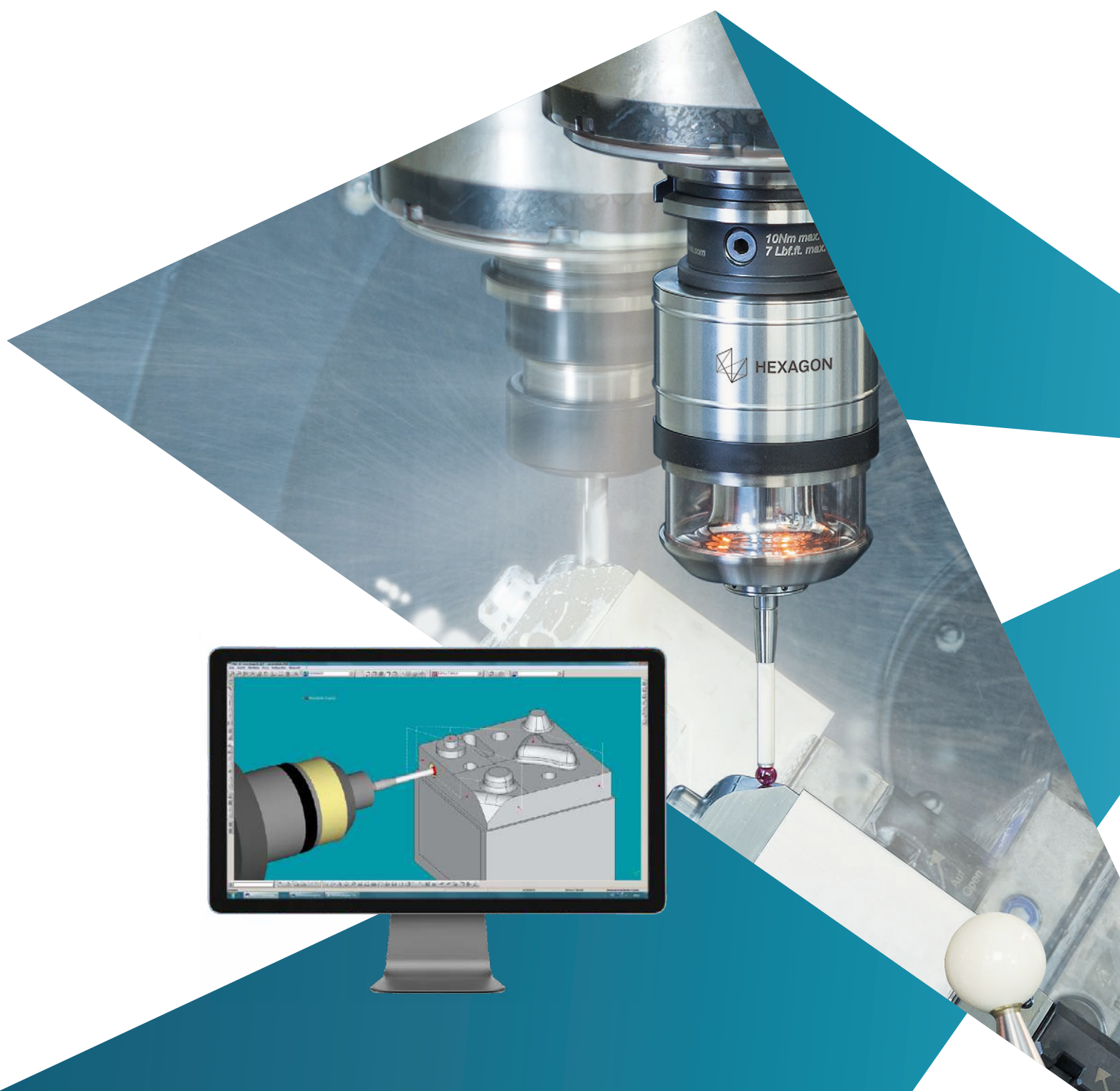
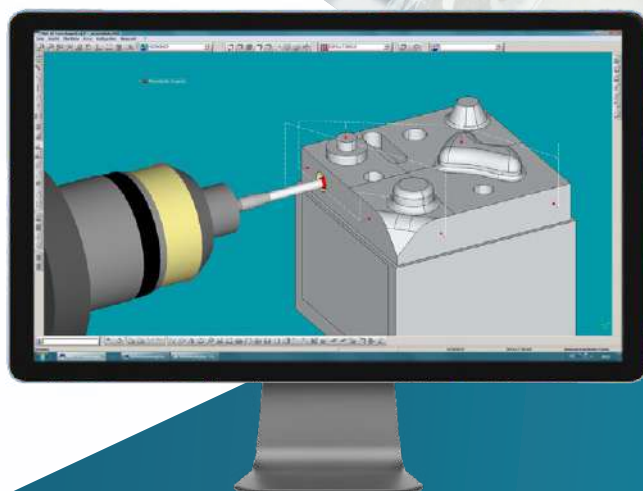


# m&h 3D Form Inspect Software

Measuring on Machine Tools





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# Why is quality control needed on the machine tool?

