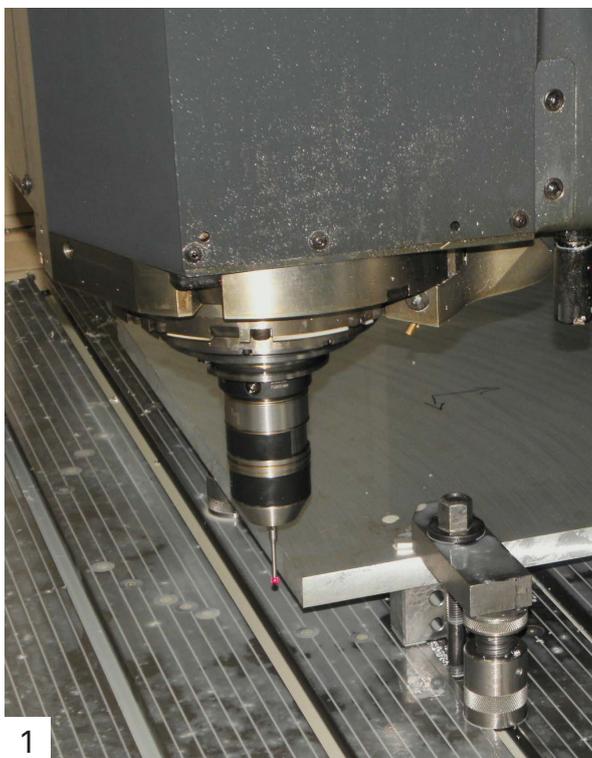
Hofmann & Engel takes over complete project management for its customers. This starts with joint research projects leading to calculations, simulations, examinations, tests, visits to industrial partners and final manufacture. As manufacturers they see themselves as a milling service provider and produce single components ranging from mould inserts, mould plates and different prototypes for mould making, machine construction and even parts for Dresden Technical University. Workpiece weights go up to 5t with maximum dimensions of 1,500 x 1,500 x 1,500mm. Materials vary from tool and stainless steels to aluminium and technical plastics. They mill mainly complex workpieces with free-form surfaces and inclined spatial geometries. Tolerance requirements are high with tolerance ranges continuously getting tighter. More frequently, measuring protocols are now included in the required scope of delivery.

Hofmann & Engel has equipped four 5-axis machining centres from different manufacturers and with different controls with m&h touch probes and 3D Form Inspect software. The software compares actual dimensions of the workpiece on the machine with the specifications of the CAD drawing. The point to be measured is selected by mouse click on the workshop computer and the measuring function is assigned by another mouse click. The software automatically generates travel paths for the probes in the background and checks for possible collisions with workpiece contours. For this function, all probes, probe combinations and cross probe styli are stored in the software and selected by the operator on the machine depending on configuration. The program is transferred to the machine and called like

any other machining program. Next, the touch probe is loaded into the spindle and briefly calibrated on a ceramic sphere with all measuring vectors triggered. This means all thermal and kinematic influences on the machine are established and compensated. This procedure, patented by m&h, ensures reliability and repeatability of measurement results at any time. With 5-axis machines, any errors in the 4th and 5th axes are automatically compensated. The program transmits results to the computer where they are immediately visible in a graphic representation on the screen. They can be printed as a protocol or transferred as a data set at any time.

When asked about the main effects to operating procedures at Hofmann & Engel, Sven Böer stresses measuring and the logging of 3D mould contours as the main achievement. "It's a big help to our work. I can assess sticking points immediately and take countermeasures at an early stage," reports Sven Böer. With 3D Form Inspect he is capable of checking his workpiece at any point, usually between machining operations, with just a few mouse clicks. "With 3D Form Inspect, we can measure positions that had been impossible before."

A second major advantage Sven Böer mentions is the measuring of different geometries while checking the fit and documenting results at the same time. "We know that it works and we can prove it," he explains. "We know that a flawless component will leave our works." Another consequence is that returns have become rare, even with complex parts requiring close tolerances. Should a part need to be reworked, almost inevitable in the case of hardening or mould repair, 3D Form



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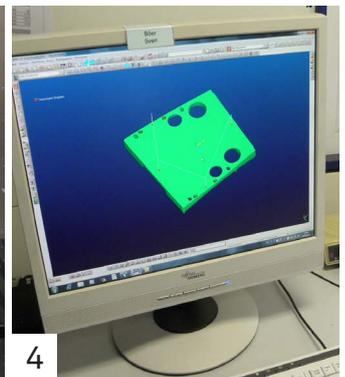
1) Fast and precise setup, including critical workpieces, thanks to Best Fit and 3D Form Inspect

2) m&h touch probes and programs also run smoothly on Mori Seiki

(left: Jürgen Sander, m&h, right: Sven Böer, master craftsmen manufacture at Hofmann & Engel)



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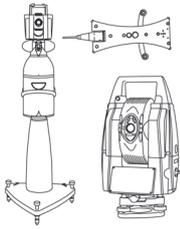
- 3| With 3D Form Inspect, swivelling errors in the 4th and 5th axis are compensated during measuring
- 4| 3D Form Inspect enables checking between machining operations at any time
- 5| Sven Böer, master craftsmen manufacture at Hofmann & Engel

Inspect with its Best Fit module helps to make a fast, precise setup. It determines the actual position of the workpiece by finding selected contour points with the help of the touch probe. The values established by Best Fit are then used for rotational and positional adjustment of the machining program. This means the workpiece only needs to be clamped in an approximate position and the machining program is optimised around critical spots. "The effect is great," confirms Sven Böer. After all, like so many other companies, he has often faced the question: 'Re-machining, but how?' or 'Re-clamping, but how?'

A further important point Sven Böer mentions is the collision control integrated into 3D Form In- spect. All m&h touch probes, with their sizes and combination options, are stored in the software. When generating the program, the contours of the selected probes and styli combinations are automatically checked for collision with the workpiece contours. If the software detects contour overlapping, this part of the program is marked as non-executable. This gives operational safety. "Handling the software is really uncomplicated," explains Sven Böer. "The operators trust in it. They can confidently start the programs on the machine and walk away."

All four machines at Hofmann & Engel are fed from one computer with a 3D Form Inspect licence, a solution that is both practical and costeffective. When asked about the total effect, they say that it is difficult to express everything just in time and money. However, there's one thing Sven Böer is sure about: "Thanks to these options we have already been able to take on work that we could not have done before. I couldn't do any more without probes and software from m&h."

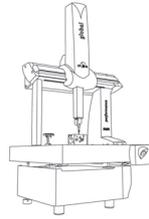
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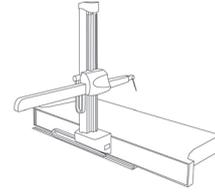
LASER TRACKERS & STATIONS



PORTABLE MEASURING ARMS



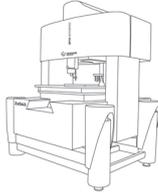
BRIDGE CMMs



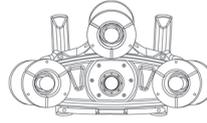
HORIZONTAL ARM CMMs



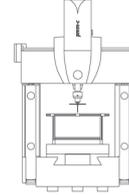
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