PowTReX

Safe Metal Powder Transfer, Recovery and Extraction for Metal AM. It's not just recycling. It is Safe Return-to-Use. Because good AM metal parts are made from good powder.

VOLKMANN
IDEAS AHEAD

PowTReX -
Powder Transfer, Recovery and Extraction

The PowTReX enables the efficient reprocessing and reclaiming of build excess metal powder for applications in Metal AM. The integrated vacuum conveyor handles the feeding of the unused powder – e.g. directly from the build chamber of the 3D printer.

A screen, with a high throughput rate, handles the sieving in respect of recycling of the metal powder. Oversized particles and agglomerates are efficiently separated. The reprocessed powder can be filled into bottles or containers or conveyed via pipe to down-stream machines.

This new generation of the PowTReX is the continuation of the successful first PowTReX series, of which over 100 machines supplied have proven themselves in metal AM production. We have taken our customers' feedback on board and consistently developed the new generation in terms of user-friendliness, ease of cleaning, and process automation.

The PowTReX system combines three functions in one compact unit:

1. the aspiration and conveying of metal powder from an upstream system (e.g. 3D printer or unpacking station) into the buffer container of the PowTReX
2. cleaning the metal powder by removing agglomerates and oversized particles by means of a sieve
3. filling the purified metal powder into a container. Optionally, a downstream machine can draw the metal powder directly from this container via a pipeline

How the PowTReX system functions

1. **Vacuum conveyor:** The Vacuum Receiver separates and collects the powder and releases powder batches to the buffer.

2. **Powder Buffer,** net volume: 25 L
Collects the metal powder before releasing it to the screener. Makes AM unloading independent of the screening rate.

3. **Powder Feeder:** Transports just the right amount of metal powder to the screener for optimum sieving performance.

4. **Ultrasonic Screener:** Mesh size 63 µm
(optional 50, 56, 75, 85, 106 µm, other sizes upon request). With ultrasonic agitation of sieve to prevent blinding.

5. **Oversize Material Collector:**
Easily exchangeable bin

6. **Collecting Bin or Pick Up Hopper:** Sieve outlet port easily connectable to optional available PowTReX-Bin (optional: fully purgeable and removeable under inert conditions), to Customer Bins, or to optional pick up hoppers to transport the sieved AM metal powder back to the AM machine.

How the PowTReX system functions

Powder extraction and Buffer

The metal powder is conveyed into the PowTReX through a hose or pipe by vacuum conveying.

There are numerous possible setups:

- draw the powder out of the build frame of an opened 3D printer by a suction lance
- aspirate the powder by suction lance inside a closed glove box or a depowdering station
- pull in the powder from a container or bottle by suction lance
- draw the powder from an IBC container
- draw the powder from a buffer container (e.g. vHub 250)

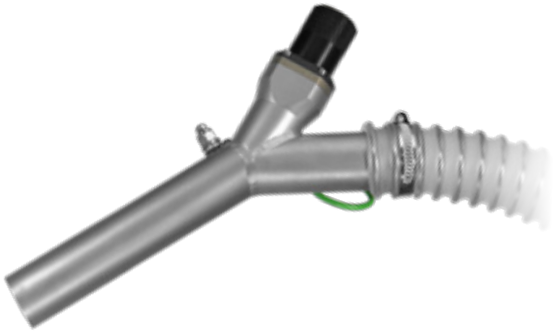
The length of the conveying pipe can be up to 25 meters and can also accommodate height differences. The high conveying capacity allows on the one hand the buffer hopper in the PowTReX to be filled quickly and at the same time the discharge point is quickly available again for subsequent tasks.

The rapid transfer of metal powder from a 3D printer or depowdering station is made possible by a high conveying capacity and a large buffer container, making the powder quickly available for the next print job. With a stainless steel powder and a 10-meter-long hose, the conveying capacity is approximately 750 kg/h.

Fig.: The powder buffer has an effective capacity of 25 liters of metal powder.

Suction lance with adjustable secondary air

The new generation of suction lances with adjustable secondary air improves the operator's ergonomics during depowdering. The secondary air prevents the lance from being pulled into the powder bed or onto smooth surfaces. Additionally, it always provides a sufficient air supply for conveying the material.



How the PowTReX system functions

Powder recovery

Within the PowTReX, oversized particles, composites and foreign bodies are separated by a sieve. Stimulated by an ultrasonic generator, high throughputs are achieved.

In addition, sensors continuously measure the loading of the sieve with powder. The material supply from the buffer hopper is controlled accordingly ensuring the sieve screen is always optimally loaded with powder.

The PowTReX can convey and sieve metal powder simultaneously, contributing to the system's high throughput rate.

Particles and other foreign bodies that are separated during sieving are collected in a bin. A sensor monitors the fill level. You can use a clamp to connect a disk valve and a bottle. The collection container can be emptied while the machine is running.

Available mesh sizes are: 63 µm (default), 50, 56, 75, 85, 106 µm, and other sizes upon request. The PowTReX screens are compatible with the earlier PowTReX version screens.

