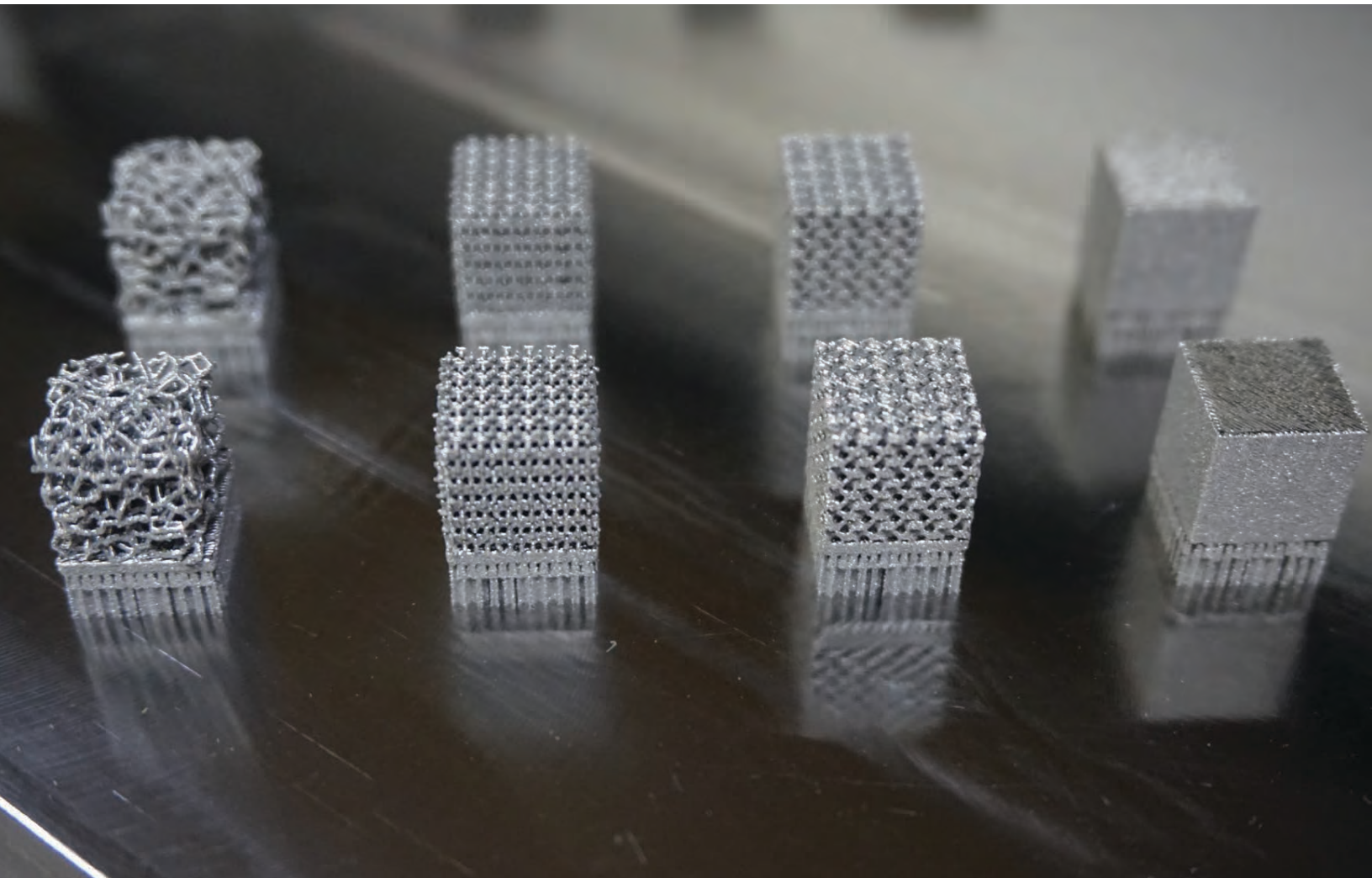
Making our world more productive

ADDvance® Laser230

Optimizing Process Reliability and Productivity in Laser Powder Bed Fusion

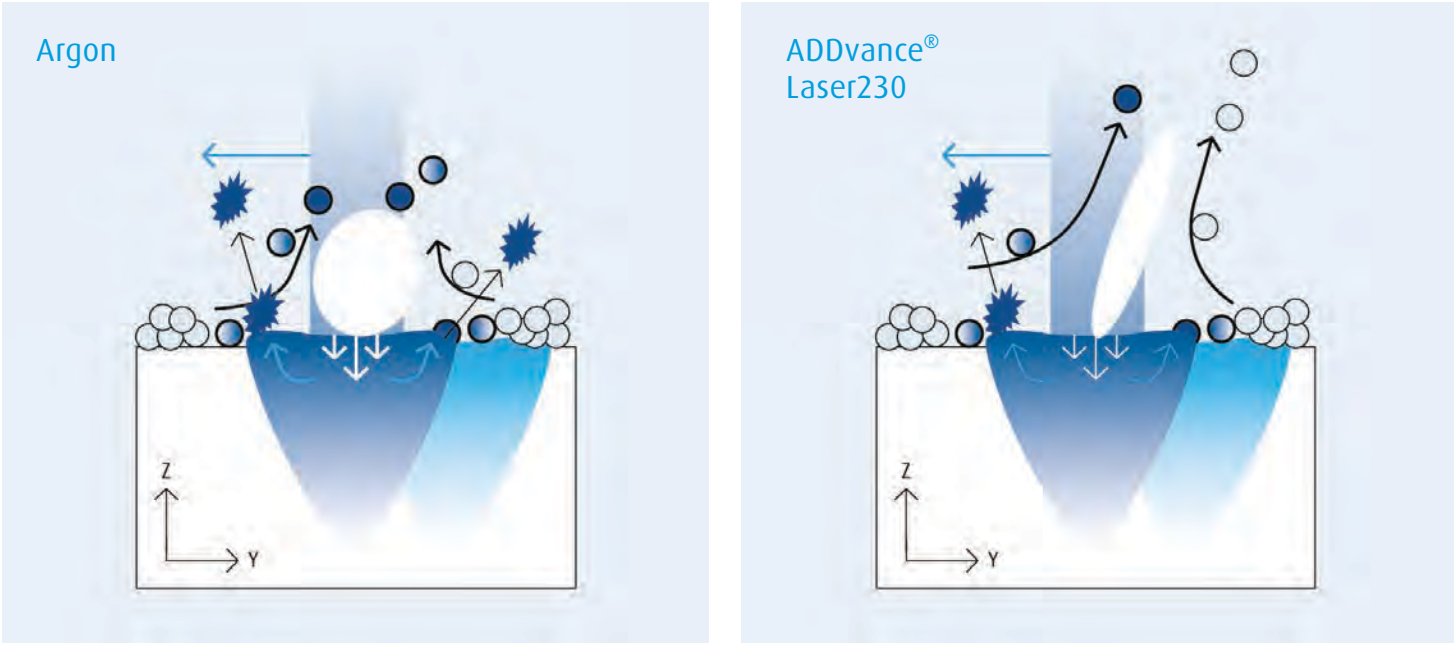


ADDvance® Laser230 ready to build

L-PBF in Focus

Laser powder bed fusion (L-PBF) is an advanced additive manufacturing (AM) process used to create complex parts based, for instance, on intricate latticed structures. Also referred to as laser-based powder bed fusion of metals (PBF-LB/M), It employs a laser as a heat source to selectively melt consecutive layers of metal powder, thus consolidating the material and producing the part. Typical real-world applications include turbines with internal cooling channels for the energy industry and intricate implants with lattice structures for the medical industry.

Many L-PBF manufacturers would welcome an opportunity to increase the reliability and lower the cost per part of this sophisticated AM process. Numerous variables affect the quality of the final part. These include the melting behavior of the powder, which can also impact the speed at which it is produced and the resulting by-products and fumes. Fumes, for instance, compromise reproducibility by disturbing the laser beam, and by-products can affect parts printed in close proximity as loose powder particles attach to adjacent surfaces, increasing the need for post-processing. The process gas (typically argon) plays a key role in avoiding surface redeposition. Set to the right flow rate, it can help remove fumes and by-products that otherwise compromise surface finish.



Melt-pool dynamic under Argon and ADDvance Laser230

New process gas for even greater reliability

ADDvance® Laser230 is an argon-helium gas mixture developed specifically to take L-PBF reliability and reproducibility to the next level. By reducing particle redeposition and porosity, it minimizes the possibility of internal defects, also lowering the risk of interference across high-quality parts printed close to each other. The resulting smooth surfaces reduce post-processing effort for the manufacturer and make it easier to qualify the part. ADDvance Laser230 also mitigates fume formation and laser disturbance for greater reproducibility. Last but not least, ADDvance Laser230 can enhance productivity by accelerating the printing process. By compressing cycle times and decreasing the cost per part, this argon-helium mix thus marks a major step forward in the competitive manufacturing of complex structures made from titanium, nickel and aluminum alloys (such as Ti64, Inconel 718 and AlSi10Mg).