Causes of errors on the workpiece

## Machine errors – kinematic deviation

- Trailing and axis errors
- Path accuracy error
- Change over time due to foundation drifts, wear, material ageing and collisions

## Tool errors before machining

- Error tolerance on the tool
- Runout tolerance
- Form accuracy
- Clamping error in shank

## Tool errors during machining

- Wear
- Edge breakage or complete breakage
- Linear expansion
- Tool change error (dirt on shank)

## Application errors – The human factor

- Operator's programming knowledge
- Incorrect choice of machining strategy
- Feed calculation
- Choice of tool / material / coolant

# m&h 3D Form Inspect, a leader on the market since 2002

With 3D Form Inspect, users can quickly and easily measure and record ruled geometries and shapes on all sides, with all axes, directly on the machine tool. The software is designed to take the work out of controlling angled positions, or shaping and positioning tolerances. This saves time, raises production reliability and improves quality.

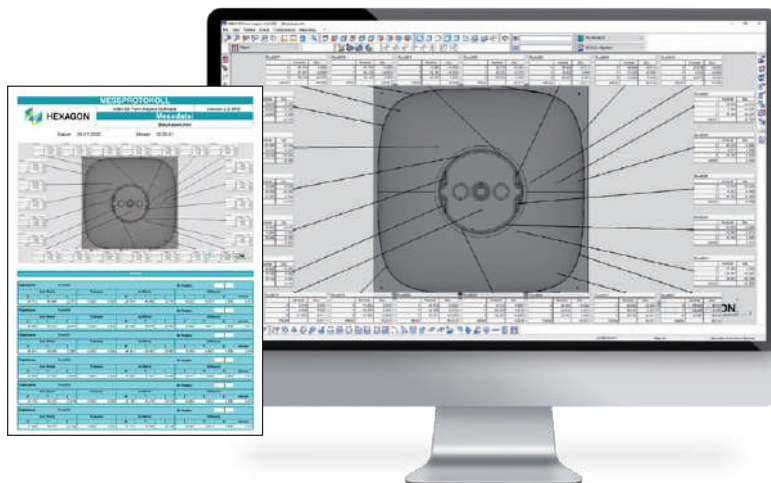
- Intuitive handling and creation of complex measuring tasks with no prior programming knowledge required
- Reliable measuring results thanks to patented calibration strategy
- Easy, safe control of freeform surfaces and ruled geometries on 3- to 5-axis machines
- Easy part alignment or post-processing of critical surfaces using Best Fit adjustment

## Full support of 4th and 5th axes

Measuring all sides of a part, for example at undercuts or inclined geometries, often causes problems. With the optional 4th and 5th axis support, it only takes a couple of clicks. Additionally, kinematic deviations can be recorded on a calibration sphere and compensated during the measurement process.

## Meaningful protocols for complete documentation

With 3D Form Inspect, users can design and create clean measurement reports. The protocols can be printed or saved digitally. Many data formats and templates are available and all reports can be designed and adjusted to meet customers' needs.



