

ZF Fonderie Lorraine: Measurement of Cast Blanks

Site / Country: Grosbliederstroff / France

GOM systems: ATOS ScanBox 4105, ATOS Core 500

GOM software: ATOS Professional VMR

Sector: Automotive supplier / Foundry

An automotive supplier based in the Lorraine region on the German border, Fonderie Lorraine is continuously striving to improve its production processes. The purchase of an automated optical 3D measuring cell has allowed the company to increase and optimize its measuring capacities for casting.



As a key player in the industrial landscape of the eastern Moselle area, Fonderie ZF manufactures complex injection-molded parts in aluminum for automatic gearboxes and engine components. It currently employs a workforce of some 400 persons, mainly employed in two sectors: the foundry comprising around twenty casting cells, and the machining sector. The main client of Fonderie Lorraine is ZF Friedrichshafen AG, the world's leading supplier of powertrain and chassis technologies. Via this customer the company has access to a number of prestigious automotive marques: Audi, BMW, Porsche, ... Every day the company manufactures 17,000 parts throughout its site.

Fonderie Lorraine: 22 years of experience

Founded in 1996 by the German Honsel group and based at Grosblierstroff, just a few miles from the German border, Fonderie Lorraine was first bought in 2010 by its customer ZF Friedrichshafen AG, which wanted to safeguard its chain of supply.

On January 1, 2017, Fonderie Lorraine then became a joint venture between ZF Friedrichshafen AG and VOIT Automotive GmbH. Today 51% of shares in Fonderie Lorraine are held by VOIT, a specialist in aluminum casting with a high level of value added and an international supplier to the automotive industry. Equipped with 22 years of experience in aluminum die casting, the company and its CEO Marc Friedrich have striven over recent years to achieve their main objective of reducing manufacturing reject rates, in particular via the measurement of cast blanks by the foundry.

A new approach: automated optical 3D metrology

Peggy Neves-Wackenheim has been in charge of metrology at Fonderie Lorraine for five years and heads up a team of 5 employees. With some twenty years of experience as a tactile CMM programmer, she then initiated investigation into purchasing a new system designed to measure blanks.

At Fonderie Lorraine its conventional CMM plants are dedicated to machining. Until now, these tactile measuring systems have been perfectly suitable for inspecting machined parts in production, but the utilization options they offer for shape and dimension analysis of castings are limited. The company was therefore on the lookout for a solution capable of testing initial samples (until then subcontracted out to mold makers) in order to validate introduction of the molds and then embark on series production.

"We met GOM for the first time at CONTROL, the international trade fair for quality assurance in Stuttgart, in 2014," says Neves-Wackenheim.

This was followed by benchmarking of the different systems available on the market. After several successful trials, the company finally opted for the ATOS Core 500, installed in an automated cell, the ATOS ScanBox 4105.



Peggy Neves-Wackenheim (right), in charge of metrology and Mohamed Rahaoui, technical programmer and user of the ATOS ScanBox at Fonderie Lorraine (source: GOM)

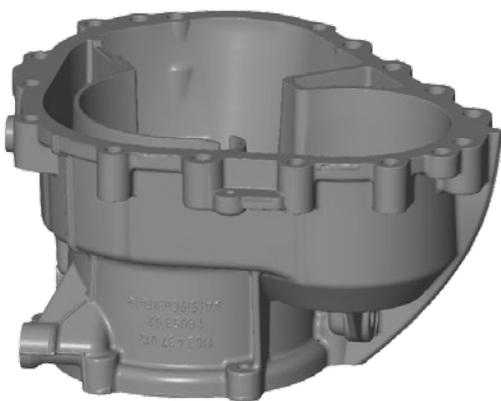
Automated inspection and simple operation

The ATOS Core 500 is the sensor in GOM's product range designed to measure small and medium-sized cast blanks.

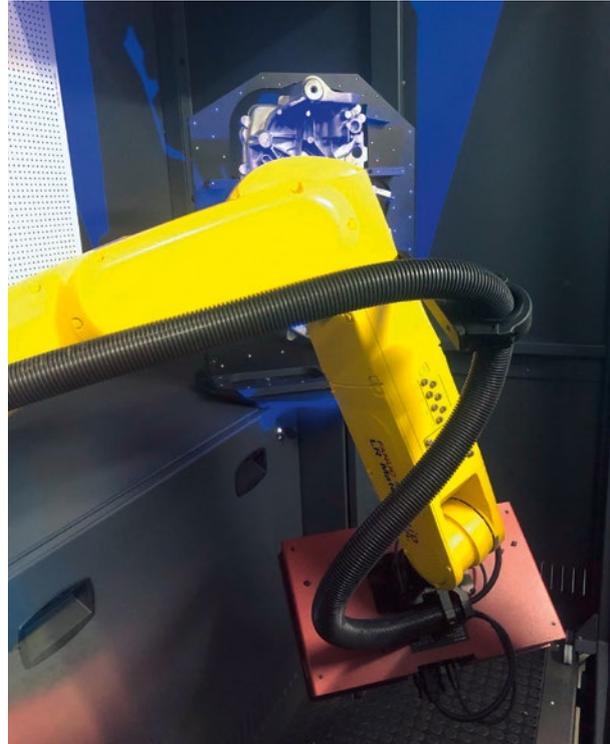
It projects a network of encoded fringe patterns, specific to GOM, onto the surface of the object to be measured. In each measuring position, the cameras capture the projected patterns in a manner akin to the human eye. GOM's algorithms exploit the registered images in a live process. The Triple Scan Technology consists of combining stereo measurement with two accompanying measurements via triangulation of the cameras on the right and left. This unique technology offers a high level of optical accessibility – a major benefit when dealing with the complexity of injection-molded die-cast aluminum parts with a bright finish.

