

Air Technologies for Additive Manufacturing

Air handling solutions from ULT



air quality

Chapters

1. Overview technologies in Additive Manufacturing
2. Dangers and health risks
3. Process gas cleaning
4. Air purification in post-processing
5. Overview ULT product range
6. ULT – air quality

Overview technologies in AM

Technology overview polymer Additive Manufacturing

Over 16 different polymer 3D printing processes are known. AMPower Insights provides an overview and classification of the most important procedures.



Technology overview metal Additive Manufacturing

Over 18 different metal Additive Manufacturing processes are known. Ampower Insights provides an overview and classification of the most important technologies.



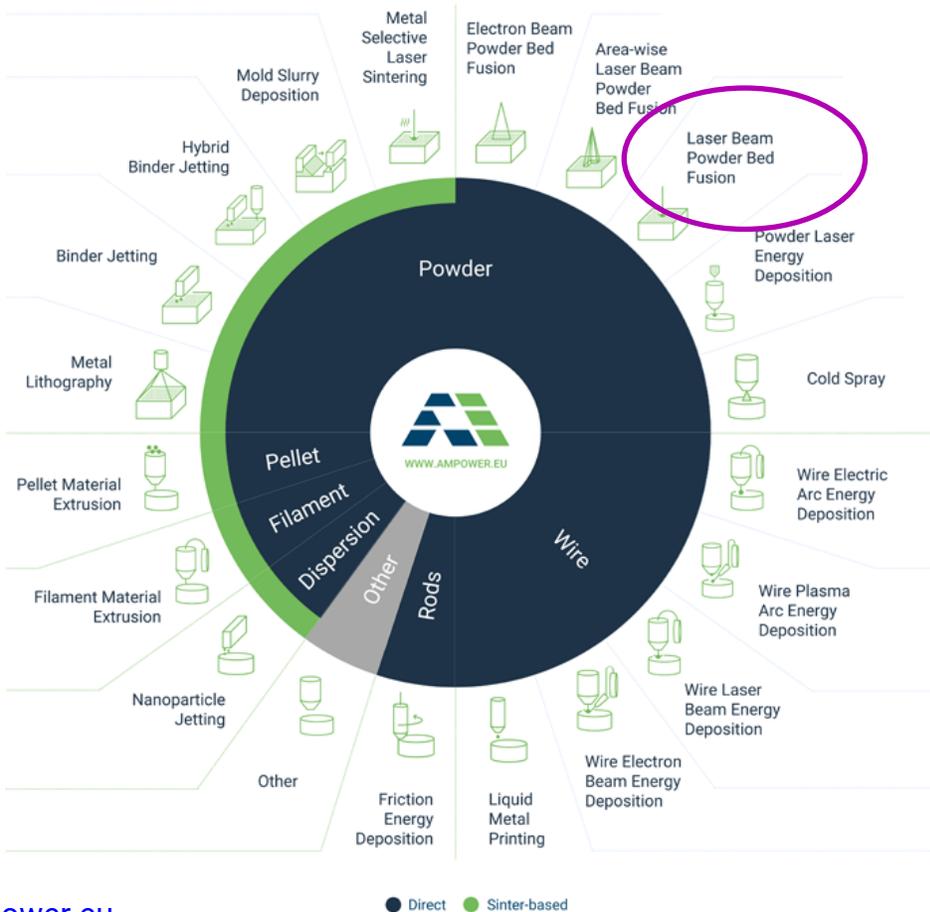
Source: <https://ampower.eu>

General information on the AM market:
<https://formnext.mesago.com/frankfurt/de/themen-events/am-field-guide/downloads.html>

Overview technologies in AM

ULT solutions for gas and air cleaning

Metal Additive Manufacturing technology landscape



Gas cleaning systems LBPF / SLS

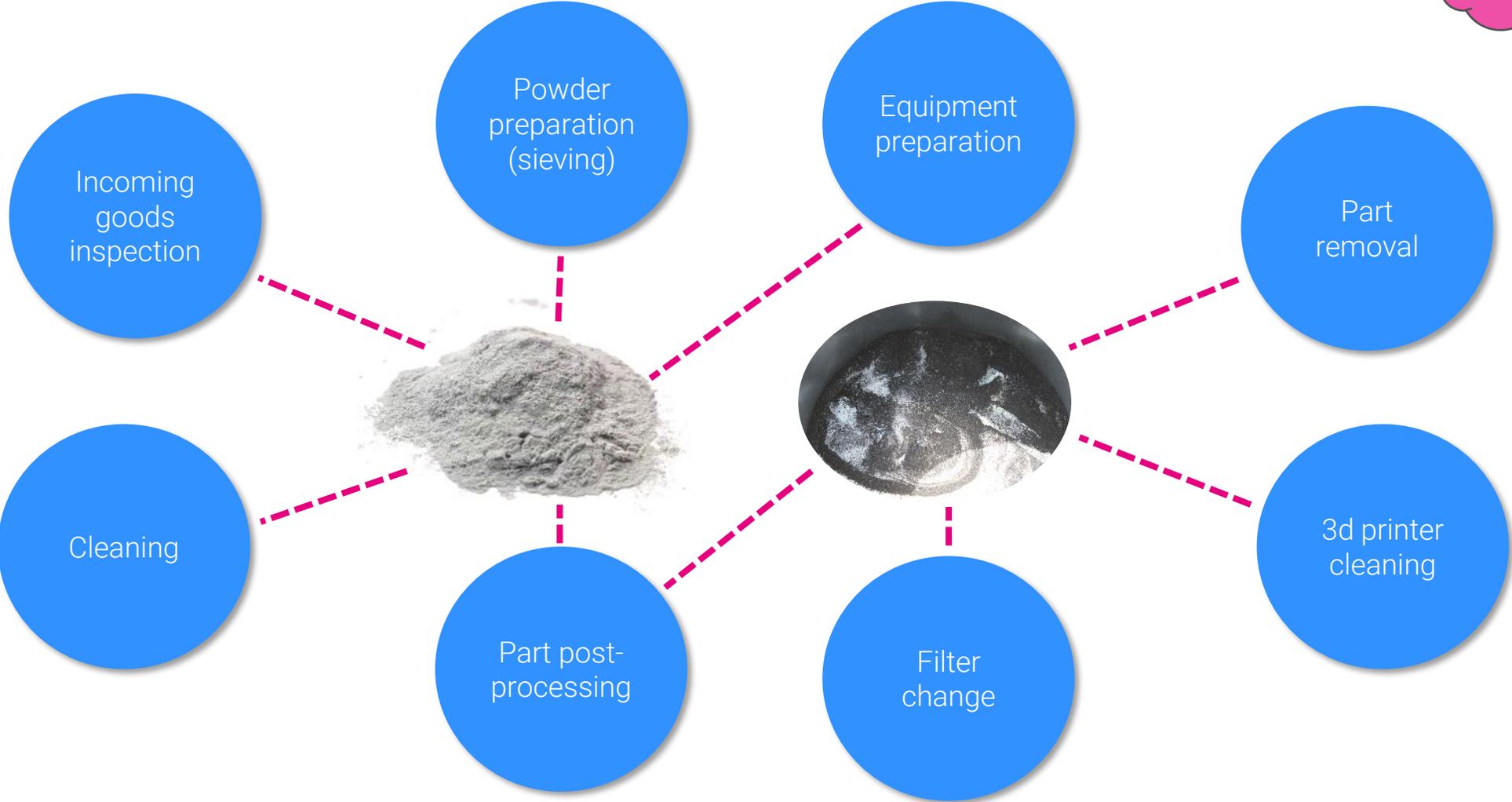
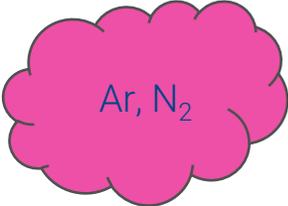


