The DiMaWert project is funded by the Bavarian State Ministry of Economic Affairs, Regional Development and Energy.«

Project Data

Project Title: Digitisation of material development along the value chains

Project Coordination: Prof. Dr. Friedrich Raether

Project Start: May 2020

Duration: 4 years

Funding: Bavarian State Ministry of Economic Affairs, Regional Development and Energy

Funding Amount: 7 million euros

Fraunhofer-Center HTL
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Contact

Prof. Dr. Friedrich Raether
Phone +49 921 78510 002
friedrich.raether@isc.fraunhofer.de

PD Dr. Gerhard Seifert
Phone +49 921 78510 350
gerhard.seifert@isc.fraunhofer.de

Fraunhofer-Center for High Temperature Materials and Design HTL
Gottlieb-Keim-Straße 62
95448 Bayreuth
www.htl.fraunhofer.de

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Project DiMaWert

Digitisation of Material Development
Along the Value Chains

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In order to achieve the agreed European climate protection goals, measures to reduce greenhouse gas emissions must be introduced in the short term. A very effective lever for this is to increase energy efficiency in energy-intensive industries.«

Motivation

Thermal processes require about two-thirds of the total energy used in the manufacturing industry, and up to now almost 90 % of this energy has been generated using fossil fuels. Therefore, there is a high savings potential here:

- In the short term through the optimisation of current processes
- In the medium and long term by developing new energy-efficient processes and thermoprocessing plants that can also be operated with renewable energy sources

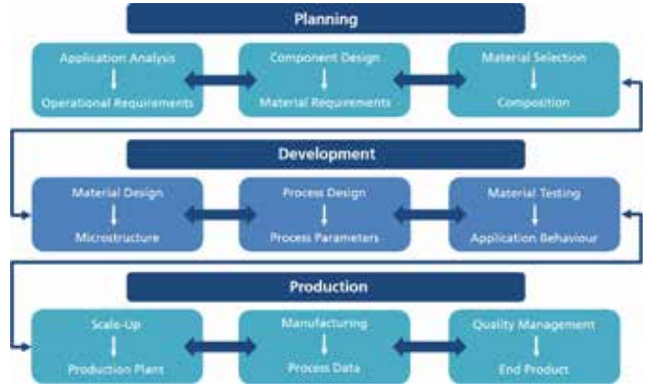
However, such developments currently require far too much time from the first pilot plants to implementation on an industrial scale. This is where the DiMaWert project comes in.

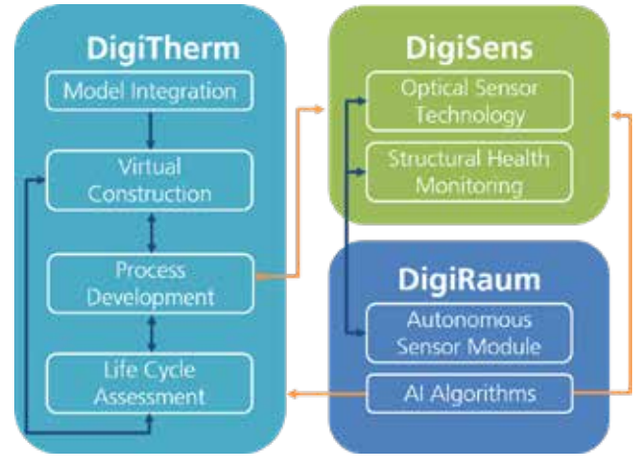
Project Goals and Methods

In DiMaWert, a methodology is to be established with which the development times for new types of thermal processes can be radically reduced, i.e. by at least half, through digitisation. For this purpose, the entire development chain, from the initial application planning to production, is to be equipped with powerful, interlinked computer-based and experimental methods. The methodology is based on the Integrated Computational Materials Engineering (ICME) already established in the USA. ICME is to be transferred to the development of thermal processes and supplemented with regard to production according to Industry 4.0 standards.

In addition to optimising thermal processes, DiMaWert also aims at material and component development, which is also to be significantly accelerated with ICME and AI methods.

In addition to the actual digital methods for creating digital furnace twins, innovative high-temperature sensor technology is also being developed in DiMaWert, which can provide the required information from the real world.





Project Organisation

The DiMaWert project comprises eight networked sub-projects:

- **Model Integration:** Multiscale furnace simulation and material data search
- **Virtual Construction:** Reliable digital kiln twins
- **Process Development:** Digital thermoprocess twins
- **Life Cycle Assessment:** Precise high temperature data and defect assessment
- **Optical Sensor Technology:** Keyhole diagnostics in the oven
- **Structural Health Monitoring:** Monitoring the condition of the kiln
- **Autonomous Sensor Module:** Kiln characterisation in the firing chamber during normal operation
- **AI Algorithms:** Selection and adaptation of artificial intelligence