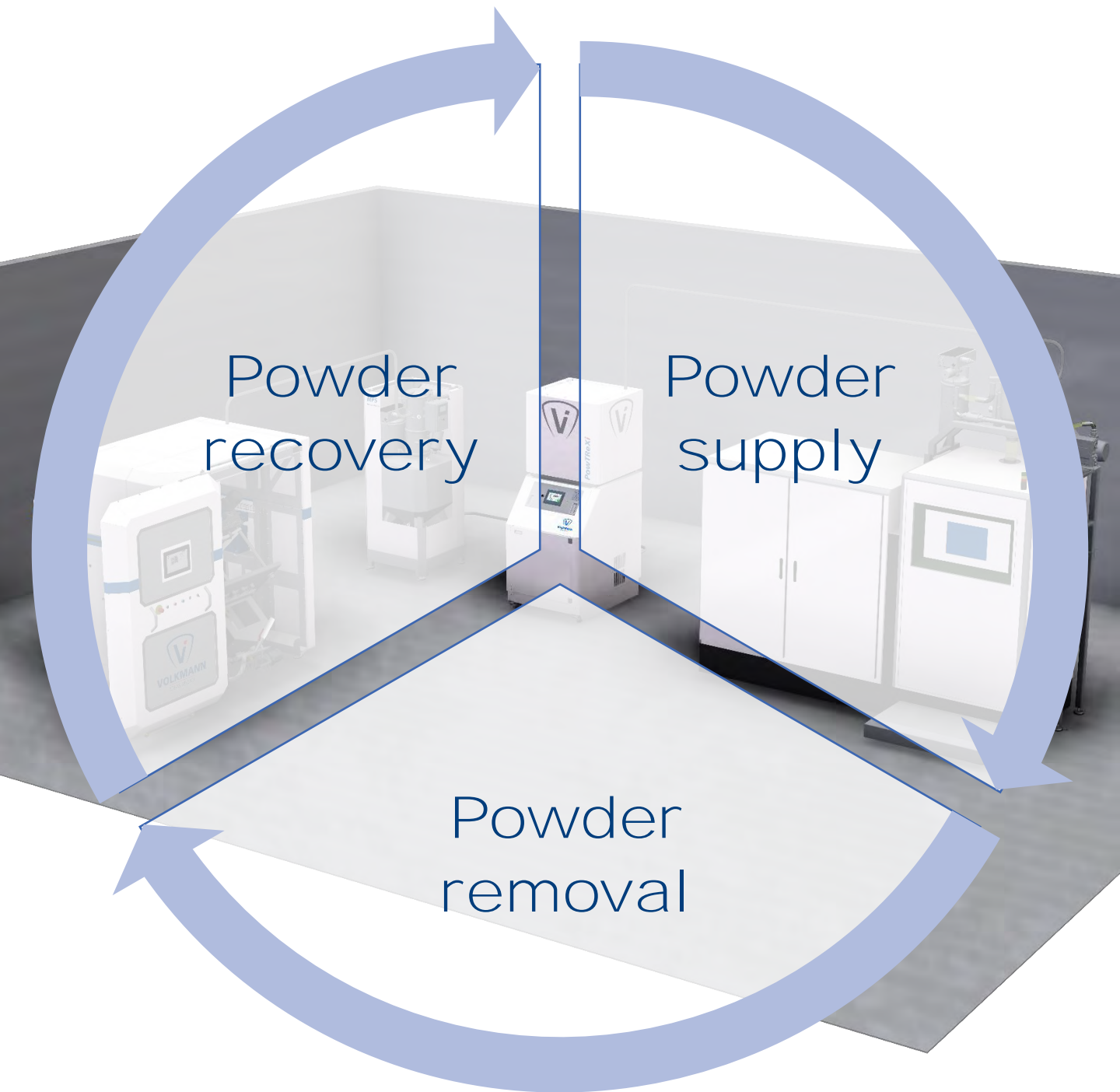


Powder Handling Solutions for metal AM



*holistic powder handling
increased productivity*

Vacuum conveying and drying

The automatic filling of a 3D printer with metal powder can be elegantly solved with a vacuum conveyor. The metal powder can be conveyed from a container or IBC, a pack, a recycling station or a mixer, or any other station, even over long distances. The vacuum conveyor is synchronized with the 3D printer via a simple interface. Vacuum conveying can be realized with all common 3D printers and retrofitting of existing printers is also possible.