Container filling or automatic conveying to the downstream system

The PowTReX is prepared for the containers and bottles of numerous printer manufacturers. The following containers can be used with additional holders and adapters: EOS bottle, EOS dispenser M 400, Trumpf TruPrint 500 cylinder, containers from SLM, Renishaw, Volkmann 50L container, Volkmann 100L container. For other containers we can offer you individual solutions.

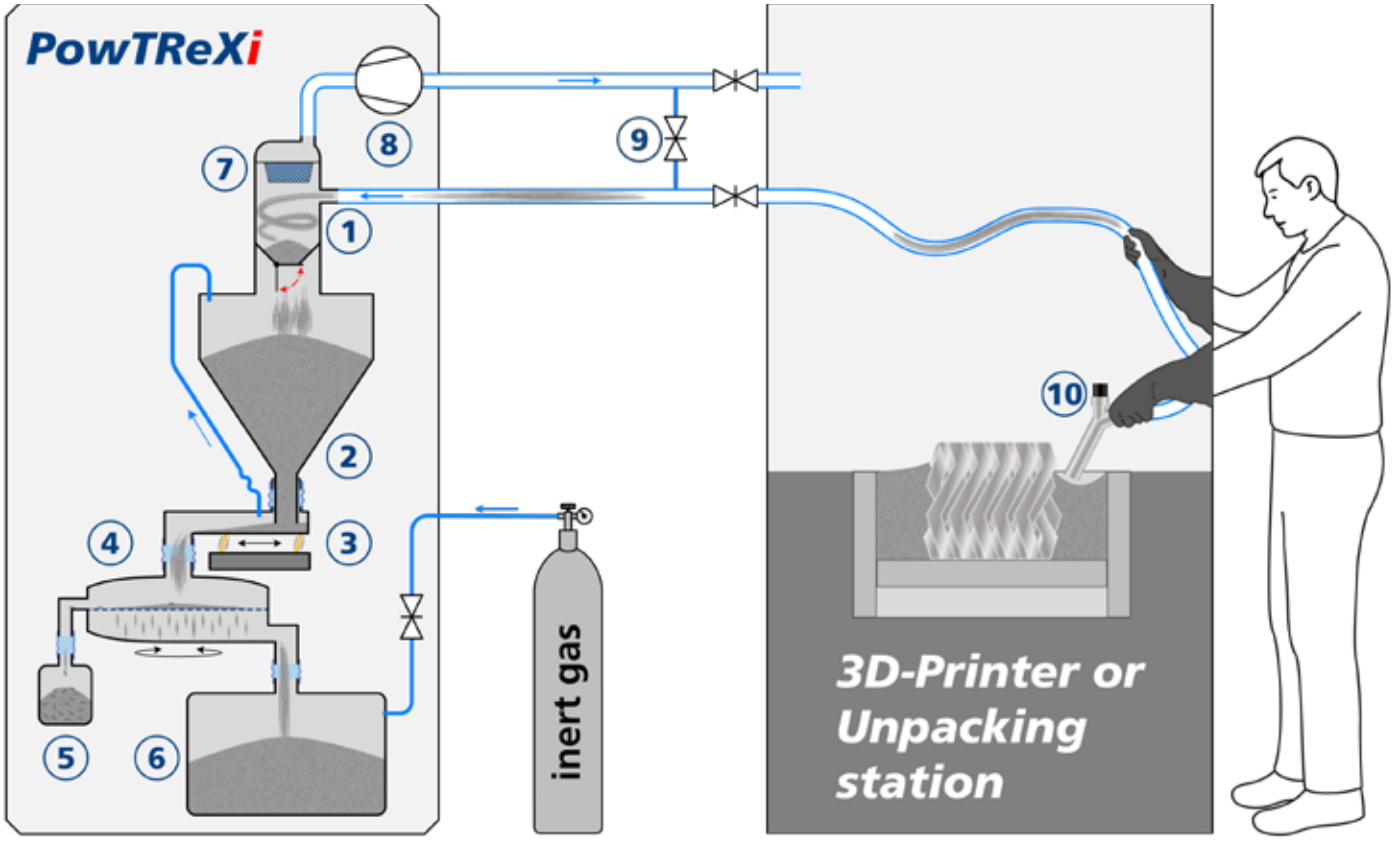
The PowTReX can also be used to fill large containers. To accomplish this, an additional frame extends the height of the machine structure.

The sieved metal powder can be transported via vacuum conveying through a pipeline to a downstream device. For this purpose, a Volkmann 100 L container is used to buffer the sieved metal powder. The conveying line is connected to the container, and powder conveyance is coordinated via data exchange between the devices.

Powder processing with Inert Gas Atmosphere

The **PowTReXi** variant is used for handling and processing powder in an inert atmosphere with low oxygen content. The metal powder is covered by the inert gas at every stage of the process. This includes the extraction, the container with the sieved powder, and the container for the separated material.

Additionally, the entire system is flushed with inert gas before the process begins. The oxygen content is permanently monitored by a sensor.
The inert gas circulates in a circuit between the feed point (3D printer, unpacking station, etc.) and the PowTReX. This loop significantly reduces gas consumption.