# Process optimisation

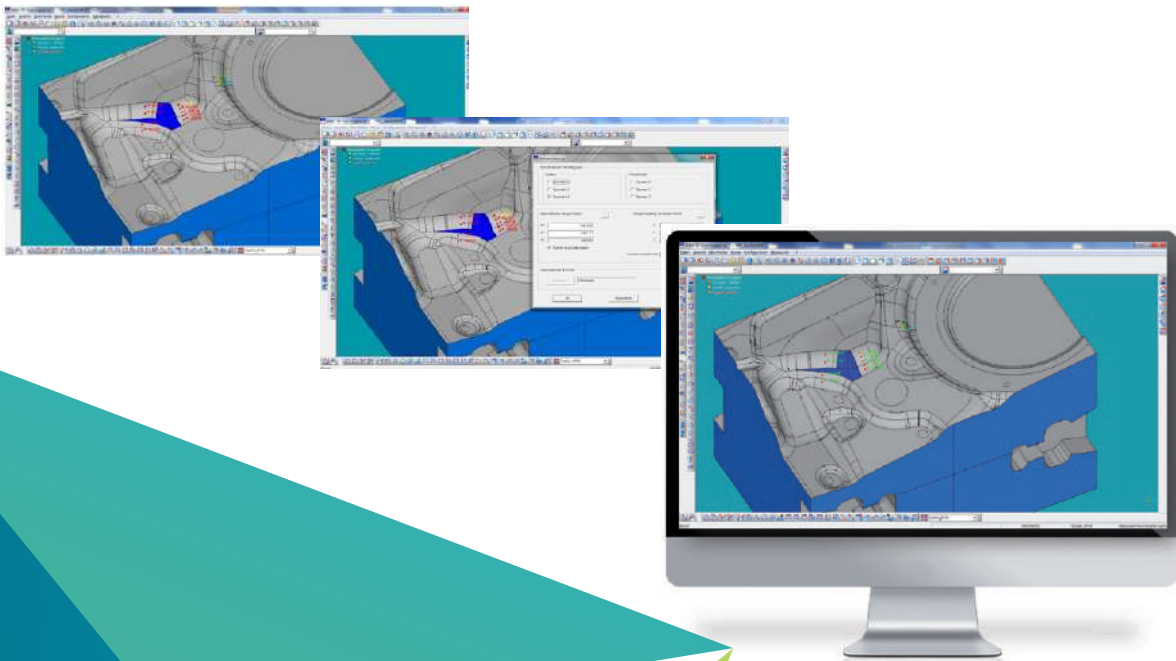
## Best-Fit Function (Optional)

Fast and easy alignment of workpieces

- Optimisation of deviations in position and location caused by turning and shifting the workpiece
- Can be used to quickly fit the raw material into the best machining position
- Rapid reclamping of moulds for necessary rework, determination of position and zero point defining after measuring

### Best Fit alignment – three simple steps

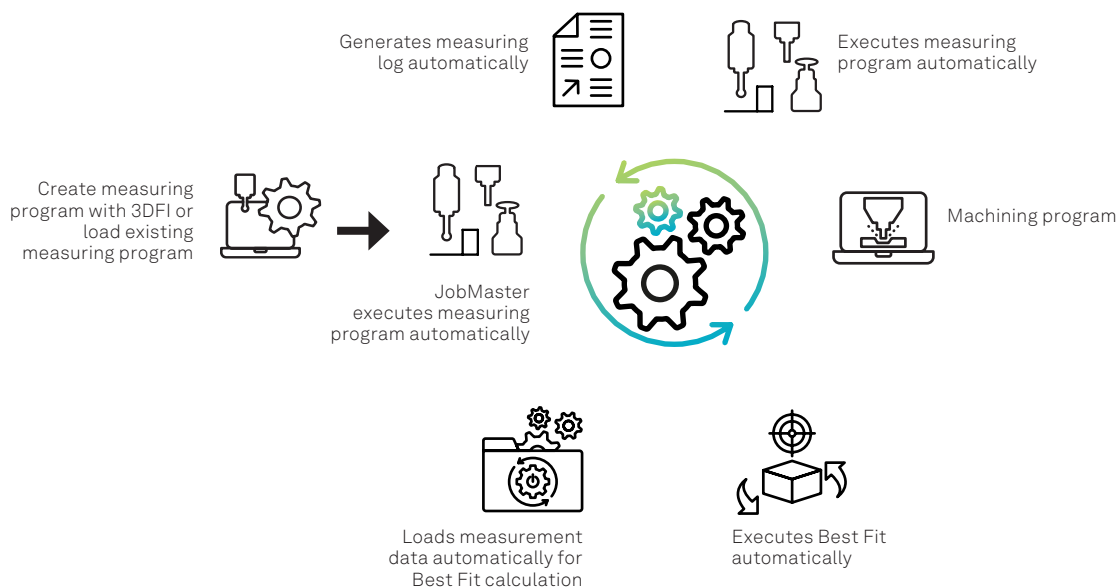
- Import measurement data and graphic evaluation
- Perform Best Fit compensation to determine position
- Evaluate results immediately on screen and describe the new position in the zero point table of the workpiece



## 3DFI JobMaster (software module)

Automated measurements,  
Best-Fit and reporting for 3D Form Inspect

- Supports and manages different measuring and Best Fit programs, as well as reporting in automatic mode
- Improves and supports unmanned operation in tool and form making
- Automatic measuring – Best-Fit – Reporting with 3DFI JobMaster