The conveyed metal powder can be additionally dried in the collecting tank of the vacuum conveyor. Therefore, the system is supplemented with an electric vacuum pump, among other things. The vacuum conveyor and all associated components are attached to a frame tailored to the 3D printer. Thus, no support loads act on the 3D printer, and negative effects on the print result due to deformation of the printer frame are consistently avoided.



3D-printer with MPC 250 vacuum conveyor incl. drying option and mounting frame

PowTReX sieving and conveying systems

PowTReX & PowTReX i

The **Powder Transfer, Recovery and Extraction System** is designed to enhance the new technology of additive manufacturing machines when handling metal powders. Consisting of three elements, the **VOLKMANN PowTReX** addresses the need to transfer material to the machine – both in a normal air environment or under an inert gas – recover the excess material, screen it and finally return the material to the machine or a container for future use. Two options are available, both are designed with high levels of containment, to meet the requirements of the metal AM industry. The inert **PowTReX i** is designed as a “closed loop” system. The inert gas is contained and reused, avoiding cost of large volumes of inert gas.



PowTReX i – The version for inert operation



PowTReX basic with EOS bottle

PowTReX basic

The **PowTReX basic** combines the core functions of its big brother in a compact highly mobile device. Optimized for smaller machines such as the **EOS M290** or the **SLM 280**, the **basic** provides an attractive option for powder extraction and sieving. The vacuum conveyor with a volume of 30l enables the uninterrupted emptying of the above-mentioned machines. After the suction process, the sieving process is activated, and the operator can proceed with the further post processing of the built job.

PowTReX sieving and conveying systems

PowTReX advanced

Our **PowTReX advanced** is based on the experience and knowledge gained from the development of the **PowTReX** and the **IDAM** project. The system is additionally equipped with a second vacuum conveyor and dosing system above the screen, which allows new and used powder to be drawn in and stored separately. The new powder can be fed e.g. from a container via a container docking station. The used powder can be fed directly from a depowdering station or alternatively from a silo (e.g. **VOLKMANN vHub**). New and used powder are fed to the screen via a vibrating chute. The mixing rate between old and used powder can be adjusted individually. In addition to sieving out the oversized particles, the sieving process also has a positive effect on the mixing of new and used powder.



PowTReX advanced (without housing) with container and docking station for virgin powder container

