



OPTIMAL PRESSURE INSIDE THE PROCESS CHAMBER

Safety Relief Valve AV 919 in Additive Manufacturing



3D-printed components made of metal powder, formed in the process chamber of the Selective Laser Melting Machine SLM500 from SLM Solutions Group AG

Metals in 3D Printing: Selective Laser Melting

The range of 3D printing technologies, especially the range of processed materials, is growing continuously. Plastic mixtures are way out in front, as they e.g. can be wound on a roll as thermoplastic fiber, that can be easily liquefied and plotted into the final 3D shape. In the wide range of industrial applications, however, metal remains the current go-to material for additive manufactured components.

To handle metals in 3D printing, complex melting processes are needed: the material, e.g. stainless steel, cobalt, chrome or titanium is present in fine powder, that is melted layer by layer with high-performance lasers and built up to a final shape – called Selective Laser Melting.

SLM Solutions Group AG, headquartered in Lübeck, is a specialist for Selective Laser Melting and one of the leading manufacturers of 3D printers for metals. In their machines, the printing is executed under a protective gas atmosphere inside the process chambers. Moreover, the powder management, that is, the fully automated supply, removal and treatment of the metal powder retains this controlled atmosphere.

To handle metals in 3D printing, complex melting



Process chamber of the Selective Laser Melting Machine SLM280 2.0 of SLM Solutions Group AG

Perfect Atmosphere inside the Process Chamber: Controlled Print

At the beginning of the 3D printing process, the process chamber is flooded with argon. While the machine's lasers operate, however, this atmosphere changes: Smoke fumes are created which endanger optimal conditions on the working surface. To ensure a perfect melting process, therefore, a circulation of the protective gas and a constant compensation takes place, but which could potentially lead to uncontrolled pressure

increase in the process chamber. The delicate glass optics of the lasers would be damaged by increased pressure. Highly sensitive Safety Relief Valves of the series AV 919 from WITT therefore keep the chambers' pressure constant: they open exactly to the set opening pressure and close immediately when the nominal value is again reached. The atmosphere in the process chamber thus remains in the optimum ratio.

"The WITT Safety Relief Valve AV 919 is certainly only a small component of our machines. But without a blow-off valve, which is exactly manufactured according to our individual requirements regarding material and low opening pressure, we could not control the pressure in the process chamber precisely enough," says Andreas Wiesner, Leader for process and material development at SLM Solutions Group AG.

For Andrew Smart, Head of Sales for Gas Safety Devices at WITT, this reflects the core competence of his team: "We design and manufacture small components with great effect. Complex applications and new technologies also require precision and reliability, which we take seriously. "

SLM Solutions Group AG uses the WITT Safety Relief Valve AV 919 made of aluminum with an opening pressure of 80 mbar. For further questions, please contact

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