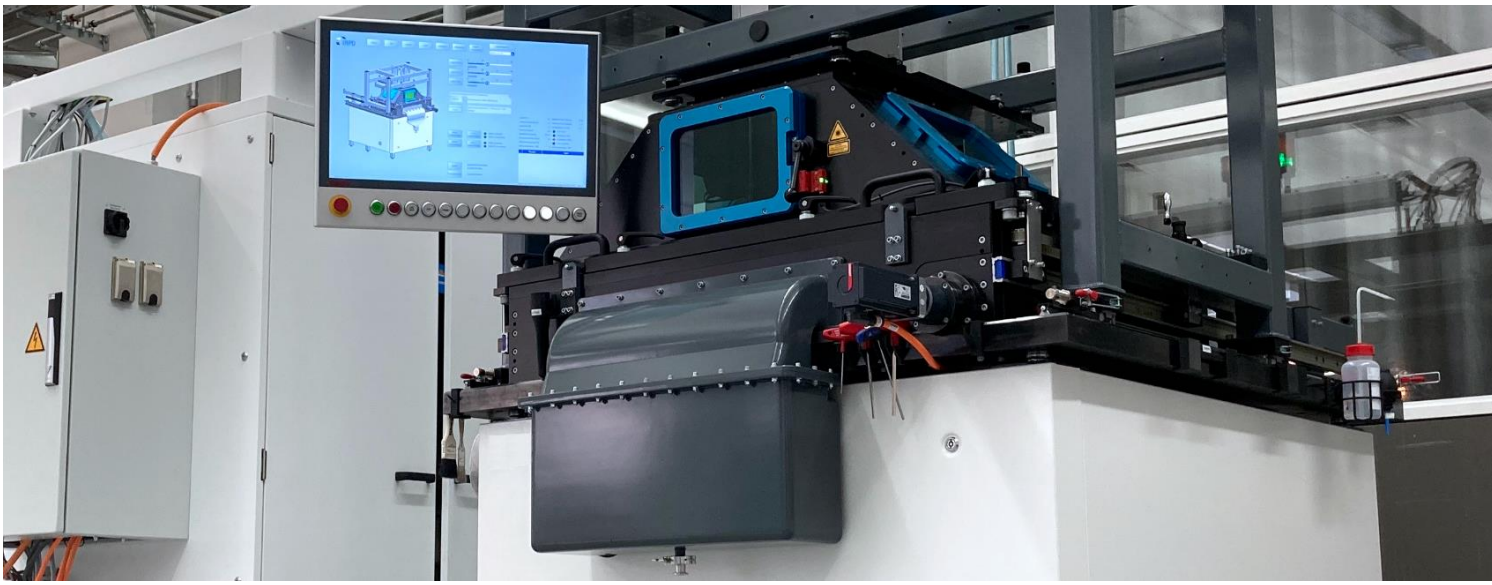
MULTI-BEAM SLM-SYSTEM



SYSTEM DESCRIPTION

In March 2020 the AM machine park of Irpd AG was supplemented by a powerful dual-beam SLM system. Thanks to ultra-modern 4-axis laser deflection units, beam diameters of 80 to 500 µm can be realized in high quality at the build plane, so that laser powers of up to 1,000 W per laser can also be retrieved for high productivity. The available power band enables process windows, which allow us to offer high quality but also highly productive process parameters for our customers. For critical materials, which tend to have high residual stresses due to extreme temperature gradients, the build process can be accompanied by a build plate heating with temperatures above 200°C. Thanks to the build plate dimensions of 400 mm x 325 mm with a maximum stroke of 280 mm, even voluminous components or small series can be realized on this system.

Figure 1: Chrome steel build job on a build plate of 400mm x 325mm

The multi-material capability of this system and the open machine control allow Irpd AG to