Extraction technology for post-processing

Source:
<https://ampower.eu>

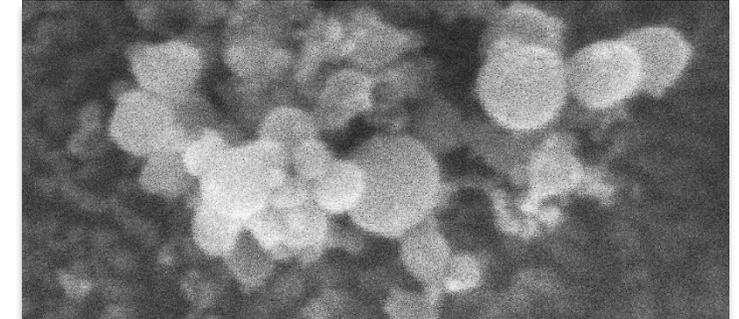
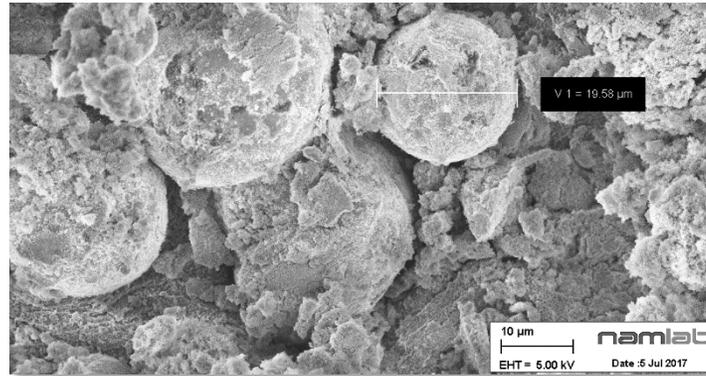
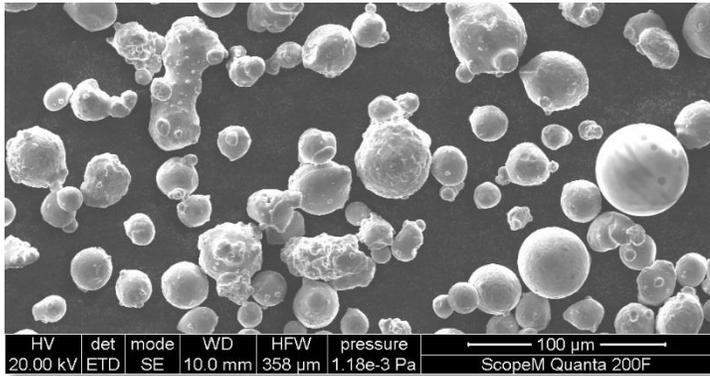
Dangers and health risks

Challenges: Contact with powder, condensate, and gases

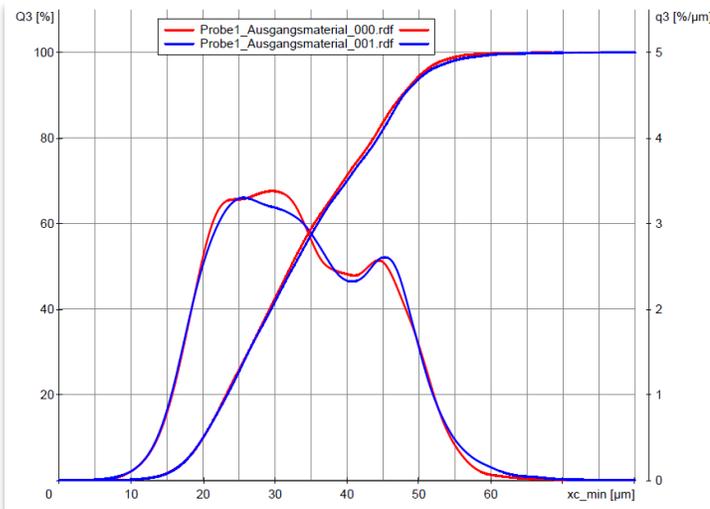


Dangers and health risks

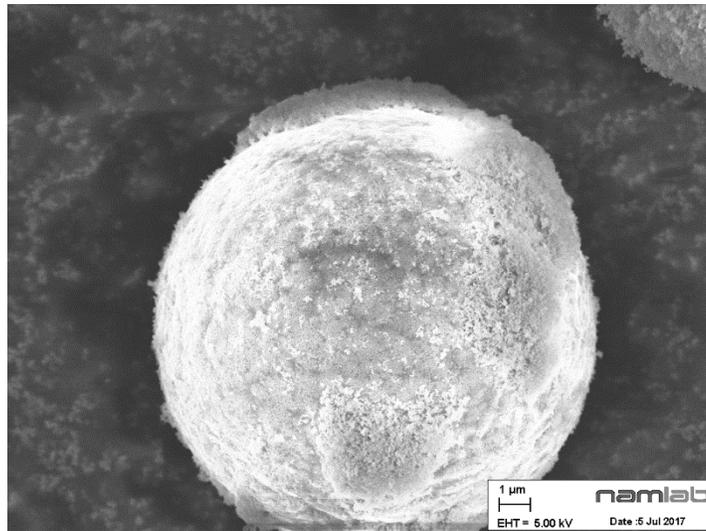
Particle sizes of metal powder and condensates



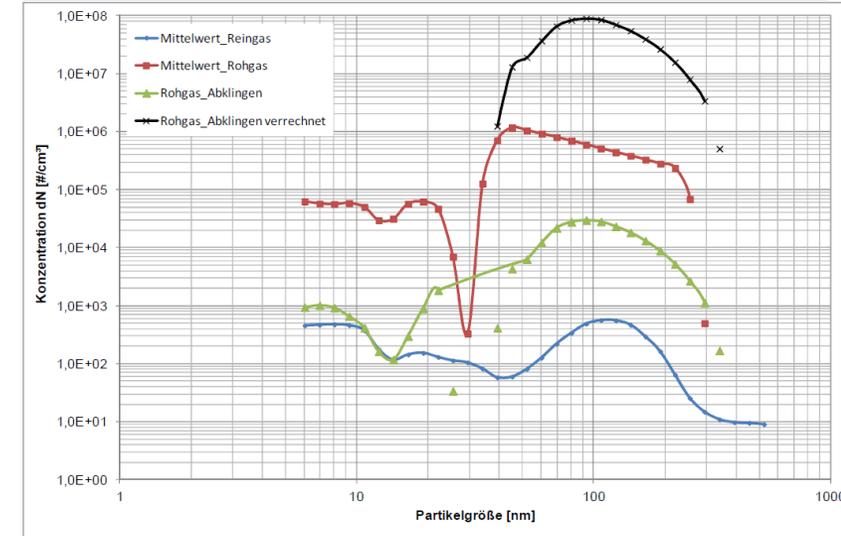
amount ca. 100,000,000 particles/cm³



starting material : 5-60 µm



material from separator



particle size distribution of raw gas before separator (6-300 nm)

Dangers and health risks

Carry over of metal particles



Metal powder



Condensates

Process gas cleaning

AMF 200 scalable solution

Features:

- Modular, open, and cost-optimized gas cleaning system based to the use of standard components
- Contamination-free disposal of the filter elements - high level of safety and containment when removing used filter cells
- Scaled systems with several modules allow larger volume flows
- Filter cell size optionally selectable according to dust load
- Filter cleaning via jet impulse
- Simple handling and operation
- Technical control operation as a slave with I/O system, or as an independent system run by an individual control
- Small footprint
- Operation possible with or without dosing of filter aid



