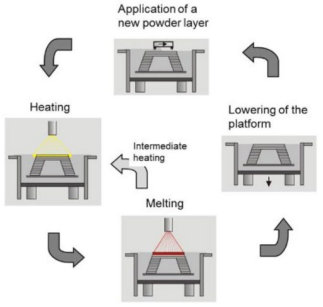
Master‘s Thesis

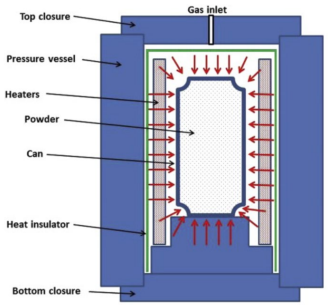
Topic: **Unleashing the potential of MAR-M247 through advanced aging heat treatment via Hot Isostatic Pressing (HIP) after additive manufacturing**

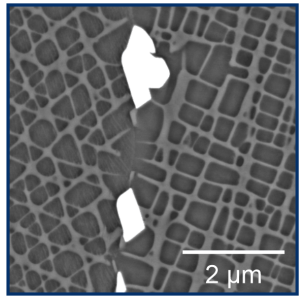
Start: Q1 2024

Description: Nickel-based superalloys are pivotal high-temperature materials, playing a central role in aviation and energy production. While traditional manufacturing methods such as casting, forging, or powder metallurgy have been the norm, additive manufacturing (AM) is rapidly gaining significance. The research project focuses on the challenges associated with the additive manufacturing of superalloys, particularly addressing the poor weldability and high susceptibility to cracking in Nickel-based superalloys with a high γ′ volume fraction through targeted alloy development. After AM, aero engine parts undergo HIP treatment, enhancing safety by minimizing pores and cracks.

Addtionially to the HIP treatment an aging heat treatment is needed to adjust the size and shape of γ′. This step is crucial to achieve the desired mechanical properties. This master thesis combines HIP and aging treatment, investigating various parameter combinations to study the impact of HIP as an aging treatment and exploring how the process influences material properties. Creep tests and Profilometry-based Indentation Plastometry (PIP) are employed to assess those properties.







Methods: HIP, Aging heattreatment, microstrucutral analysis, PBF-EB, Creep tests, PIP

Location: Erlangen

Supervisor: **Elisabeth Kammermeier** elisabeth.kammermeier@fau.de

Group leader: Dr.-Ing. Christopher Zenk

Professor: Prof. Dr.-Ing. habil. C. Körner

If interested, the supervisor can also provide information on other possible topics in the fields of alloy development and nickel-based superalloys.

20.11.2023