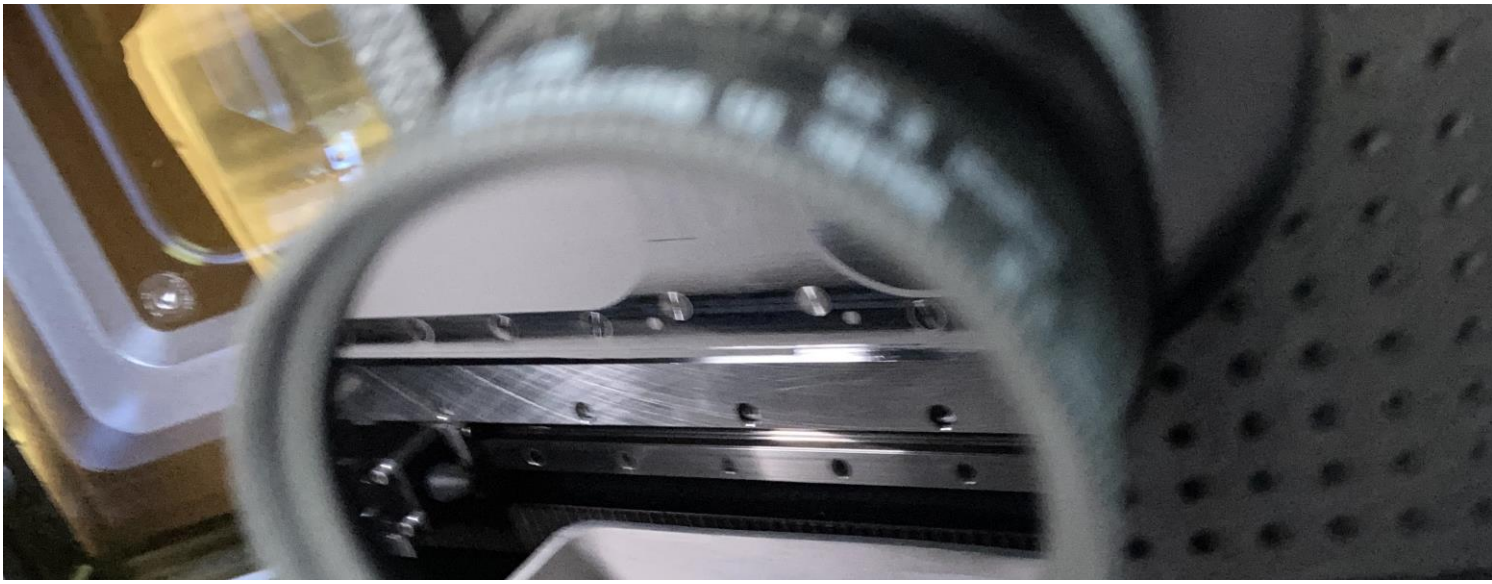
qualify customer-specific materials

within the scope of (bilateral) order and development projects.

Technical data of the multi-beam SLM system

Laser power	2 x 1,000 W
Build envelope (x,y,z)	400 mm x 325 mm x 280 mm
Build plate heating	> 200°C
Beam diameter	80 to 500 µm (defocus & zoom)
Build job protocol	opt. tomography in preparation

IRPD



BUILD JOB PROTOCOL

The Build Job Protocol (data logging) is planned for early 2021. An off-axis camera and different sensors will record the process data and system status data. The data will be summarized in a build job report that is made available to the customer.

OPTIMAL SHIELDING GAS FLOW GUARANTEES HIGH COMPONENT QUALITY

To realize homogeneous component quality over the entire build plate area, constant shielding gas conditions have to be achieved on the build plate area. With the support of the simulation expertise of Irpd AG, a high quality shielding gas flow was realized to ensure a constant gas flow over the build plate. The gas inlet and gas outlet nozzles near the build plate in combination with the shielding gas guidance in the area of the laser window were designed based on empirical and simulative studies. Hence, the soot particles occurring during the melting process are efficiently removed without remaining in the build chamber for a long time. Thus, even for long build job durations, unwanted beam scattering and attenuation due to airborne soot particles or soot particle depositions on the laser window can be counteracted. The investigations through computational fluid dynamics (CFD) also supported the design of the gas inlet and gas outlet nozzles in order to optimally counteract the deposition of large weld spatter particles on the powder bed. Weld spatters may cause microstructural defects such as bonding defects.

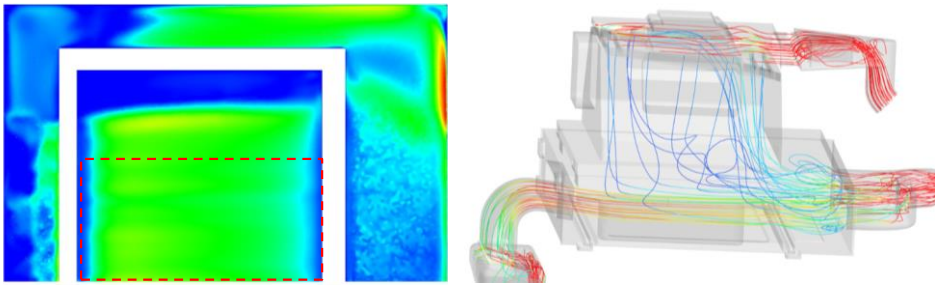


Figure 2: Shielding gas flow velocity close above the build plane (symmetry cut) as well as inside the build chamber and the components guiding the shielding gas

The self-cleaning filter system also contributes to the high quality of the shielding gas system. Conceptually, the soot particle filter is designed in such a way that constant pressure and flow conditions are available throughout the entire gas cycle, regardless of the current build job duration.

Contact us:
+41 71 274 73 31
sales@irpd.ch

Connect with us on LinkedIn