

ASURE3D™ Powder Cabinet.

The ultimate solution to maintain AM powder quality.



Challenge

Additive manufacturing (AM) processes require metal powder of defined and consistent quality. Powder is typically stored on an open shelf somewhere near the 3D printer until it is needed. However, ambient air and humidity in particular affect the powder and its chemical and physical properties. Depending on the ambient conditions, the powder can thus age during storage. This is particularly true of sensitive powders such as aluminium alloys and titanium alloys. Alternatively, powder can be stored in a closed cabinet. But here also, it reacts with the atmosphere in the cabinet. Even if the cabinet is purged, ambient air and humidity flow in each time the doors are opened. And this humidity must be rapidly removed before it has a chance to affect the powder.

Solution

Messer developed the powder cabinet, atmosphere control for powder metal storage quality, to resolve this challenge. It uses a selective purge gas stream to maintain a non-critical moisture value in the cabinet. The ASURE3D™ Powder Cabinet equipment works by continuously measuring humidity levels. Whenever the doors are opened and humidity rises, the equipment triggers a high-volume purge gas flow as soon as the doors close again to rapidly remove moisture in the air. It then applies a lower stream of gas to ensure a consistently low level of humidity and maintain that until the doors are opened again to remove powder.

Innovation

The ASURE3D Powder Cabinet equipment is particularly valuable for cabinets with multiple storage shelves as these are a great place for ambient air and moisture to hide and constantly affect the powder particles. The equipment uses a highly directional gas stream and a carefully selected flow rate to ensure the desired moisture value. It is also an economical solution as it does not waste purge gas when the door is open. It only triggers the purge stream once the doors have been closed again.

Components

The ASURE3D Powder Cabinet is a specially designed dual-chamber powder cabinet with a tailored purge gas flow logic to control moisture activity with accuracy. The purge gas flow is optimized for two operating modes:

- High in response to a massive ambient air intake when the doors are opened
- Low to deal with mild air pollution caused by a leakage, used powder containers, or even new packages in some instances

The purge gas flow is interrupted while the doors are open to avoid wasting gas.

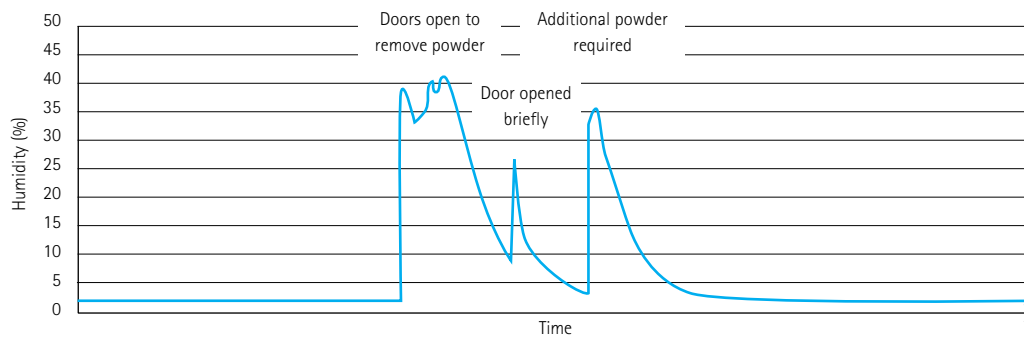
The ASURE3D Powder Cabinet comprises the following components:

- Flow control unit for the purge gas and specially designed purge gas supply logic
- Moisture control and monitoring unit
- Touchscreen for easy control of functions
- Real-time monitoring of humidity levels, temperature and door opening times
- Alarms indicating out-of-range humidity levels and extended open door position
- Two storage chambers (1000 x 500 x 500 mm), each with four levels
- Stainless steel trays, each holding up to 30 kg of metal powder
- Two open storage levels at the bottom for equipment

Benefits at a glance

- Optimized storage of high-value AM powders
- Consistent powder quality levels – from delivery to application
- Improved purge gas supply logic and flow control
- Demand-driven purge gas flow rate for maximum economy
- Ease of operation and straightforward commissioning

Effect of door opening and purging on humidity levels



Opening the powder cabinet door and mapping the effect of this on humidity levels. Purging effectively and rapidly reduces humidity even if this stabilization process is interrupted by an operator opening the door again.



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