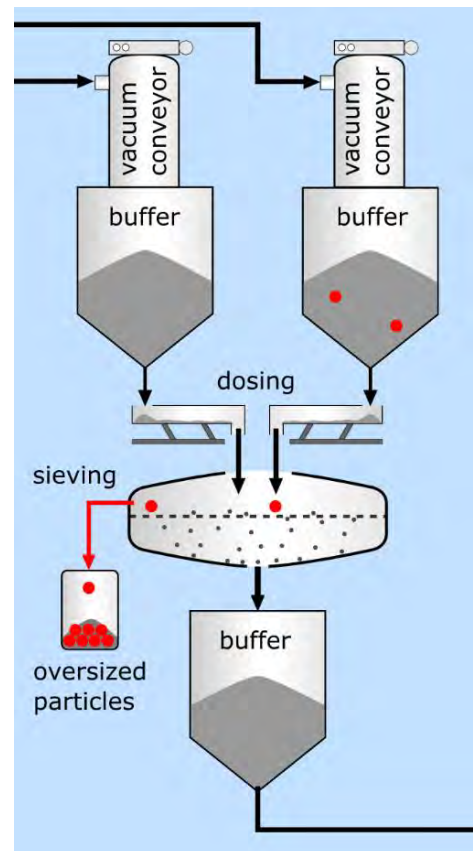


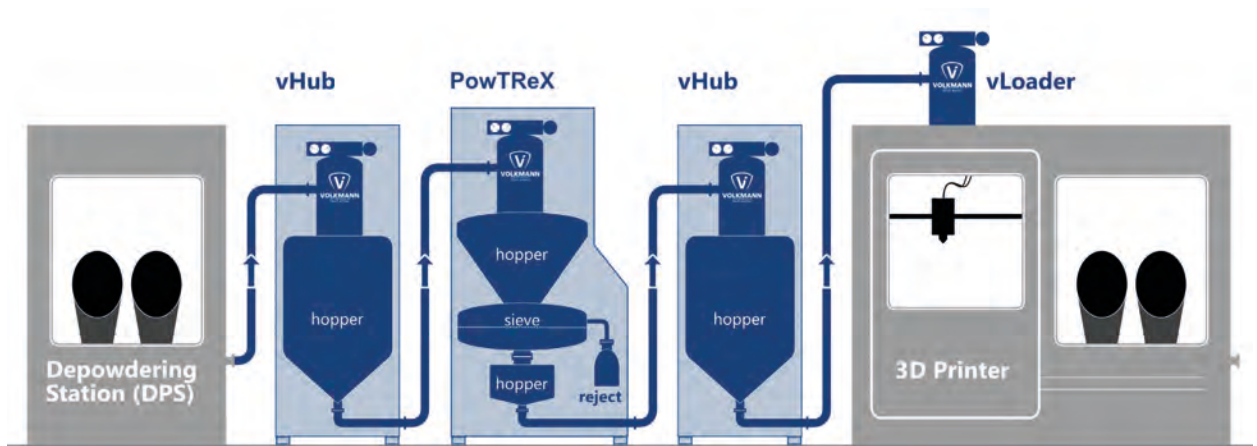
Illustration of the basic principle of the **PowTReX advanced**

vHub – modular powder supply

The **vHub** provides an intelligent buffer and conveying system, which can be expanded modularly. It can be used wherever two processes are connected via a conveyor. For example, a **vHub** can be placed between an unpacking station and the **PowTReX** to create a buffer before the screening system and allow faster emptying of the station. In addition to the high buffer volume the **vHub** is equipped with a strong vacuum conveyor with a capacity of up to 1500 kg/h. If the volume of one module is not sufficient, up to three additional modules can be connected in series. Only the first needs the full scope of control, while the other modules are controlled in the "master-slave" principle. This means that the supplementary modules do not require their own power and compressed air supply. They are conveniently connected to the master vHub via a plug-in connection.



Single vHub



Potential use of two vHub as buffer stations between different process steps

The full circle of powder handling for AM

Volkman holistic powder handling

With the products presented, **VOLKMANN** can offer you a holistic concept for the handling of metal powders. Starting with the **VOLKMANN DPS** as a solution for the complete depowdering of your built jobs via the **vHub** with up to 3 modules as a flexible and intelligent buffer to increase the capacity of the powder management, the **PowTrex** as a smart conveying and screening system and the vacuum conveyor MPC 250 incl. drying option for the supply of the printer, **VOLKMANN** offers a complete and well-thought-out concept for the modern AM shop floor.

The powder handling concept is influenced by many factors, such as the type and number of machines to be supplied, the total size of the AM production, the materials used and many others. Therefore, we work out an individual concept together with you, in order to meet your demands. Please feel free to contact us to receive an individual concept and offer.



Powder removal

automated depowdering system DPS

The new **VOLKMANN** depowdering station enables the highly efficient depowdering of the build box & build components in a fully automated process. Both are loaded directly from the 3D metal printer into the depowdering station without the need for intermediate steps such as the unpacking of the built components.



The entire cleaning process takes place in a closed chamber either under atmospheric conditions or under inert gas. The process removes not only the excess metal powder from the deepest cavities of the built components, but also the adhering powder from cleaning chamber, so that the component can be removed cleanly.