The projection unit of the ATOS Core system is based on GOM's Blue Light Technology. The blue fringes of the LED projector are observed with bandpass filters, so allowing light-based interference to be eliminated. Due to its powerful light source, short measuring times are achieved here.

"We were particularly interested in the automation feature/interface of the ATOS ScanBox. This technology tipped the balance in favor of GOM. The casting team is fully independent, and the machine is really easy to use thanks to the Kiosk mode. All measuring, inspection and reporting processes can be conducted quickly and easily," adds the metrology specialist.



3D mesh of a cast blank



Measurement of a casting component (source: GOM)

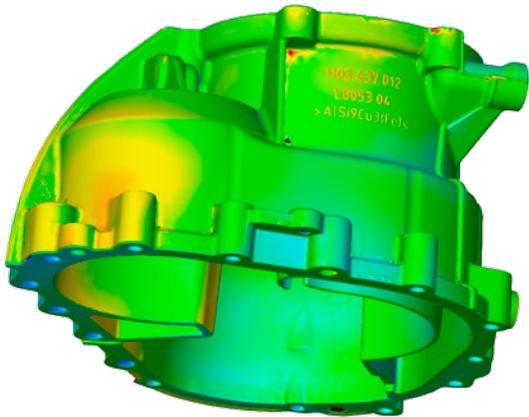
The ATOS ScanBox module comes with all elements required for fully automated 3D digitizing and inspection. The complete system includes hardware, software, worldwide customer service, safety equipment and documentation. As a result, the automotive supplier does not have to worry about any additional planning or investments.

The ATOS sensor is attached to a fast and robust industrial robot. The components to be measured are positioned on a rotation table to enable the sensor to measure all areas of the object from above and below with short distances.

The Virtual Measuring Room (VMR) acts both as the central control station and the measurement planning software for all elements of the ATOS ScanBox 4105. The robot can be completely controlled through a simple and safe software interface. Users thus require no knowledge of robotics.

The VMR enables programming, complete inspection and reporting to be prepared in advance without blocking the system, resulting in short downtimes and fast part turnarounds at Fonderie Lorraine.

The Kiosk Interface is a human machine interface which simplifies interaction with the measuring machine for Fonderie Lorraine. It automatically handles the complete measurement and inspection workflow, as well as the visualization of pages of reports and exports. As human interaction is greatly reduced, high precision and data quality are guaranteed, and measurement parameters, data and operating system are protected.



The measuring data can be analyzed immediately and compared directly with the CAD data. Deviations from CAD are highlighted in color, so making problematic areas easy to recognize and allowing improvements to be made to the manufacturing process.

Fast measurement

Mohamed Rahoui, who has been employed at Fonderie Lorraine for 20 years including ten in the metrology department, is the main user of GOM's automated cell at the company.

"This technology from GOM enables me to scan a part and get an overview of the global deformations of blanks when removed from the mold – this isn't possible with three-dimensional tactile systems. This is why it became a pressing need to purchase the GOM machine, to supplement the tactile system," he explains.

3D optical inspection with GOM's technology makes it possible to reduce trial and error loops. Once the part is removed from the mold, a full analysis is available for the part after around ten minutes.

"This is an extremely smart system, which reduces the level of human input. Less adjustment and preparation are required than with tactile machines, and very little human intervention to prepare for programming. I just perform my programming for the analysis range, and the software will do the rest. This significantly reduces the risk of error. Measurements can be taken very quickly, so we get the result faster," adds the programmer.

The purchase of this machine and his personal motivation has allowed him to advance to his current position of technical programmer within the company after spending many years as a production operator.

Rahoui also emphasizes the collaboration with the team from GOM: "Cooperation with GOM's application engineers, working hand in hand during installation and training, has enabled me to achieve the necessary level for optimal utilization of the machine."

GOM Inspect: ergonomic analysis software

Most conventional systems only capture a discrete quantity of information. ATOS, on the other hand, systematically supplies a full-field point cloud that characterizes the part in its entirety. On analysis, it is then possible to choose between examining all surfaces (e.g. during development) or solely geometrical specifications for entities constructed on mesh (cylinders, circles, planes, ...).

The result of a scan takes the form of a polygonized point cloud (STL). The mesh can then be retained for future analysis such as process capability analysis and trend analysis in production, or to monitor levels of tool wear.

This enables staff at Fonderie Lorraine to immediately identify any dimensional deviations via the color plot shown on screen, resulting in a significant time saving for the company.

In the context of Industry 4.0, GOM machines also permit the export of correction values for application to the process.

“We have succeeded in becoming more responsive to problems. We are now able to respond while parts are still blanks and to look ahead even before proceeding with machining. This allows us to not only save time, but also money during the entire production process. We are able to undertake new projects while adhering to our aim of reducing reject rates,” explains Mme. Neves-Wackenheim.

According to Philippe Schuler, responsible for quality, safety and the environment at Fonderie Lorraine, the installation of a second automated cell is conceivable within the group.

Fonderie Lorraine

Founded in 1995, Fonderie Lorraine, a joint venture between the major German companies ZF Friedrichshafen AG and VOIT Automotive GmbH, is an automotive supplier specializing in the production of aluminum parts for automatic gearboxes and engine components. Its main business is turning aluminum blanks into finished parts, ready for installation. The company currently employs a workforce of some 400 persons.

GOM

GOM develops, produces and distributes software, machines and systems using 3D coordinate measurement technology and 3D testing based on latest research results and innovative technologies. With more than 60 sites and more than 1,000 metrology specialists based throughout the world, GOM guarantees professional advice as well support and service. More than 14,000 system installations improve the product quality and manufacturing processes in the automotive, aerospace and consumer goods industries.