

Manufacturing Fact Sheet

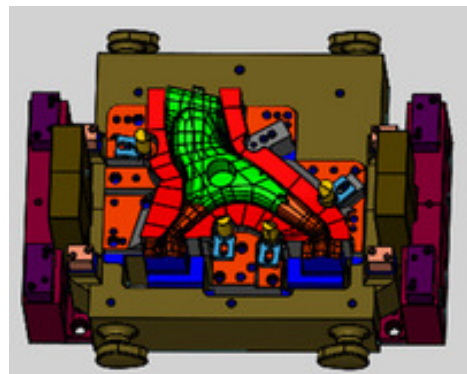
GOM's optical analysis systems work hand-in-hand to manage key processes such as material analysis and simulation, tool-making, try-out and production control for the sheet metal forming, casting and plastics industry. Steel, plastics and aluminium manufacturers, sheet metal formers and suppliers rely on GOM measurement systems on a day-to-day basis, knowing they offer consistent quality assurance from coil to the final product.

Scan-Xpress supports the manufacturing industry sectors such as tool manufacture, tool try-out and tool maintenance. Time-effective data acquisition results in cost-effective, fast and easy integration into downstream processing requirements.

- **Tool Manufacture**

Die Design / Forming Simulation

Stamping simulation software is used to test the forming process to ensure that complex metal forming problems can be identified as early as possible during tool development. The outcome of the forming process and part formability must be simulated with realistic values to guarantee that a perfect 3D-Die-Layout is developed during tool design. If input parameters such as material characteristic values are inaccurate, the simulation will produce poor forming tools. GOM systems deliver precise material characteristic values (FLC/FLD) to support the stamping simulation software. Once the right values are input, forming tools can be produced more cost-effectively and the first prototypes produced faster.

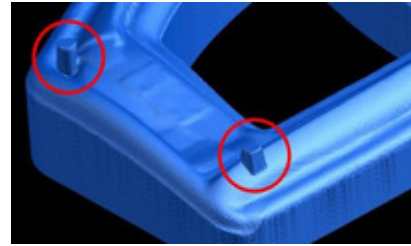


Reduction of Machining Times

When the part and tool design for a product has been approved by the forming simulations within CAD programs and an appropriate material has been chosen, the next step is to CNC machine a stamping die/tool from a cast blank.



This process can be speeded up significantly by 3D digitizing the cast blank with GOM's ATOS system. Thus, interference contours such as sprues can be recognized promptly and collisions with the milling cutter avoided. The digitized cast data is then used to align the cast blank with the CAD model in order to verify the machining allowance for the entire part and position it correctly on the CNC machining centre. This generates optimum cutting paths, avoids "air milling" and reduces machining times by more than 50%.



- **Tool Try-Out**

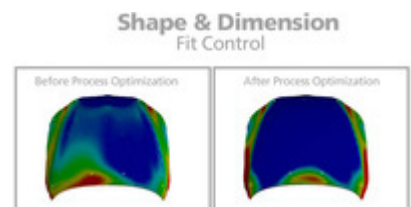
Faster Tool Try-Out through Forming Optimization

During try-out of sheet metal forming tools, the complex interaction between material, tool and press machine needs to be mastered as quickly as possible. GOM's optical metrology systems enable fast inspection of the shape and dimensions of sheet metal parts. In addition, the GOM ARGUS system for forming analysis detects material defects that occur during the forming process even before they are visible to the human eye. Objective root cause analysis significantly reduces iterations until tool buy-off. What's more, comprehensive quality control based on GOM optical metrology leads to shorter production start-up times and guarantees component integrity.



