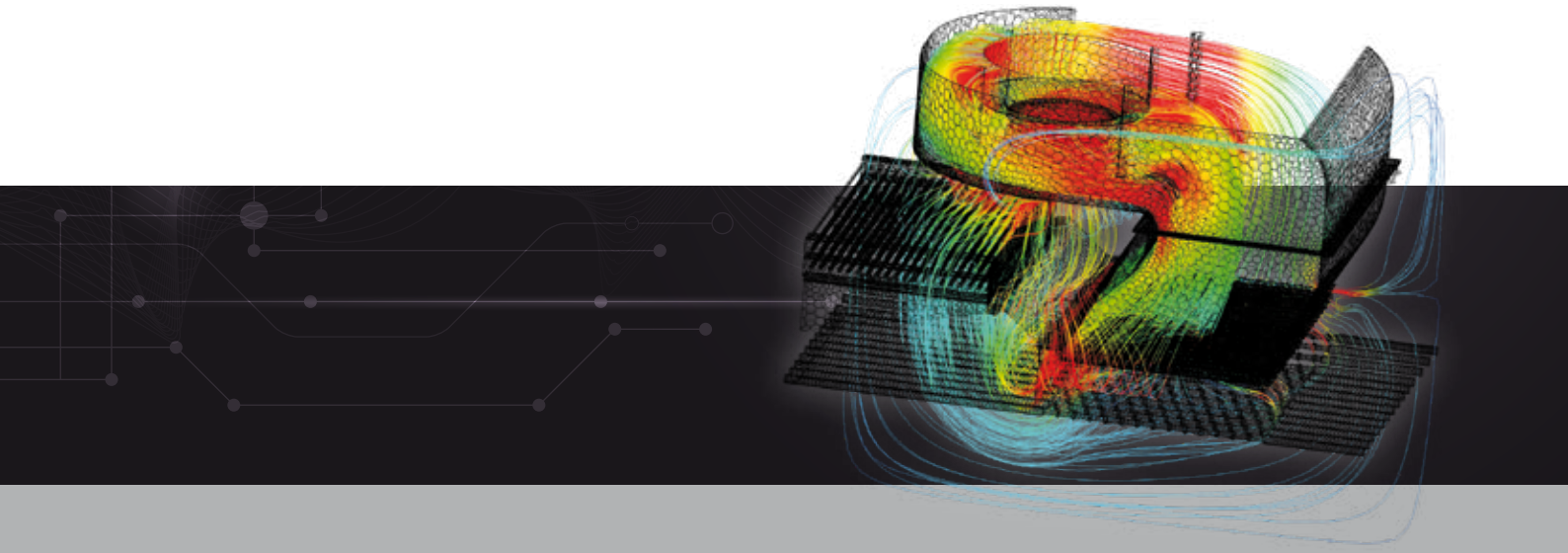
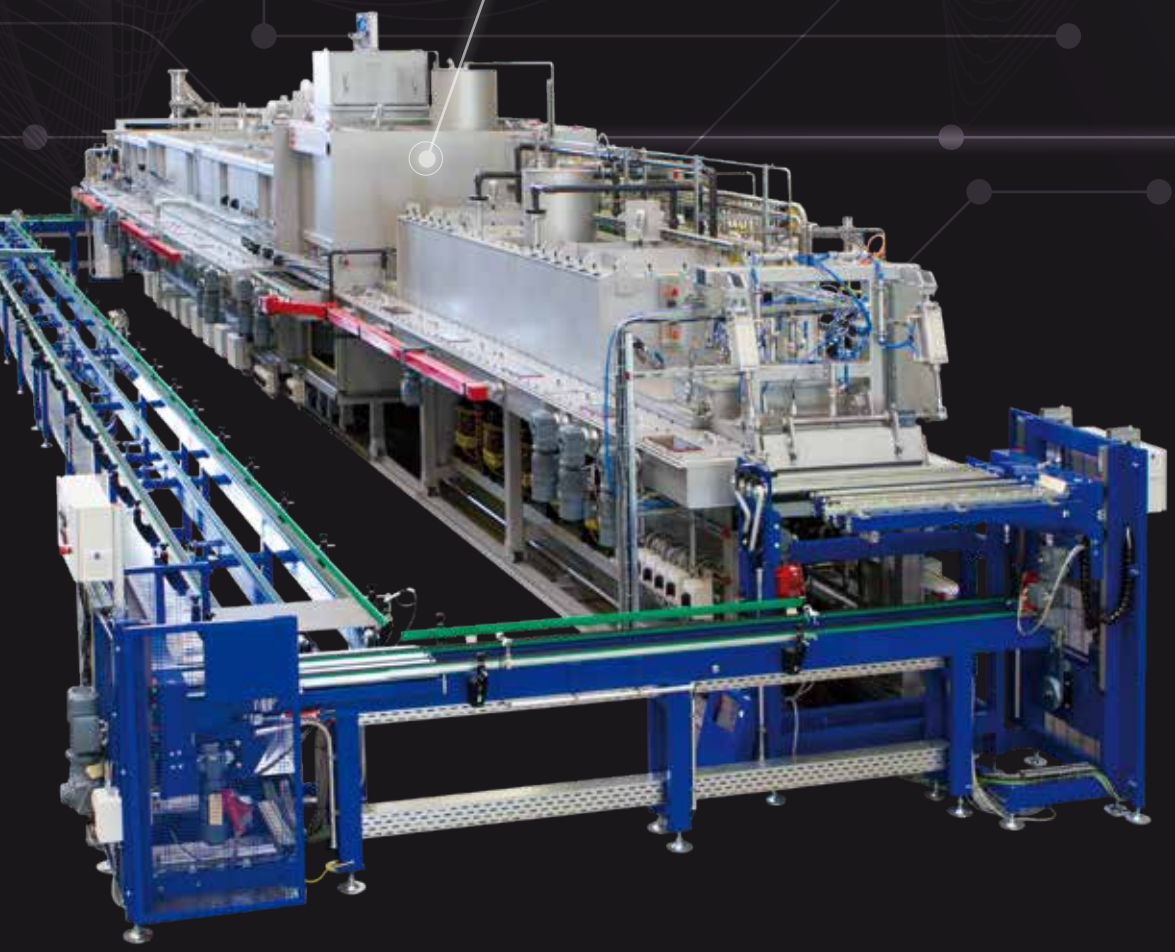
ONEJOON

