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PBF-LB

Systems Overview

PBF-LB Systems Overview



To operate a PBF-LB system, one needs to be familiar with the different components that it includes. This scenario aims to familiarise the trainee with the PBF-LB machine systems, including the build chamber, the power source, the gas system and the powder system

PBF-LB Systems Overview



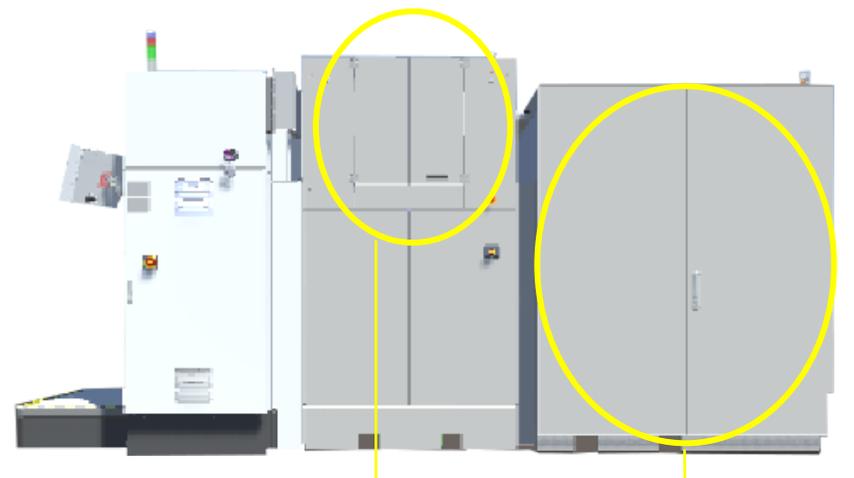
This scenario should be employed as a walkaround, where in each relevant area there is a prompt to look into the details of that specific area. These are comprised of the build chamber, the power source, the gas system, and the powder system.

From View of EOS M400-4



Electrical cabinet Build chamber

Back View of EOS M400-4



Powder system Filter system

PBF-LB Systems Overview

Build Chamber



The build chamber includes all parts present in the area where the part will be built. This includes parts relating to other systems.

WARNING: When working with an open build chamber, you must wear the appropriate PPE (basic if cleaned, advanced if there is visible powder residue).

- Show viewing window:
 - The viewing window allows the operator to visually monitor the build, so that any major issues can be tackled early-on, usually by stopping the machine.
 - After this the door opens so the user can see inside the chamber.



- Show machine panel:
 - This panel, besides being used to control the system, is also where all the information about the current work is shown.



PBF-LB Systems Overview

Build Chamber



EOS M400-4 – Build Chamber
Laser Beam Window

- Show laser beam window:
 - The window where the laser passes through. It ensures that no particles come into contact with the mirrors/lenses.

- Show process gas outlets:
 - These outlets ensure the process inert gas is dispensed into the build chamber. They are used both to fill the chamber before the build, as well as to evacuate by-products from the build process.

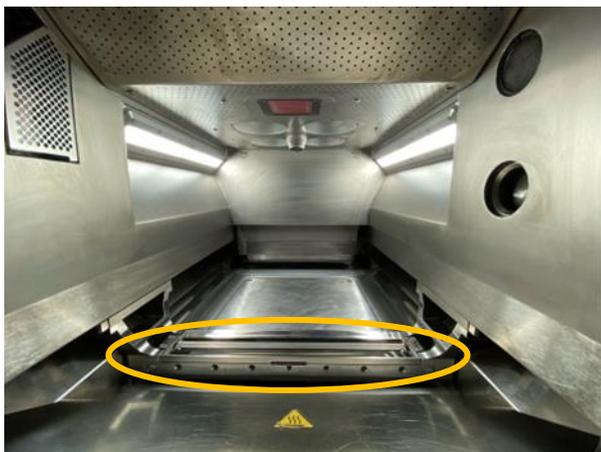


EOS M400-4 – Build Chamber
Process Gas Outlets



PBF-LB Systems Overview

Build Chamber



EOS M400-4 – Build Chamber
Recoater

- Show recoater:
 - The recoater blade ensures that every layer will have an even layer of powder, with height equal to the one set in the program.
 - After this the recoater makes a pass.



EOS M400-4 – Build Chamber
Build Platform

- Show build platform:
 - The build platform is the metal substrate in which the powder will be spread and later fused to produce the parts. It can move vertically, lowering with every layer.
 - After this the build platform moves down and back up.

PBF-LB Systems Overview

Gas System

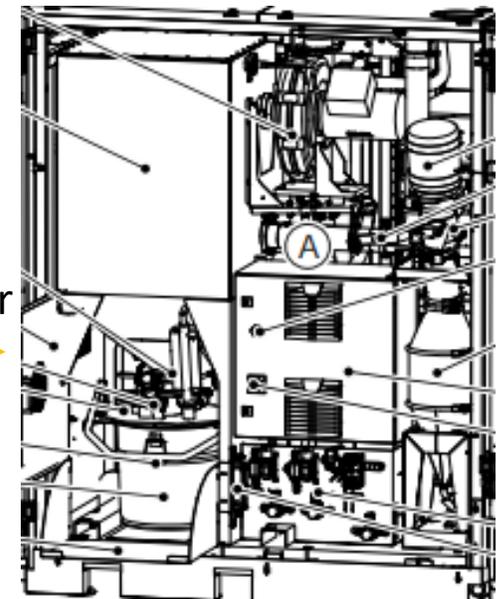


The gas system is composed of the parts responsible for the internal circulation of the Inert gas, as well as the removal of the atmospheric gases (to avoid contamination from O₂ and CO₂) present in the build chamber.