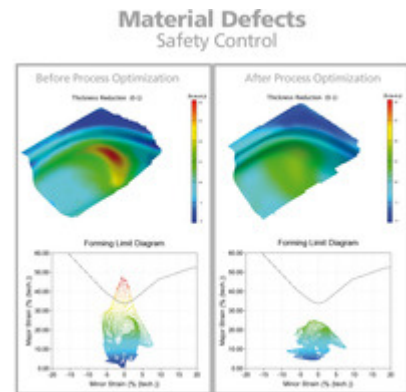
Shape & Dimension Control

During tool try-out, the ATOS 3D digitizer delivers fast results on the actual geometry of a stamped part. This makes it possible to verify on the shop floor that the part will fit properly during assembly and that it complies with optical requirements. The ATOS system not only measures deviations between the stamped part and CAD parameters over the entire surface but also checks hole pattern, trim and spring-back for required tolerances using special algorithms with sub pixel accuracy for precise inspection of cut edges.



Detection of Material Defects

A material's forming limits might be exceeded during the stamping process without this being immediately visible to the human eye. GOM's ARGUS strain measurement system checks for areas of the material that have been critically weakened, e.g. due to extreme material thickness reduction. The strain values and the thickness reduction are displayed as graphics and validated in relation to the Forming Limit Curve (FLC) of the selected material, a process that produces the Forming Limit Diagram (FLD).



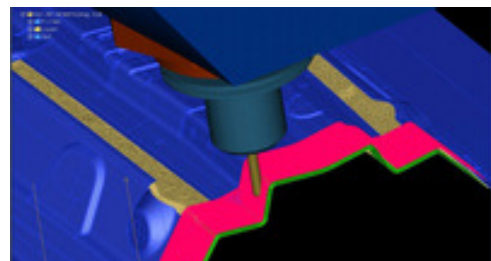
The FLD reveals those areas where stamping parameters (lubrication, down-holder force, blank positioning, etc.) need to be adjusted or areas of the die that need reworking. The ARGUS system helps to detect material defects that arise during the forming process. At the same time, the system supports optimization of tool try-out. To assess the shaping process in a multistage tool, parameters from the different shaping stages can be recorded and evaluated in a single project. The deformation ratios can be measured, visualized and evaluated in each individual stage as well as across the entire deformation process.

- **Tool Maintenance**

Repair and maintenance of tools and dies represent a major cost factor in the manufacture of parts. Optical measuring systems from GOM can be used to quickly locate and repair a broken die, or to proactively check for die wear and extend tool life.

Data Backup for Broken Dies

Fast digitizing of an approved tool ensures that any manual changes made during tool try-out can be archived reliably. ATOS STL polygon meshes serve as the perfect database for updating CAD data to the latest status via reverse engineering. More importantly, ATOS 3D digitizing data also supports direct copy milling to replace broken tools.



Wear Control

The ATOS digitizer is used to monitor wear on active surfaces without removing the tool from the press. Full die surface inspection against CAD or master data during short maintenance periods makes it easier to estimate tool durability and service life. Pro-active wear control results in improved maintenance and repair planning, thus preventing production of scrap parts.



Press-Machine Analysis

The GOM PONTOS online motion measurement system supports dynamic 3D analysis of stamping machines during operation. Measuring bolster bending and deflection, velocities and accelerations, etc., helps to detect and prevent unfavourable oscillation. Dynamic analysis of the press process enables forming machine parameters to be optimized and thus ultimately reduces maintenance and service costs.



- **Sheet Metal Parts**

Inspection of Sheet Metal Parts

The ATOS optical digitizing system is an established system in the inspection of sheet metal parts. GOM has developed special algorithms that are used to measure entire surfaces as well as sharp-edged features with sub pixel accuracy. In combination with the GOM Inspect Professional Software package, ATOS is the perfect solution for verification and quality control on sheet metal parts.



Typical applications include:

- Flexible Alignment Strategies (RPS, best-fit, etc.)
- Full Surface Verification
- Hole Pattern Inspection
- Trim & Spring Analysis

Online Calibration of Fixtures, Jigs and Gauges

The ATOS 3D digitizing system is not used solely for geometrical full-field verification of parts and components. The GOM Touch Probe combines optical 3D free-form measurement and online tactile probing within one system. The live inspection of single points supports fast and intuitive online calibration. Combined with the GOM Touch Probe, the ATOS digitizer therefore effectively speeds up the calibration and validation of fixtures, jigs and gauges.

