



On request, we develop individual coating systems according to customer requirements«

### Services

- Development and sampling of lacquers on a laboratory and pilot plant scale
- Application-dependent selection of coating systems using databases, AI and thermodynamic calculations
- Application-oriented analysis of the coating systems via FEM simulation
- Development of ceramic coatings
- Coating of test specimens and components
- Coating of textile structures (e.g. fabrics, fibres)
- Coating production and coating application also under inert conditions (Ar, N<sub>2</sub>)
- Characterisation of lacquers
- Characterisation of coatings

### Application Examples

- Wear and corrosion protection, e.g. for high-temperature applications
- Anti-adhesion coatings for molten metals
- Gas-tight sealing of porous structures
- Heating layers



Fraunhofer-Center HTL  
is certified acc. to ISO 9001:2015

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Lacquers and Coatings



### Application Procedure

- Dip coating
- Paint application by spraying or brushing
- Squeegee application
- Calender coatings

## Lacquers and Coatings

### Development and Synthesis of Lacquers

Fraunhofer-Center HTL develops coatings and coating lacquers based on sols, dispersions and inorganic polymers. Suitable coating materials are selected using thermodynamics calculations, AI algorithms and material databases with little development effort. The coating systems and their interactions with the substrates are also analysed specifically at their operational requirements using FEM simulations and optimised if necessary.

Depending on the coating system and application, coating lacquers are developed and manufactured. A large material variety of different non-oxide and oxide systems is offered for lacquer sampling. The synthesis of the lacquers is carried out on a laboratory scale of up to 2 litres or on a pilot plant scale up to 100 litres. In both cases, production can also be carried out under inert conditions.

In addition to development and sampling, existing lacquers are also modified at the HTL according to customer specifications and their properties are specifically adapted, e.g. by means of additives, so that they can be optimally processed.

### Coating Process

At the HTL, test specimens and components are coated individually according to customer requirements. The coating is usually applied from a liquid precursor based on sols, dispersions or inorganic polymers. In addition, textile structures and continuous fibre bundles can also be coated. Depending on the requirements, the coatings are applied in air or under inert conditions. This is typically followed by thermal treatment to densify and burn in the coatings in air or under inert conditions. The existing coating processes allow layer thicknesses from a few nanometres to more than 100 micrometres.



In addition to contract coating, the HTL also develops and optimises individual ceramic coatings for use at high temperatures.

### Lacquer and Coating Characterisation

A variety of characterisation methods are available for analysing the different lacquers and coatings. These range from chemical analysis to rheological analysis of the lacquers and material examinations of the coatings to application-related tests. Many test procedures can be carried out according to DIN EN certified standards.

### Choice of Material Systems

- $\text{Al}_2\text{O}_3$ ,  $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$
- $\text{ZrO}_2$ ,  $3\text{Y}_2\text{O}_3\text{-ZrO}_2$ ,  $8\text{Y}_2\text{O}_3\text{-ZrO}_2$
- $\text{SiO}_2$ ,  $\text{TiO}_2$ ,  $\text{MgO}$ ,  $\text{MgAl}_2\text{O}_4$
- $\text{Y}_2\text{Al}_5\text{O}_{12}$ ,  $\text{Y}_2\text{SiO}_5$ ,  $\text{Y}_2\text{Si}_2\text{O}_7$
- $\text{LaPO}_4$ ,  $\text{AlPO}_4$
- $\text{SiC}$ ,  $\text{BN}$ ,  $\text{Si}_3\text{N}_4$
- Various glass systems
- Metals and alloys