

#### What is it?

- It is an automated machine only requiring to load the parts and switch on the machine. The operator is free to do other things whilst letting Typ4 do the work unattended.
- It processes entire build compartments in the 20l class or smaller of powder based AM plastic.
  - The loading mechanism is like a big funnel, if you can pour the powder you can fill the machine.
- It unpacks - breaks - the powder cake.
- It de-powders the parts.
- It gives the used powder ready to be refreshed.
- The 20l class machine is available for around 20.000,- EUR until 2022-12-31, you can order now, first come first served. Price will increase next year by around 30% due to inflation and end of introduction phase.
- Delivery of Typ4 is 4 weeks.
- Introduced at Formnext Frankfurt 2021.

For a general overview please visit the website: <https://pulvermeister.de/typ4-en/> , scroll down the page to see a Youtube video of how to use (German).

#### What makes it special?

- The 'little brother' of the Typ3, which has already processed more than 200,000 parts without any modification. Same principle, fourth iteration, hence Typ4.
- It uses a vacuum circuit to transport the powder.
  - This circuitry is contamination free -> for refreshing and further use of the used powder (already stored in a container -> facilitates handling).
- Practically no powder contamination for the user.
- Conforms to German machine and safety guidelines.
  - No heavy lifting, easy handling.
  - When opening (the lid or the drawer) the whole machine stops immediately for safety reasons.
  - Negative pressure monitoring system. If the vacuum fails, the air pressure of the nozzle is switched off immediately.
  - Drum rotates, inclination of the drum also by rotation of the second axis. Air supply and powder removal through axle.
- Very robust and high quality construction. Simplicity in reliability is the key to the design.
- The degree of detachment of the powder from the built surface can be very finely controlled by 4 parameters:
  - Inclination of the drum. (also see above mentioned video)
  - Air pressure of the injection nozzle in the drum.
  - Rotation speed of the drum.
  - Time control of the process.
- Explanation: The adhesive strength of the powder, like its decomposition (or degradation), is linked to the cause of heat absorption in the build process. The more heat the powder absorbs at a particular point, the more it will adhere to the adjacent contact surface and the less likely it is usable for refreshing (degradation). By fine-tuning the 4 parameters mentioned above, it is possible to control how much powder is detached and thus reused, and in what quality.

- The trade-off is how much a part should be stressed and how long it takes to get the required amount of used powder. This fact will become even more interesting if in the future when the mixing ratio of new and old powder changes in favour of a lower use of new powder (constraint: printer progress with cost advantage in serial production due to lower consumption. Politics: Recycling).
- To de-powder more powder than you want to reuse, simply connect to another vacuum and continue the process to remove degraded powder from parts -> dust reduction when handling parts and reduced waste generation (glass beads/powder vs. pure degraded powder) -> improved health and respiratory system of powder bed printer users in post-processing.
- PULVERMEISTER also uses the stress factor for quality control. If something went wrong in the manufacturing process, the parts are more likely to break. This was already saving a considerable amount of money as we found that we then had received degraded powder. As the parts are the first step in production, costs are also saved:
  - No wastage of electronic components with the added work of casting into casing.
  - No shipping of faulty components to customers (spedition cost and handling).
  - Not having to handle with the increased service cost of exchanging parts and finally customer satisfaction.
- The whole process is very fast: for a 16l PA11 Black, EOSP110 build tray with deep cavity parts it takes about 15 minutes. Let's say 30 minutes for safety's sake. That means 16 build compartments of the above material, machine combination in 8 hours. One day building, one day cooling = 32 EOSP110 operated from Typ4 with 100% safety margin.
- Everything you need to use the machine is on the machine (loading funnel has its own place in the machine).
- The drum and other large parts of the Typ4 are made of stainless steel. All other parts can also be made of stainless steel, which is more expensive but may be suitable depending on the inspection criteria: SLS stainless steel 3D printed parts - for food or medical devices.
- It is internationally patented (some are pending, the PULVERMEISTER brand is even protected in the USA and China).

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