Process gas cleaning

AMF 200 scalable solution

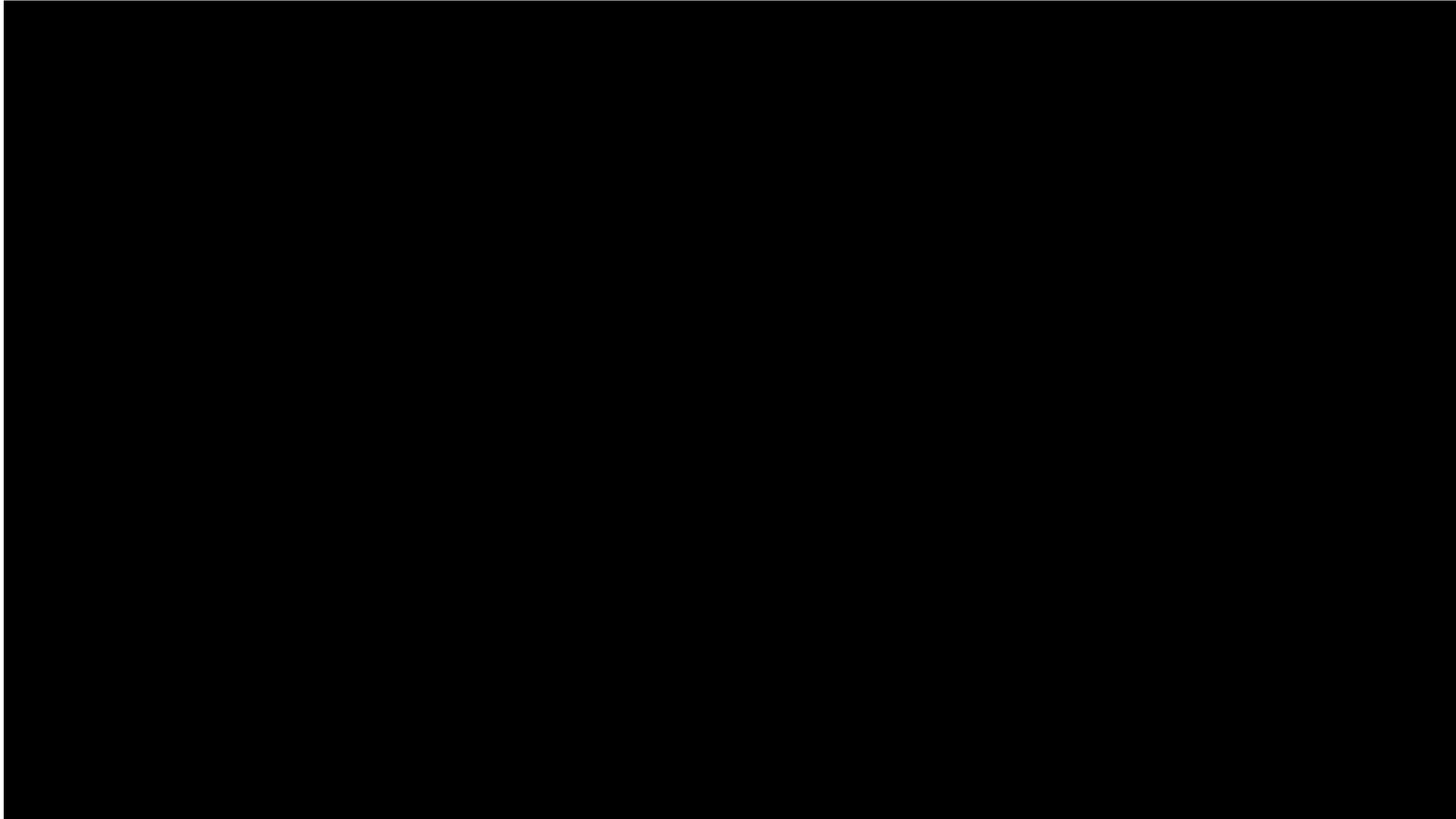
Equipment:

- Frame with housing on castors
- Standard: two filter cells, each with 5 m² filter area and dust collection volume up to 60 l
- Larger filter cells with 10 m² filter area each possible
- Emergency filter utilization for separating coarse dusts
- Side channel blower with mounted frequency converter
- Various sensors (differential pressure filter stages, fill level filter cell, oxygen, volume flow, temperature)
- Shut off process gas inlet, outlet (pinch valves)
- Integrated field bus modules