## 3DFI Execute (software module)

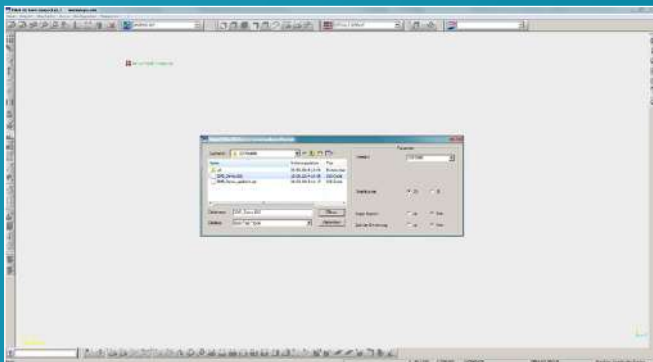
3DFI Execute an easy-to-use solution for manual and, in combination with 3DFI JobMaster, automated execution of pre-programmed 3D Form Inspect programs, inclusive Best-Fit and reporting functions.

### Features

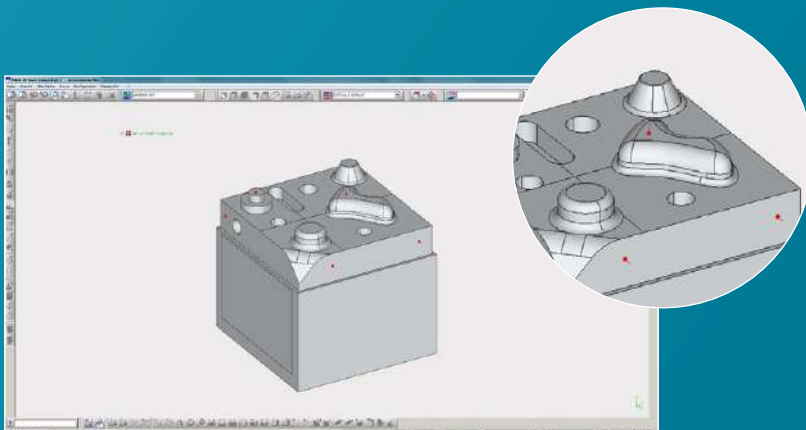
- Open existing projects
- Measurement and export of 3- and 5-axis programs
- Import and evaluation of measurement results
- Calculation and execution of Best-Fit operations
- Creation of reports

# How to achieve the desired result?

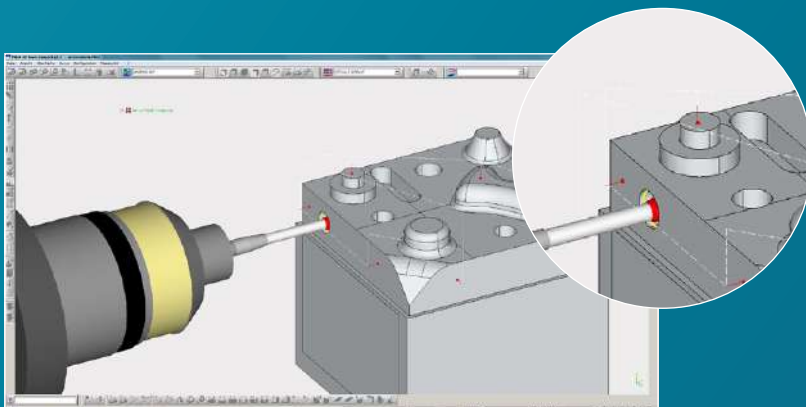
**m&h 3D Form Inspect supports a wide range of CAD formats and machine post-processors.**



> Import workpiece data

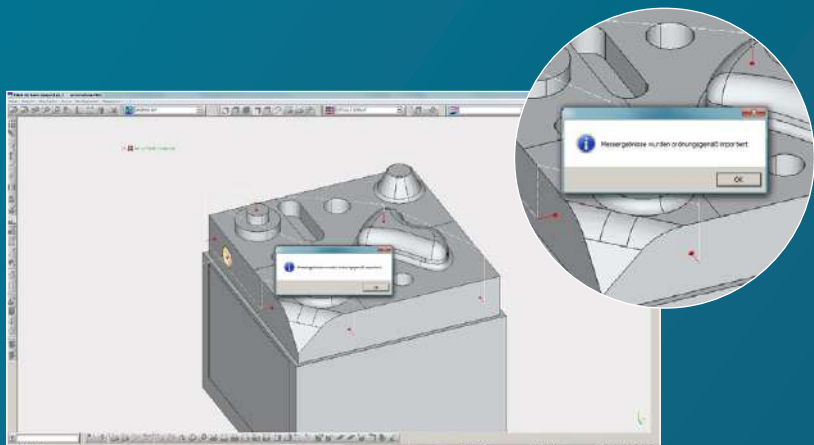


> Define measuring points with the click of a mouse or load a saved measuring program

