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An innovative testing machine for heating, quenching, tension, compression and cracking studies of industrial relevant high-temperature alloys –HiMat BMBF project

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The development of new high temperature superalloys for aircraft engines and stationary gas turbines in power engineering requires higher service temperatures to enhance efficiency and reduce CO₂ emissions. The development of these new materials require the structural (phase transformation) and mechanical (hardness) studies of strengthening and high temperature phases, precipitation kinetics (growth & dissolution), creep & crack growth and forging processes. This will include the development of a new testing machine for neutron scattering studies able to reproduce the rotation or forging forces at high T of a gas turbine which means tension and compression possibilities (up to 100 kN) and furnace heating (up to 1200 °C).

In the HiMat project, we will focus not only on the development of the testing machine but also on the study of different new high temperature superalloys:

- Fundamental studies (strengthening, phase stability...) on new developed Co-base superalloys (materials developed by FAU).
- Industrial studies (understanding of forging, creep resistance..) on VDM Ni-base superalloys (material developed by VDM Metals).

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