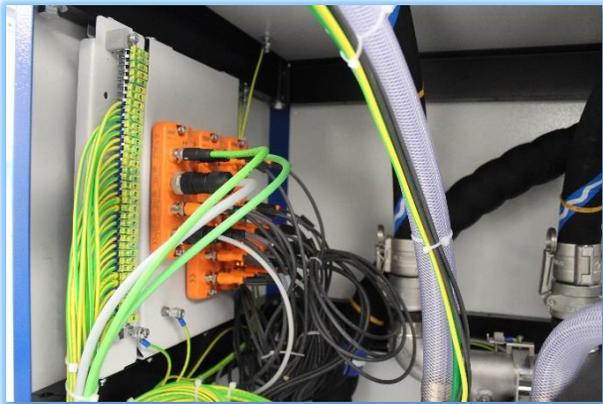
Process gas cleaning

AMF 200 work principle



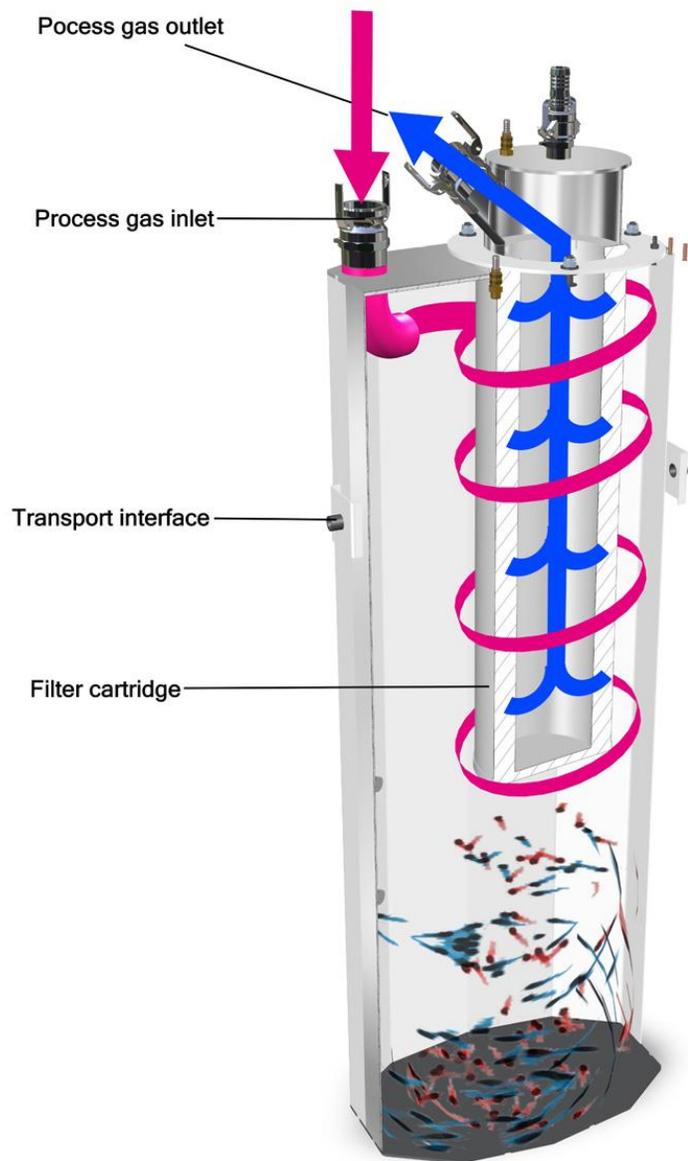
Process gas cleaning

AMF 200 – standard device with 200 m³/h



Process gas cleaning

AMF 200 gas cleaning – main filter cell

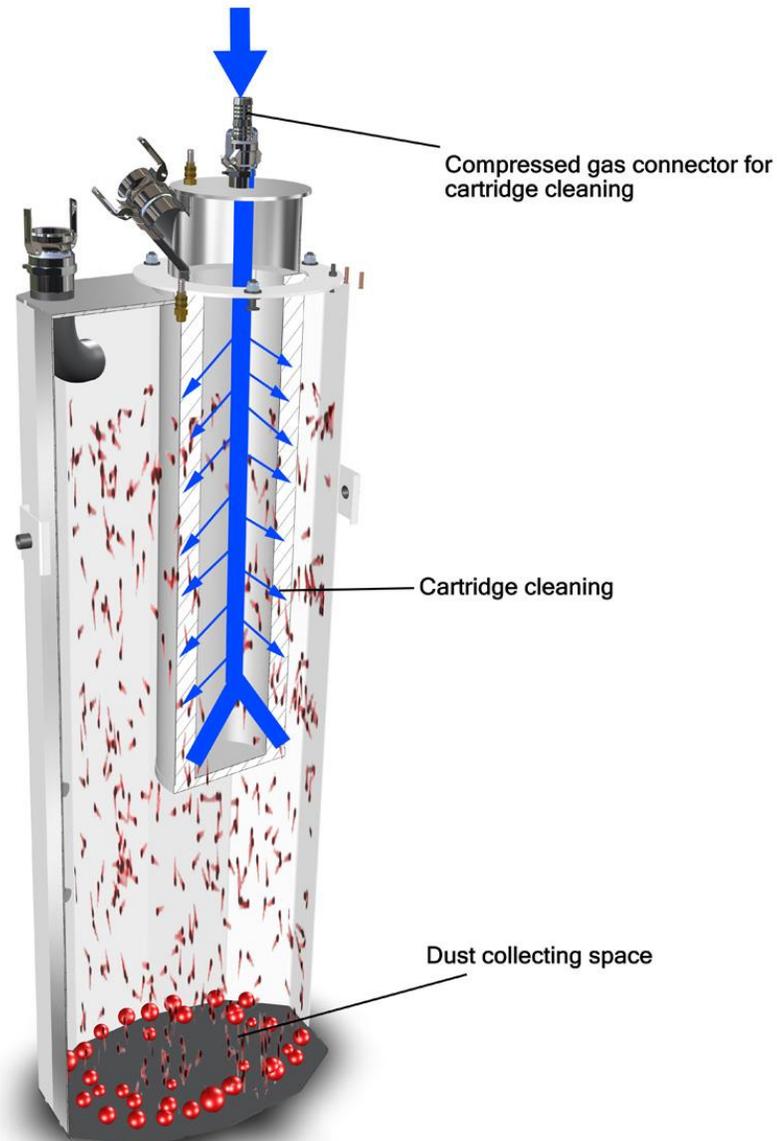


Filtration during process:

- Raw gas (red) flows spirally along filter cell housing downwards to the dust collector
- Direction of raw gas is switched and flows upwards inside the filter cell to the cartridge
- Pre-selection of bigger particles when direction is switched
- Remaining particles are filtered by cartridge, clean gas (blue) leaves the filter cell

Process gas cleaning

AMF 200 gas cleaning – main filter cell



Cartridge cleaning:

- Inert gas impuls (blue) is applied inside the cartridge
- Filter cake is removed and falls down to dust collector

What makes this solution so special?



Combination of filter cell and dust collector!

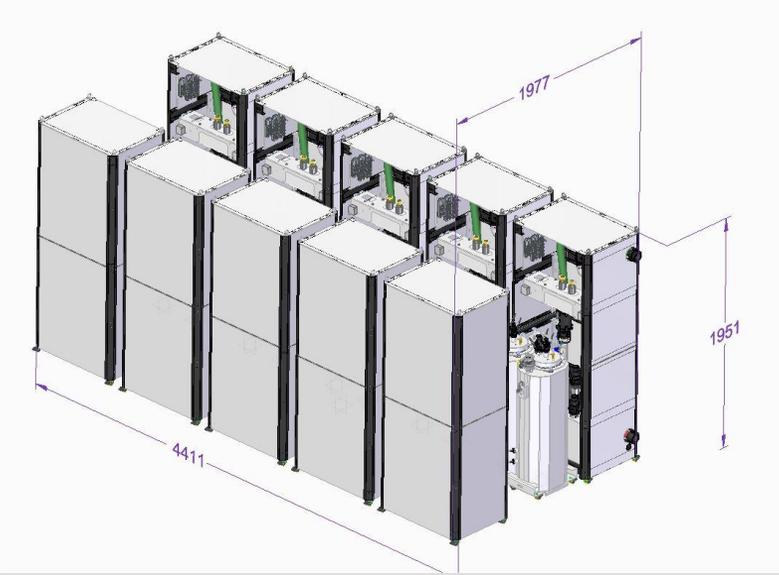
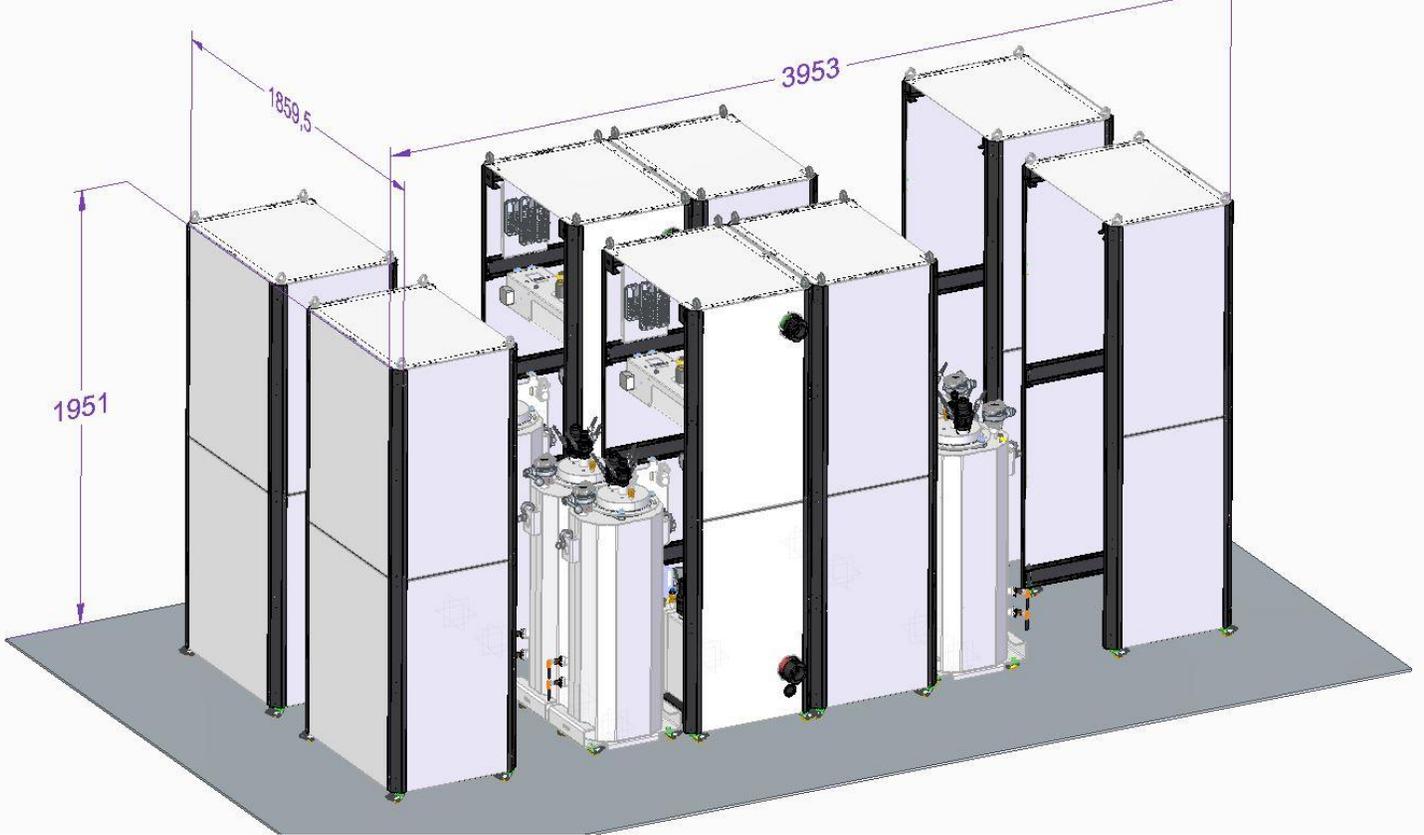
Well-proven technology bei ULT!