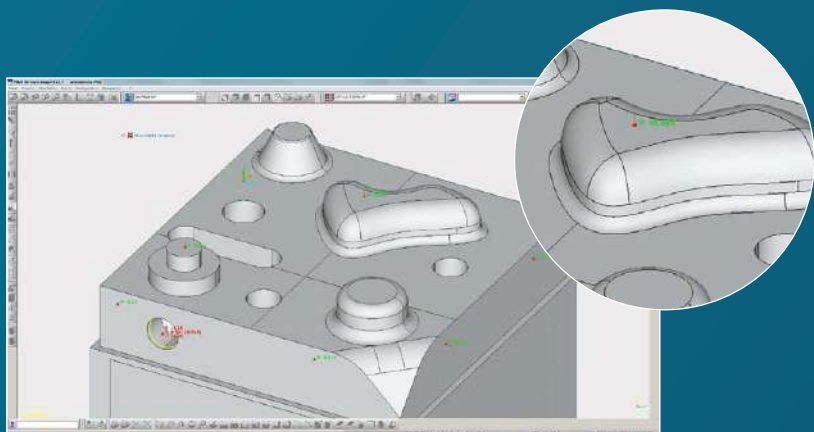


> Run collision control and simulation of the measuring program on screen, plus data transfer to the CNC controls

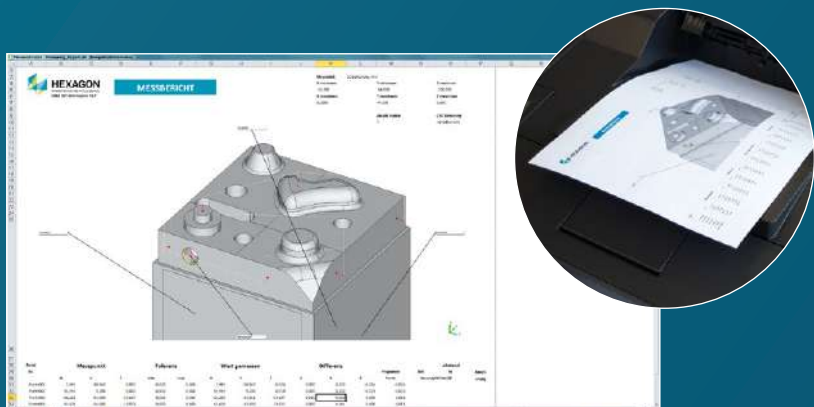
Carry out fully-automatic calibration and measurement on the machine >>>