Reference project

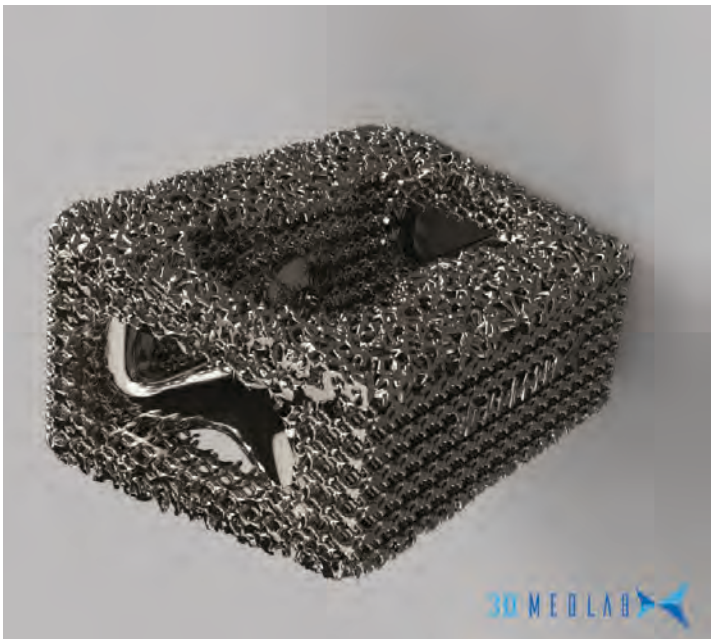
Series production using ADDvance Laser230 as opposed to pure argon has been shown to yield the following gains on Ti64 lattice structures used in spinal cages for medical applications:

- → 35% drop in hot spatter redeposition for fewer defects and smoother surfaces
- → 70% less porosity
- → At least 10% rise in productivity

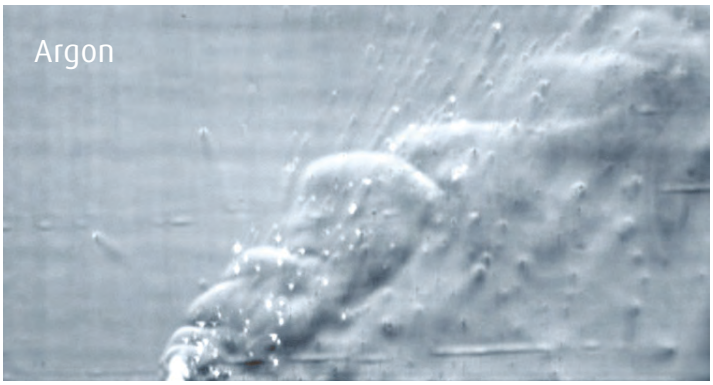
One-stop service with plug-and-play deployment

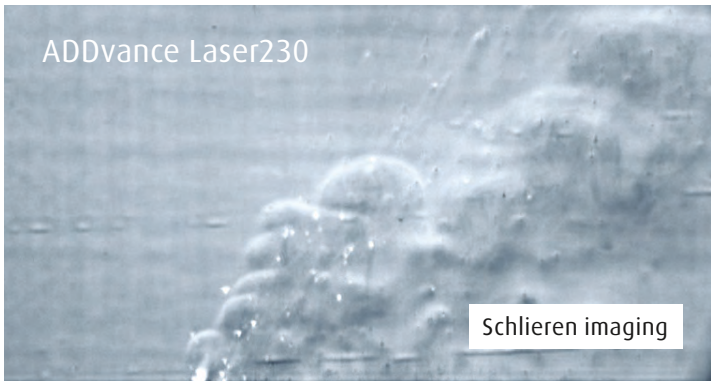
ADDvance Laser230 is compatible with all laser bed printers and can be “plugged in” without requiring any modifications to the printer parameters to achieve instant improvements to process reliability and stability. To augment the productivity gains with sophisticated applications such as Ti64 medical parts, we have developed special productivity parameters for EOS M290. Others are available on request.