EOS M300-4

Open door



EOS M400-4



PBF-LB Systems Overview

Gas System



EOS M400-4 – Gas Systems Cabinet
Particle Collection Filters

- Show particle collection filters:
 - These filters capture the process by-products for disposal, brought by the gas circulation system.

- Show gas circulation system:
 - This system is responsible for gas circulation in the machine. The gas flow carries out the fine metal powder and particles emitted from the build process. These particles are collected in mesh filters and the gas is re-circulated.



EOS M400-4 – Gas Systems Cabinet
Gas Circulation System

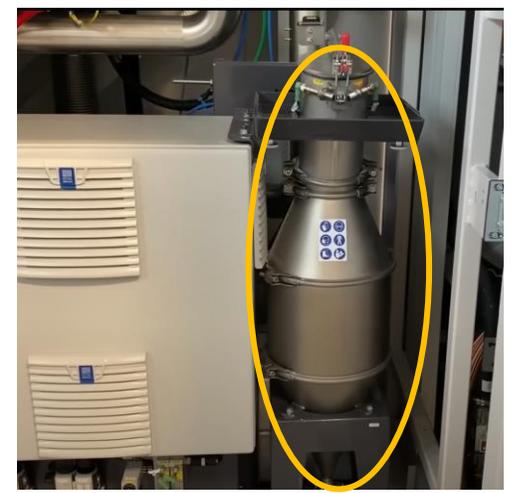
PBF-LB Systems Overview

Gas System



EOS M400-4 – Particle Collection Bin

- Show particle collection bin:
 - After the passivating filter reaches critical coverage, the passivated material is dropped into the collection bin, which needs to be changed at least once every 70 hours.



EOS M400-4 – Passivating Material Bin

- Show Passivating material bin:
 - This bin contains the passivating material to be used in the particle collection filters. The material used is often Limestone.

PBF-LB Systems Overview

Gas System



EOS M290

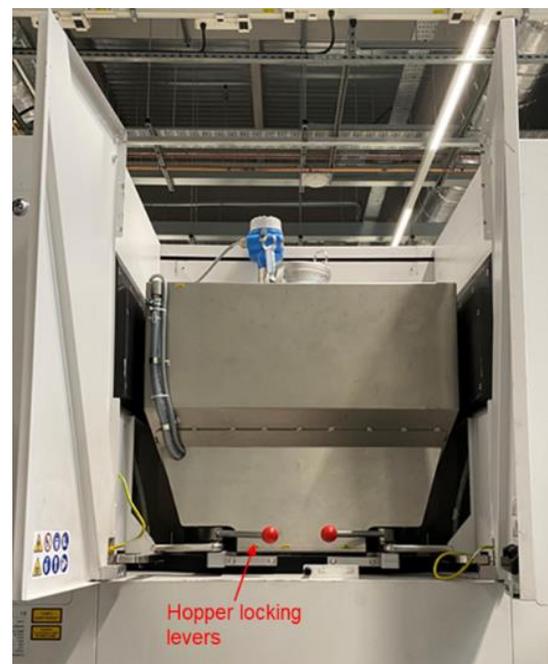
- Show inert gas bottles (Ar or N or He):
 - These bottles contain inert gas that is to be used to fill the build chamber after evacuating the atmospheric air through the vacuum pump. They might contain Argon, Helium, or Nitrogen.

PBF-LB Systems Overview

Powder System



The powder system includes the components that are responsible for the circulation of powder within the system.



EOS M400-4 - Hopper

- Show Powder dispenser/Hopper:
 - The hopper stores powder to deliver to the build chamber. It's capacity is usually enough for a full build chamber with maximum build height (z axis). The weight of the powder is measured through load cells, and further displayed in the control panel.
- Show dosing system:
 - The dosing system monitors the level of powder, transferring powder from the hopper to the build area as needed.