> Import measuring results

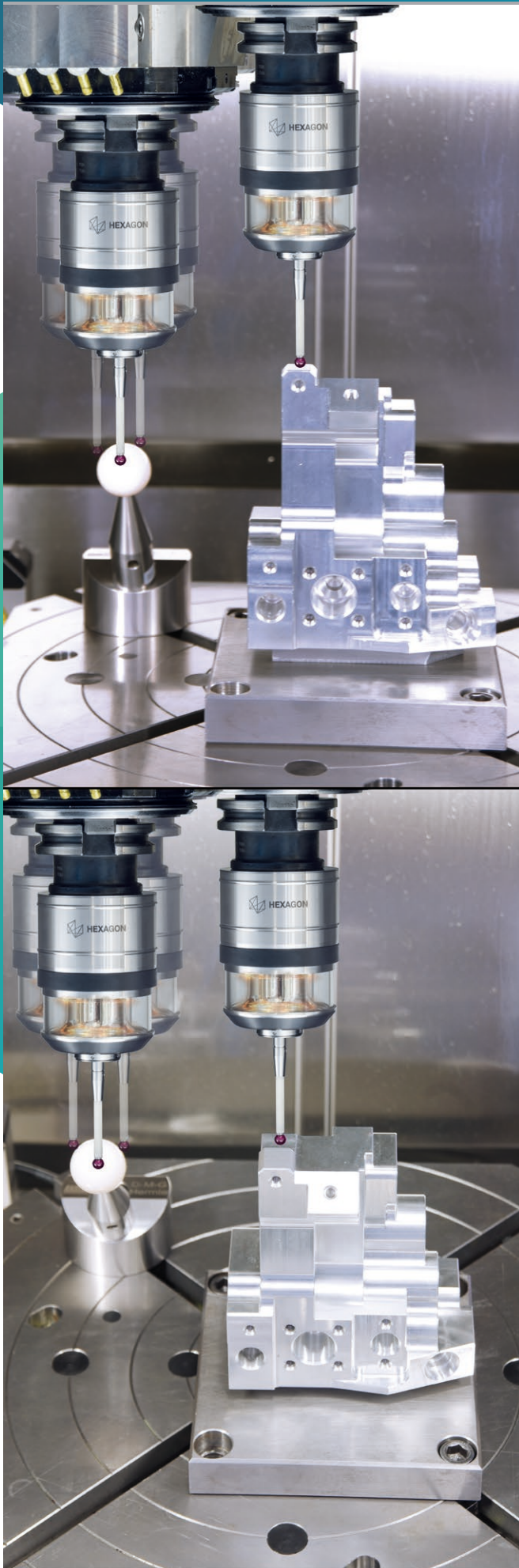


> Analyse measuring results; immediate rework is possible without wasting time



> Create a measuring log and documentation of the quality achieved





**After each axis movement,  
probing vectors are calibrated  
on a calibration sphere”**

**Maximilian Macha,**  
Head of Product management,  
Hexagon's Manufacturing Intelligence division.

# Patented “Real time calibration” for best results

3D Form Inspect offers the option of adapting the calibration strategy to different requirements, depending on the production or positioning precision of the machine and the required workpiece tolerance.

## One-time calibration

Ideal for parts that have a relatively large tolerance, the “one-time” calibration function, takes 161 calibration probings “one time” on the calibration ball.

## Workpiece-related calibration

The “workpiece-related” calibration function is used for series production or palletised systems. This function analyses the part-program to determine which probe angles and vectors are required by the program. This calibration is run once before measuring the workpiece. Once completed, the workpiece can be measured.

## Highest precision calibration (patented)

Hexagon’s patented “highest precision” calibration strategy is an essential feature for eliminating as many sources of error as possible. Patented by Hexagon, it ensures the calibration of the probing vectors on the calibration sphere after each axis movement. This results in the calibration of the exact points and probing vectors that were set as measuring points on the 3D model. Measuring points with the same probing vectors are only calibrated and then calculated for the vector, which saves time.

## The advantages of patented calibration

- Compensate measuring errors occurring at the spindle interface (SK/BAT)
- Automatically detect and compensate kinematic changes while measuring
- Identify thermal displacements in the working area and apply to evaluations
- Remove the effects of Axis Lag-errors from measuring procedures
- Eliminate pre-travel variation of probing systems using vector calibration



# m&h 3D Form Inspect Software

By making it possible for manufacturers to save time, enhance quality and reduce errors, 3D Form Inspect has established itself as an essential software program for leading companies of all sizes in the following fields:

- Aerospace
- Automotive
- Mould & Die
- Mechanical Engineering
- Power Generation
- Precision Industry
- Medical Technology
- Domestic Appliances

Here are extracts from our customer testimonials:



**“ This simply gives us the certainty in production we need. And it provides a rapid return on investment, definitely.”**

**Markus Graber**  
RUAG Aerospace, Hardheim



**“ This software pays for itself within the shortest time.”**

**Jürg Huber**  
Geberit, Jona



**“ Ultimately, measuring on the machine accelerates the complete production process”**

**Jörg Lehmann**  
Langer, Illmensee



**“ The spotting was reduced by 70 – 80%.”**

**Dipl.-Ing. Marc Alexander Popov**  
Vorwerk, Wuppertal



**“ Measuring with 3D Form Inspect is a step forward for mould makers.”**

**Oliver Schütze und Dirk Strümpf**  
Braunschweig



Hexagon is a global leader in sensor, software and autonomous solutions. We are putting data to work to boost efficiency, productivity, and quality across industrial, manufacturing, infrastructure, safety, and mobility applications.

Our technologies are shaping urban and production ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's Manufacturing Intelligence division provides solutions that utilise data from design and engineering, production and metrology to make manufacturing smarter. For more information, visit [hexagonmi.com](https://hexagonmi.com).

Learn more about Hexagon (Nasdaq Stockholm: HEXA B) at [hexagon.com](https://hexagon.com) and follow us [@HexagonAB](https://twitter.com/HexagonAB).