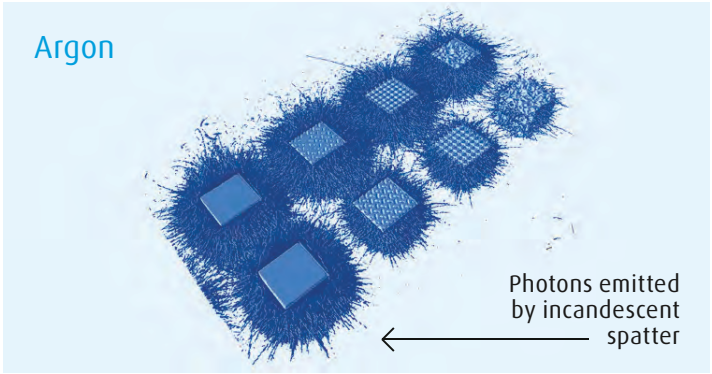
Depending on your volume requirements, you can choose between pre-mixed cylinder bundles or on-site mixing from bulk tanks. Our network of AM specialists and gas supply engineers look forward to working with you to select the supply mode, equipment and services that best meet your specific needs.

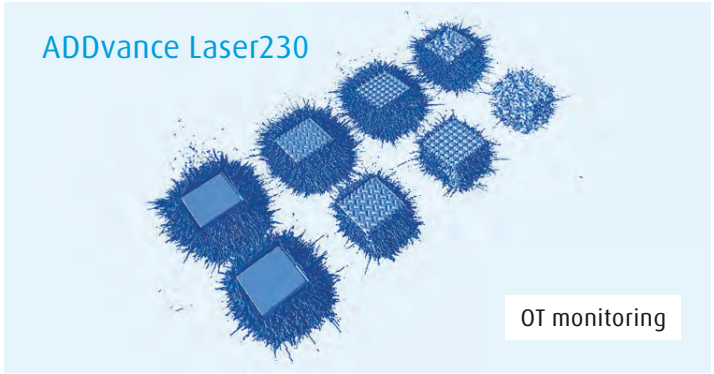


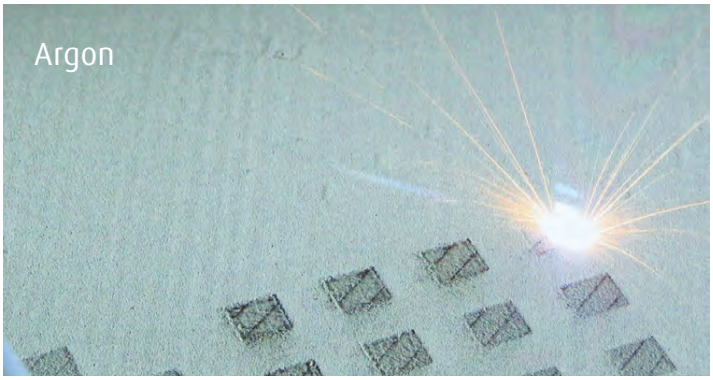
Spinal cage printed using Ti64, fast parameters and ADDvance Laser230

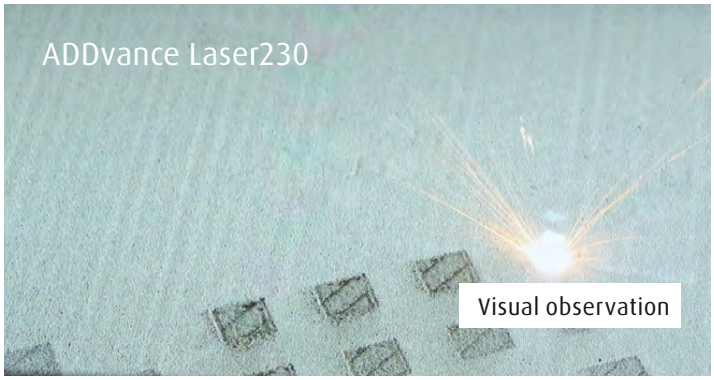












"Porosity is the first criteria we look at in terms of defining the quality of an additive manufactured medical device. The results of our joint atmospheric gas study with Linde shows that the right balance of helium to argon in the process gas mixture – and ease of implementation – can make all the difference to both quality of output and productivity."

Gael Volpi, Head of Additive Manufacturing, Marle Group, describing the results of L-PBF testing on medical components conducted with ADDvance Laser230 as part of a joint development program between Linde and 3D Medlab, member of the Marle Group.

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