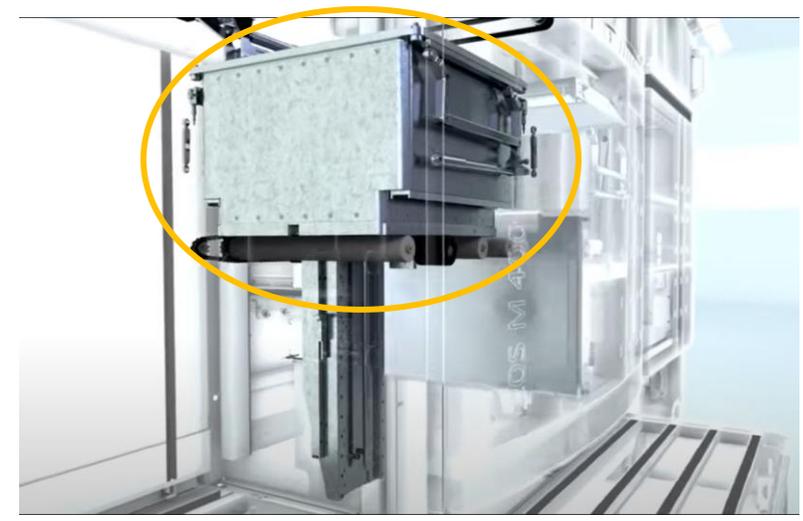
EOS M400-4 – Powder Dosing system located at the base of the hopper

PBF-LB Systems Overview

Powder System



- Exchangible frame:
 - The exchangeable frame contains the building platform carrier to which a building platform is fastened and the front and rear collector duct.
 - The exchangeable frame, with the building platform fitted, is moved into the process station for the building process and into a suitable peripheral module for further work steps using a roller conveyor system.



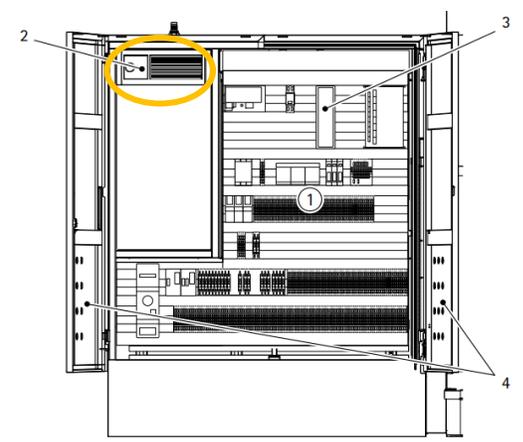
EOS M400 – Exchangible Frame

PBF-LB Systems Overview

Power Source



The power source includes all the components that are required for the laser to be created and guided correctly, as well as the cooling system to guarantee that those components do not overheat.



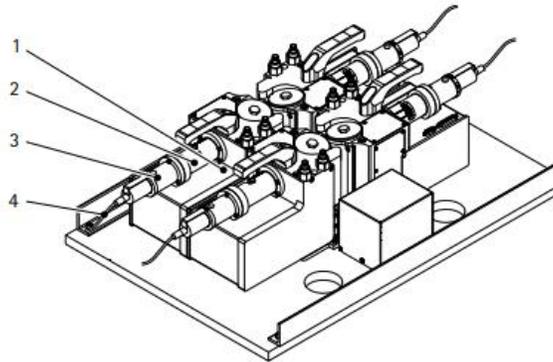
EOS 400-4 – Laser Unit

- Show Laser unit:
 - The laser unit consists of one or more fiber lasers. It is responsible for the generation of the beam.



PBF-LB Systems Overview

Power Source



- 1 Scanner with protective covers (4x)
- 2 Beam expander optics (4x)
- 3 Collimator with holder (4x)
- 4 Optical fibre (4x)

EOS M400-4

- Show optical system:
 - On its way to the process chamber, the laser beam passes under an optics cover bolted to the machine frame.
 - The optical fiber from the laser ends in a collimator. The beam expander optics shape the laser beam arriving from the collimator, define the way the light reaches the scanner and the related focusing capability. The scanner guides the laser beam arriving from the beam expander optics along a defined path over the building area using two mirrors operated by galvanometers.

- Show chiller:
 - The chiller includes the tubing as well as the components used to cool the other machine systems, mainly the power source parts.



Chiller unit supplied with
the EOS M400-4

PBF-LB Systems Overview

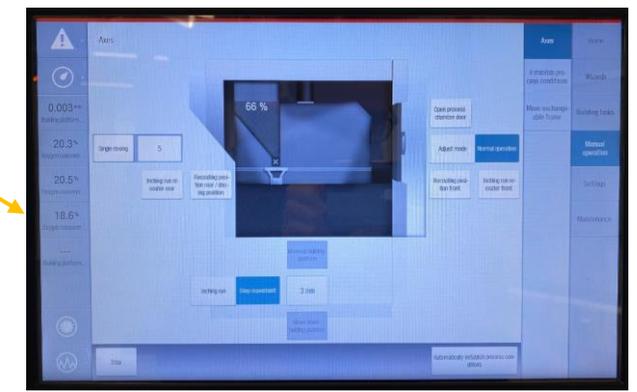
Software

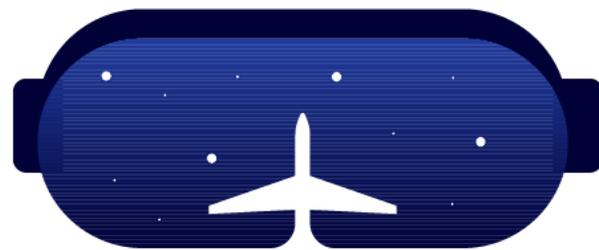


After the trainee has learned about all the areas of the machine a print job should start, with the monitoring information shown on the monitor.



EOS M400-4 – HMI View





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