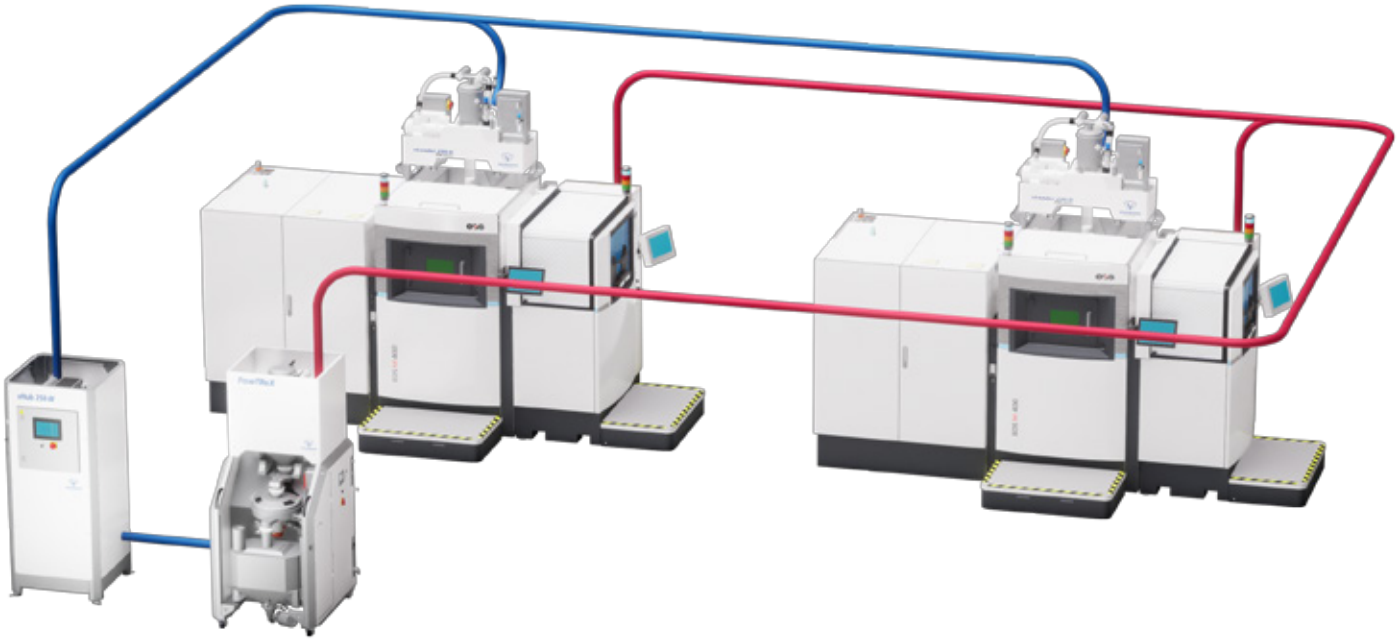


1. vacuum conveyor
2. powder buffer
3. powder dosing
4. sieve
5. oversized particles
6. sieved metal powder
7. filter
8. electrical vacuum pump
9. bypass pipe
10. suction lance

Team Play: Integrating the PowTReX into a Production Cell

Automatic conveying of metal powder between systems offers numerous advantages. The metal powder is contained, safeguarding the personnel, the workshop, and the powder itself. Automation reduces the number of personnel required and increases overall productivity, including unmanned production shifts.

The PowTReX is suitable for numerous automated powder conveying variants, including the supply of used powder and the transfer of sieved powder. Closed powder circuits can be implemented as a production cell with up to six 3D printers, for which the PowTReX then acts as the central powder preparation system. EOS printers can be filled directly with the VOLKMANN vLoader 250. The VOLKMANN vHub 250 can be integrated as a buffer for used and processed powder.



When linked with an upstream (e.g., vHub 250 metal powder buffer) and downstream (e.g., vLoader 250) device, the PowTReX PLC controller can coordinate the entire system.

For more complicated setups, like those with multiple 3D printers, a vHub 250-M handles the coordination.

Technical Data

	PowTReX	PowTReXi
Power supply:	400-480 V, 50-60 Hz. max. 0.5 kW	 max. 2.5 kW
Compressed air consumption (CDA):	at 5.5 bar / 80 psi (min. 4.0 bar, max. 6.0 bar) max. 1.500 Nl/min max. 53 cfm	 max. 150 Nl/min max. 5.3 cfm
Footprint:	1005 x 1211 mm (39 ½ x 47 ¾ in)	
Height:	2375 mm (93 ½ in)	
Weight (w/o container for sieved powder):	350 kg (772 lbs)	450 kg (992 lbs)
Materials:	304, 316L (for parts with powder contact)	

The PowTReX controller features an OPC-UA interface for exchanging data with other systems.
The integrated control cabinet is UL 508A certified.

Fig.: PowTReXi in an inert closed powder loop

VOLKMANN GmbH · Schloitweg 17 · 59494 Soest (Germany)
www.volkmann.info · Phone +49 (0) 2921 9604 0 · mail@volkmann.info