Top view of a built box before entering the **DPS**



Clean built job exiting the **DPS**

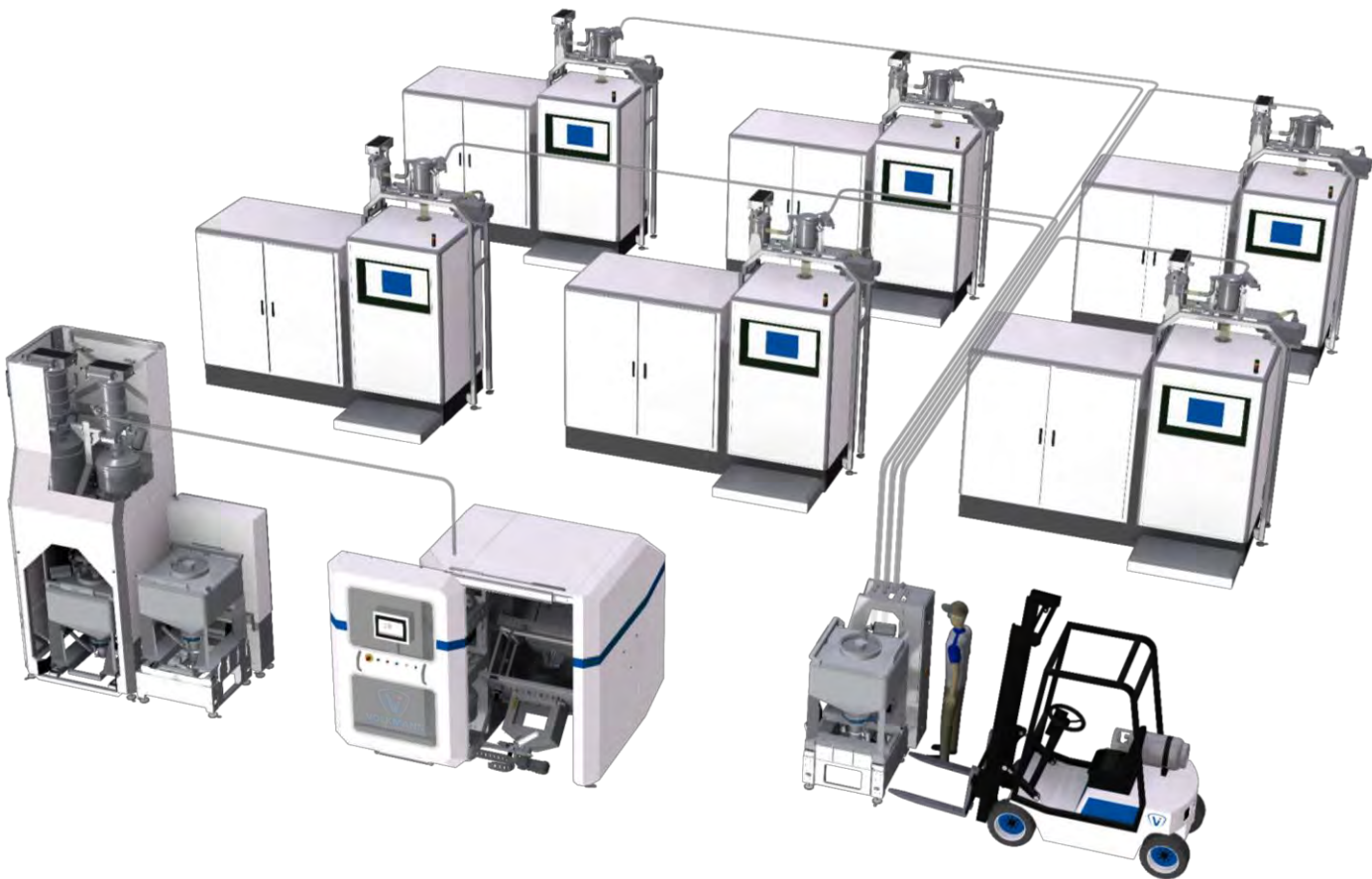
Total powder handling

Solutions for the AM-factory of the future

Closed loop powder handling for a multi machine set up

In addition to the single machine set ups, it is also possible to implement multi machine set ups. This increases the utilization of the powder management system and maximizes overall productivity. In the example shown, we are dealing with a production cell with six machines. With a container docking station, the individual printers are supplied with powder mixture as required via MPC 250 vacuum conveyors. After completion of the job, the built box is transferred to the **VOLKMANN DPS** and completely depowdered. The excess powder is extracted from the **DPS** with the **PowTReX advanced** and mixed with new powder in a freely selectable percentage. The powder is then filled into a container to be stored until it is needed. Alternatively, the printers can also be supplied directly from a buffer under the **PowTReX advanced**.

There are various options to customize the concept to customer needs, this is why we develop a tailor-made solution together with each customer.



Six printer production cell with a holistic powder handling concept by Volkmann. Including placement and mixing of new powder, sieving, powder supply for the printers and automated depowdering station.

VOLKMANN is project partner in the research project

»Industrialization and Digitization of Additive Manufacturing (AM) for Automotive Series Processes - IDAM«.

The project is funded by the German Federal Ministry of Education and Research (BMBF) and coordinated by the BMW Group.



Twelve project partners, amongst them

- GKN Powder Metallurgy, Radevormwald
- Fraunhofer Institute for Laser Technology ILT, Aachen
- Chair for Digital Additive Production DAP, RWTH Aachen

and

- **VOLKMANN** GmbH, Soest

are investigating into the integration of metallic 3D printing into the conventional production lines of the automotive industry.



Check the QR-code with a press release by Fraunhofer ILT on the IDAM-project

