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Monitoring in 3D printing: What companies need to know

In industry, monitoring refers to the monitoring of processes. How can this be achieved in a process such as 3D printing, which may take several hours and runs independently within a system? Here are the answers to the main questions:

Why is monitoring important in 3D printing?

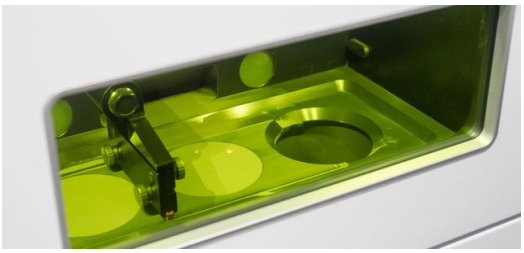
During printing, a 3D printer works fully autonomously. It produces complex components for high-end applications. Just small deviations can however render the component unusable costing the company expensive material and time. Monitoring also helps companies to provide continuous proof of the quality of their components. This is vital in industries subject to strict safety regulations such as medical technology.

What monitoring systems are there and how do they work?

TRUMPF offers customers three monitoring systems that automatically check different areas of 3D printing: Condition & Performance Monitoring, Powder Bed Monitoring and Melt Pool Monitoring. The first monitors machine components and process environments. Integrated sensors record data such as oxygen content, cooling water temperatures and axle torque. When printing is finished, the system creates a report of the process.

Powder Bed Monitoring checks whether the 3D printer has correctly applied the powder. A high-resolution camera in the printer takes an image of the powder bed after each layer. An IT system then evaluates the images in real time and detects deviations such as drag lines in the powder bed or insufficient powder. Our video shows how this works in detail.

Melt Pool Monitoring monitors the laser's melt pool and compares it with the data from a reference workpiece. Deviations such as a colder melt pool or overheating are graphically portrayed by the system. Operators can then immediately see where the error lies and take remedial action.



Process data such as the laser melt pool and powder application are monitored independently by the TRUMPF systems. (Source: TRUMPF)

– TRUMPF

Automated monitoring solutions are indispensable especially in strictly regulated sectors such as medical technology. (Source: TRUMPF)

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How do operators find out that an error has occurred?

TRUMPF's 3D printers automatically generate process reports at the end of printing. This gives operators a quick overview of key parameters such as productive and non-productive times. The system also documents, for example, consumption figures for gas and powder. If anomalies occur, operators can intervene immediately. To correct errors, operators are not required to be actually present. With the TruTops Monitor software, the 3D printer can be accessed and changed from anywhere.

Powder Bed Monitoring enables even more convenient operation. The equipment automatically notifies when the system detects an error. Operators define limit values for notification to take place. The system also classifies errors into categories and provides remedial assistance.

On which TRUMPF 3D printers can the monitoring systems run?

Monitoring can run on all TRUMPF 3D printers: TruPrint 1000, TruPrint 3000 and TruPrint 5000. TRUMPF will also be world premiering a new 3D printer featuring the monitoring solutions at Formnext. Equipment from other manufacturers lack the necessary sensors and are therefore incapable of running the monitoring systems.

At the Formnext trade fair in Frankfurt, TRUMPF will be exhibiting its monitoring systems in Hall 12, Stand E 61.

3D PRINTING

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