Extremely safe for highly flammable materials!

Contamination free handling – unique in the market worldwide!!!

Process gas cleaning

AMF 200 – modular scaling for higher flux and filter area



Process gas cleaning

Example applications and technology partners



Source: Trumpf

TRUMPF



Process gas cleaning

Example applications and technology partners



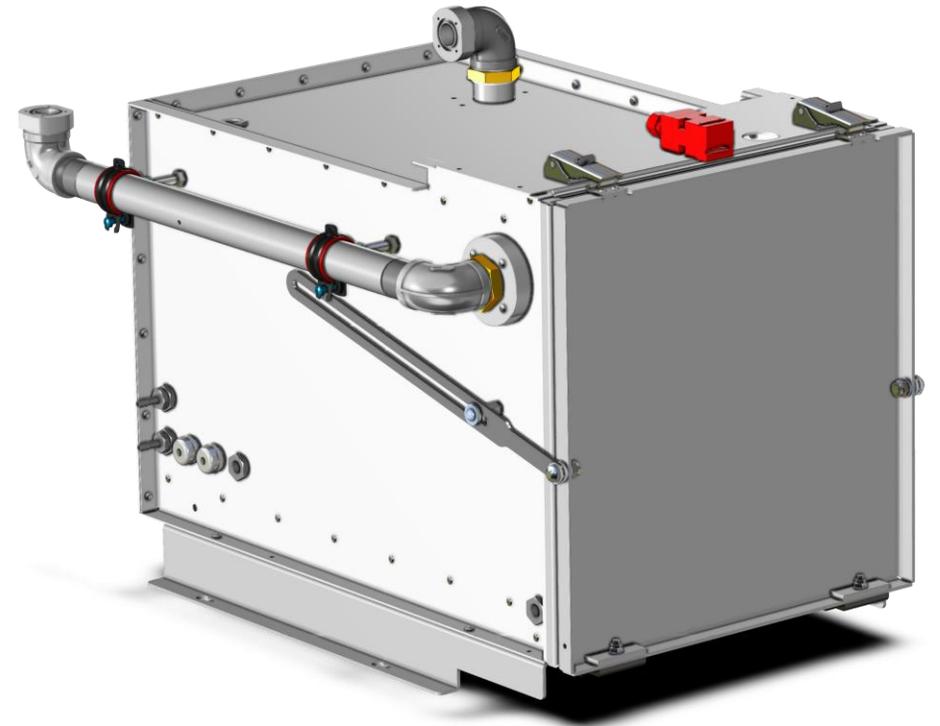
HAMUEL
REICHENBACHER
Unternehmen der SCHERDELGruppe

Process gas cleaning

AMF 160 – small, quiet, but yet powerful

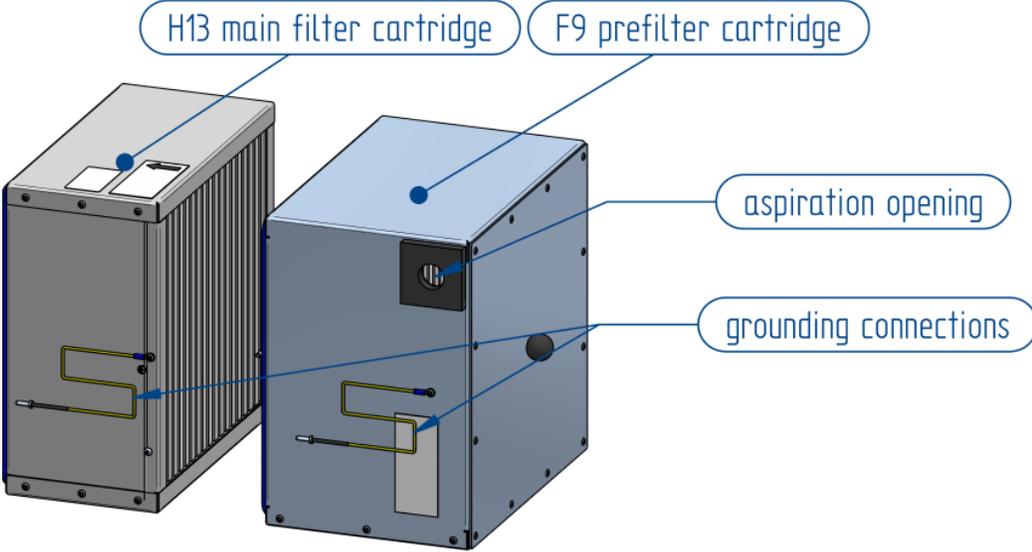
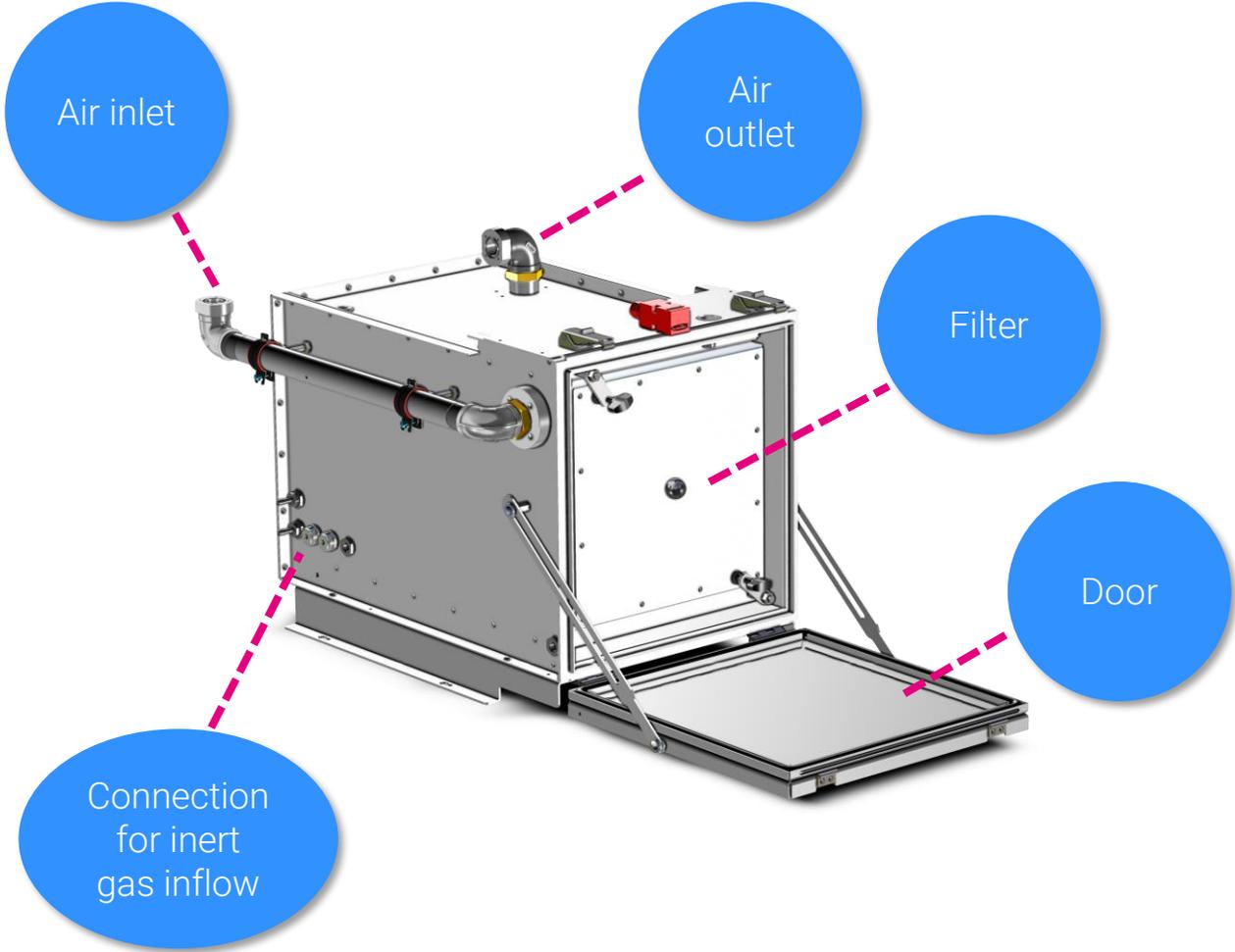
Basic information:

- OEM system for installation in e.g. 3D printing systems
- Gas-tight designed for inert gas circuits
- Highly effective cassette filter
- Suitable for laser sintering processes
- Laser deposition welding
- Plastics 3D applications
- Can be controlled by a higher-level controller



Process gas cleaning

AMF 160 – small, quiet and powerful

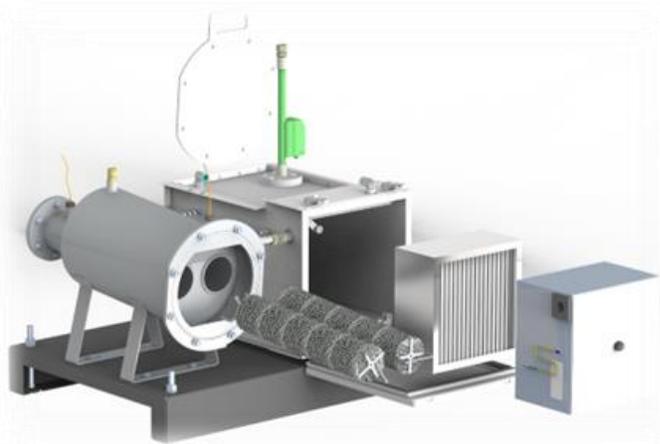
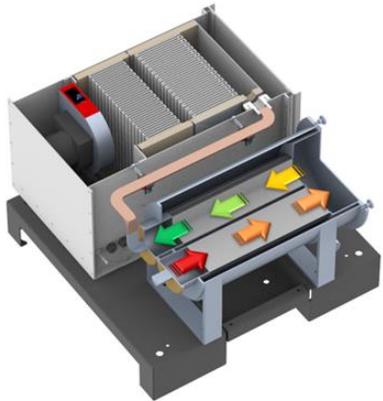


Process gas cleaning

AMF 160 +POLY for polymers

SLS Gas cleaning

- Condensation of plastic from the gas phase
- Cooling of the hot exhaust gases
- Filtering of the rest particles
- Integration unit: compact and flexible



Process gas cleaning

Safety first

Our detailed operating instructions provide:

- Step-by-step information on the passivation of used filters
- According to the latest research and development in additive manufacturing
- **ULT know-how built up on the experience of more than 25 years**



 **GEFAHR!** Das im Filter abgeschiedene und gesammelte Material kann sich bei kleinsten Erschütterungen und Materialbewegungen in einer mit Sauerstoff angereicherten Atmosphäre entzünden und einen Brand verursachen. Erschütterungen und Stöße am Filter sind zu unterlassen. Der Filter ist in der gleichen Ausrichtung wie er im Gerät positioniert ist zu entnehmen und abzustellen.

- Eine Löschdecke aus flammhemmendem Material und ein Pulver-Feuerlöscher der Klasse D nach EN 3 sind zur Brandbekämpfung bereit zu halten.

5. Den Vorfilter am Griff mit äußerster Vorsicht entnehmen und auf einen höherverstellbaren Transportstich abstellen.

6. Den Vorfilter mit geeignetem Passivierungsfeststoff (trocken, feinkörnig, rieselfähig) auffüllen, bis der Filter bis zur Ansaugöffnung gefüllt ist.

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7. Die Ansaugöffnung des Filters mit dem an der Filterfront befindlichen Eltek verschließen.

8. Den Filter in einen geeigneten Entsorgungbehälter heben. Der Behälter muss den Filter vollständig aufnehmen, mindestens 2 cm über dem Filter hinausragen und fest verschließbar sein.

 **HINWEIS!** Den Entsorgungbehälter auf einer transportierbaren Unterlage platzieren (Palette o.Ä.) da dieser nach Abschluss der Arbeiten ein sehr hohes Gewicht besitzt.

9. Den Entsorgungbehälter mit geeignetem Passivierungsfeststoff (trocken, feinkörnig, rieselfähig) bis auf Höhe der Filteransaugöffnung auffüllen.

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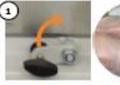


13. Den Entsorgungbehälter mit dem Deckel und Spanning fest verschließen und versiegeln.

14. Einen neuen Vorfilter F9 in das Gerät einsetzen.

15. Die Andruckelemente wieder in Position bringen und den Filter fest verspannen.

16. Den neuen Vorfilter F9 an das Potentialausgleichssystem vom Gerät anstecken.



17. Die vordere Revisionsöffnung schließen und mit den Spanning verschließen verriegeln.

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10. Das Filterverschlussset wieder von der Ansaugöffnung entfernen.

11. Den Filter mit Passivierungsfeststoff abdecken.



12. Die Potentialausgleichsverbindung für den Filter vom Gerät trennen. Das Potentialausgleichsblei mit in den Behälter legen.



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Process gas cleaning

Example applications and technology partners



Air purification in post-processing

Removal of dust particles, vapors, and gases

Extraction of particles, gases and vapors at the source:

- Reducing emissions of dust, gases and vapors
- Protecting the health of employees and the environment
- Avoiding loss of productivity

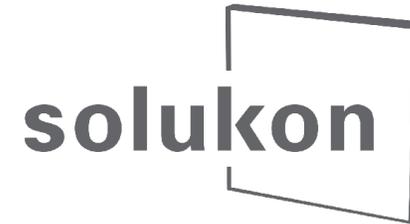


Air purification in post-processing

Removal of powder bed material and particles



SCHOELLER
BLECKMANN
OILFIELD
EQUIPMENT



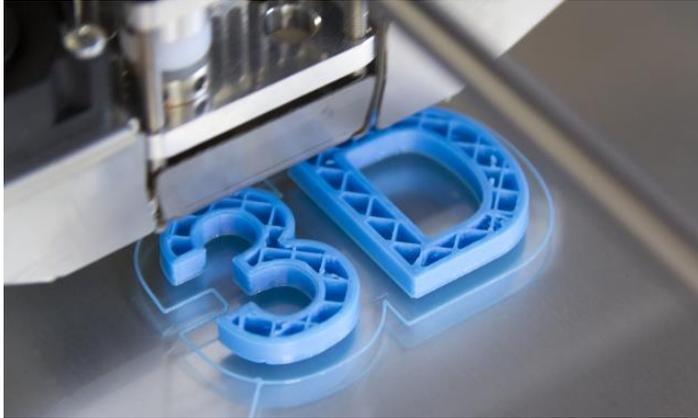
Air purification in post-processing

Removal of powder bed material and particles

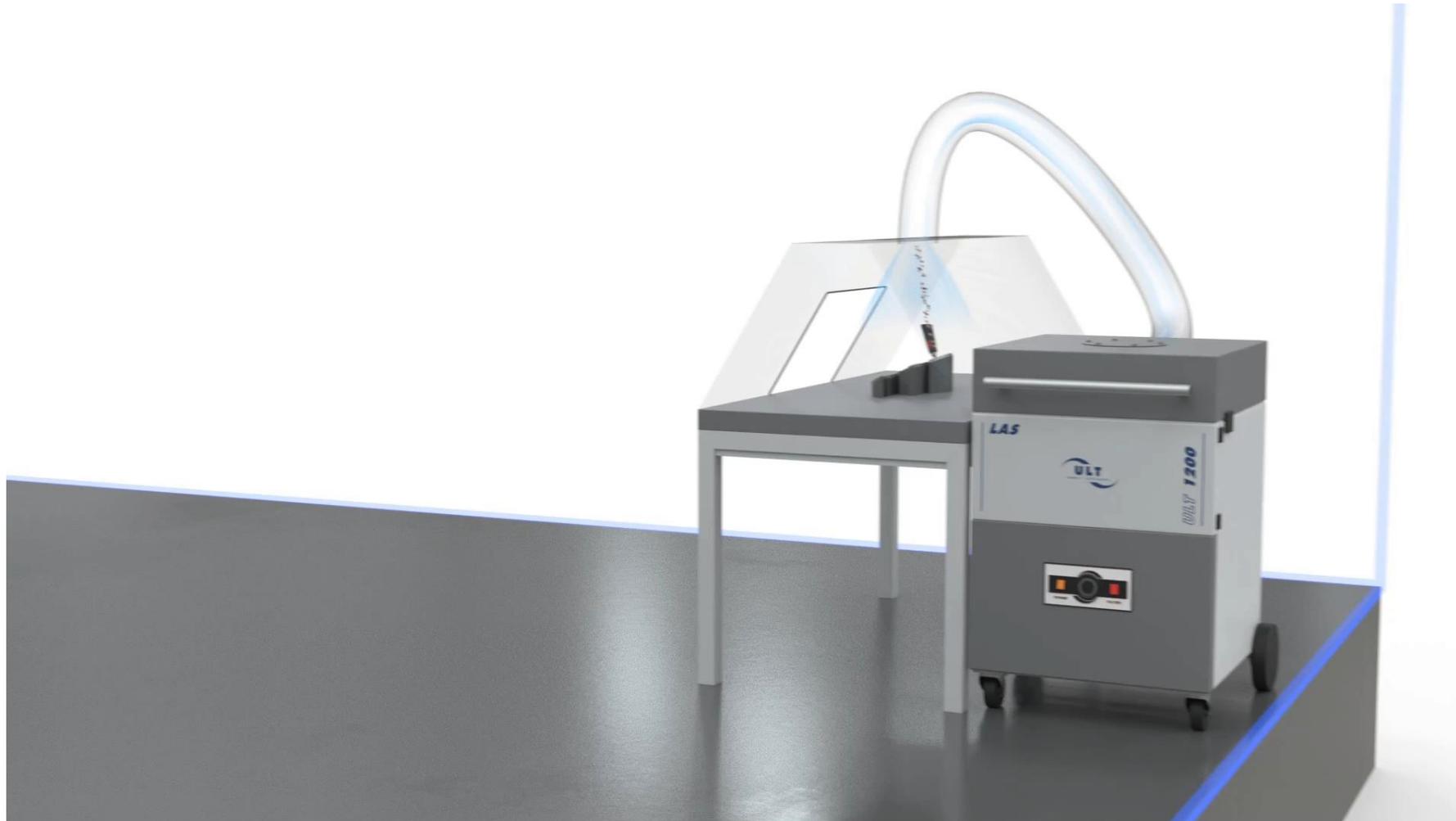


Air purification in post-processing

Removal of vapors and gases (FDM / SLA process)



Air purification in post-processing



Air purification in post-processing

Removal of dust particles, vapors, and gases

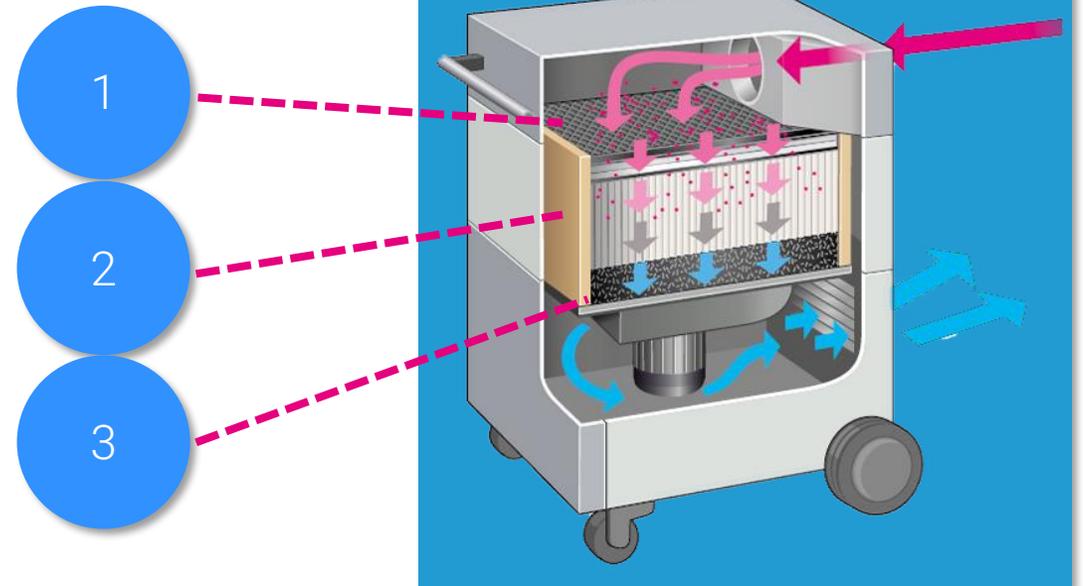
Technical implementation:

Extraction system / pollutant capturing:

- Extraction arms
- Extraction cabinets
- Extraction tables

Filtration system / particle separation:

- Prefilter (1)
- Particle filter (2)
- Adsorption/activated carbon filter (3)



ULT product range

Air handling solutions

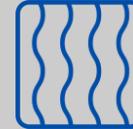
Laser fume extraction

Marking, cutting, welding,
drilling, joining, etc



Dust extraction

Bonding, casting, laminating,
cleaning, coating, etc



Complete solutions

Production halls,
system integrations



Additive Manufacturing

LBPF (metal)
SLS (plastics)



Soldering fume extraction

Manual and automated
soldering



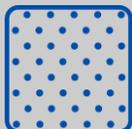
Battery cell production

Fume extraction and
air drying (mini environments)



Removal of odors, vapors, gases

Depaneling, bulking, mixing,
filling, grinding, etc



Oil mist separation

Utilizing cooling lubricants in
machinery



Ionization

ESD protection,
surface cleaning



ULT product range

Air handling solutions for a wide range of applications



ULT product range

Your benefits



Comprehensive standard solutions



Specific customer solutions



Extremely quiet operation



Simple operation



High flexibility



Economic efficiency and cost savings



ULT – air quality

Four pillars for continuous success

1

Extraction and
filtration standard
solutions



2

Extraction and
filtration customized
solutions



3

Process air drying



4

Accessories



ULT – air quality

360° service for satisfied customers and partners



ULT – air quality

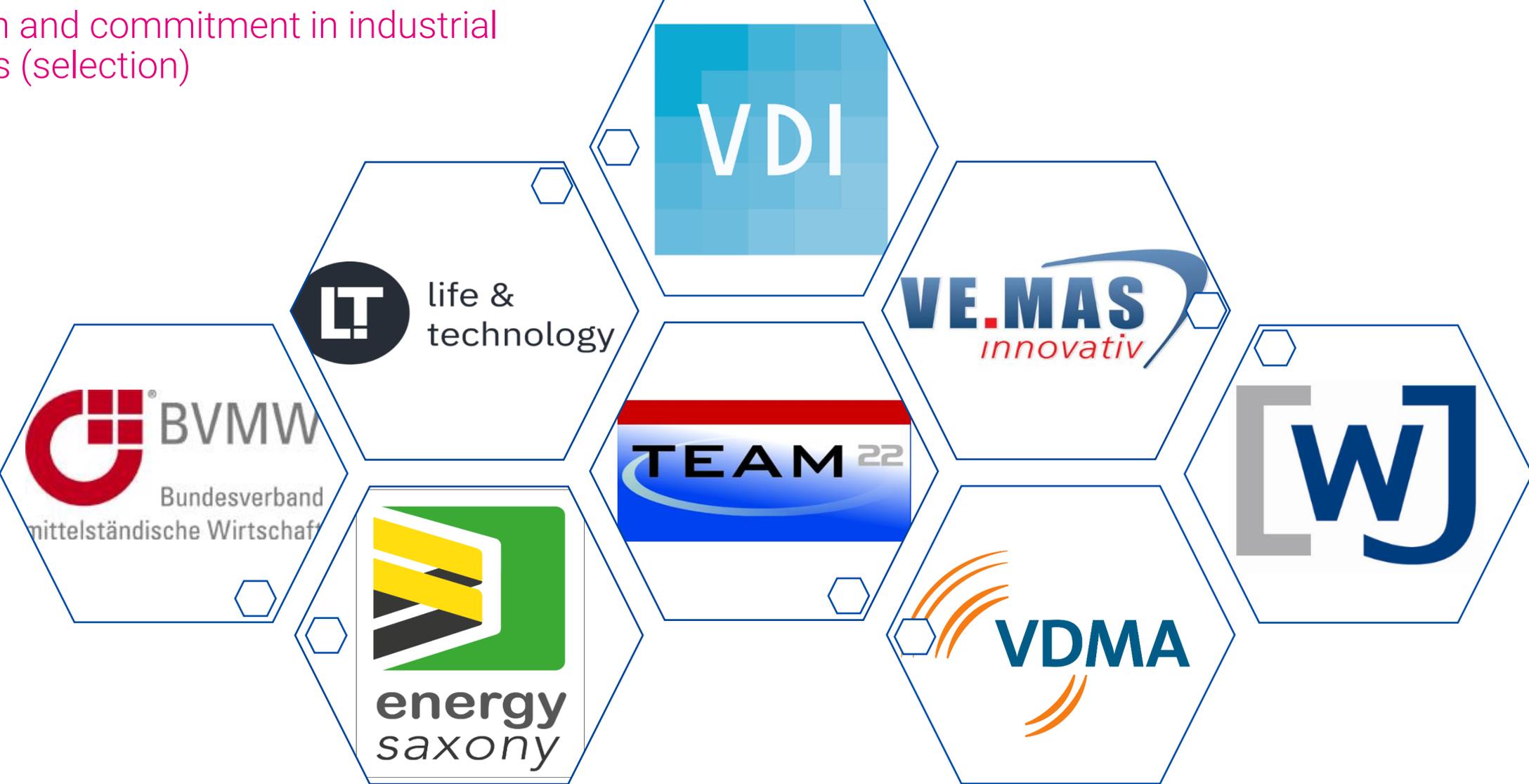
Germany-wide research network



- Cooperations with colleges, technical colleges and universities
- Close collaboration with leading research facilities and institutes

ULT – air quality

Participation and commitment in industrial associations (selection)



ULT – air quality

Corporate information



- Founded in 1994
- In the sixth expansion stage since 2018
- Certified according to DIN EN ISO 9001
- Annual production > 5,000 systems
- Family-owned company

ULT – air quality

The people behind the company

Managing board:
Dr Stefan and Alexander Jakschik



Staff:
ULT employees



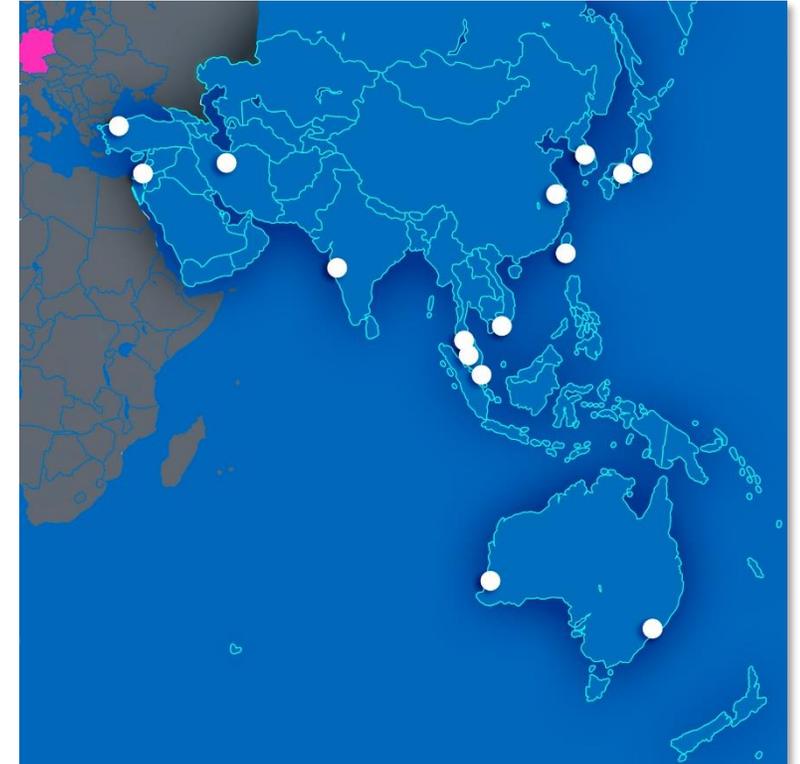
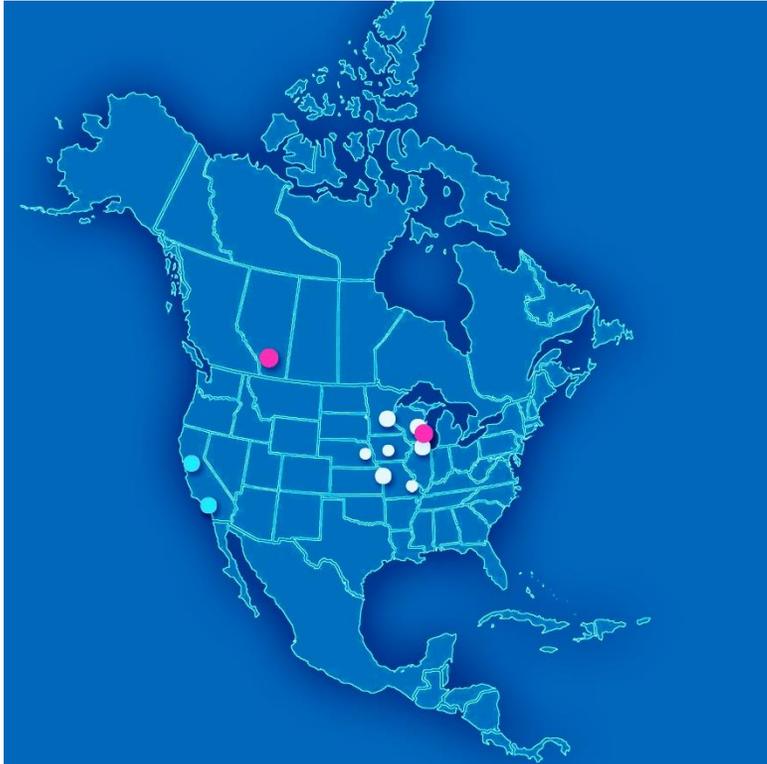
ULT AG – air quality made in Germany

Continuous expansion of the German
sales and service network



ULT – air quality

Continuous expansion of the international sales and service network





Thank you for your attention.