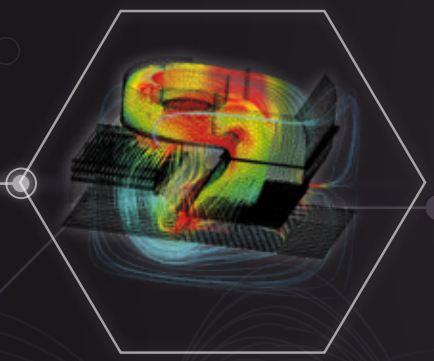


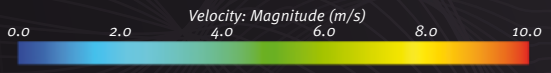
ONEJOON PRODUCT DEVELOPMENT
HIGH PERFORMANCE FURNACE SOLUTIONS

Model-based process optimization **for high-performance operations**

Sophisticated furnace solutions by computational fluid dynamics







ONEJOON Product Development
High Performance Furnace Solutions

How do I achieve the optimal operating status of my thermal process? Does my innovative idea work in a production furnace?
Over the years, computer-based calculation methods have become increasingly important. ONEJOON integrates the latest methods of flow simulation into comprehensive technical and practical company know-how. This results in a very efficient and realistic planning process and an optimal furnace design.

Based on our in-depth expertise in the field of CFD flow simulation, we deliver customized furnace solutions for your challenges. Let us exploit the full potential of your process!

Service portfolio
- Detailed prediction of flow fields in industrial furnaces or piping systems / fittings
- Validated pressure loss calculations in the overall system
- Fluid mechanical and thermal evaluation of innovative process ideas or existing systems
- Targeted optimization of the product inflow for the best possible transfer of heat
- Precise, local detection of flow or temperature-critical furnace areas
- Realistic modelling of chemical reactions in the furnace chamber

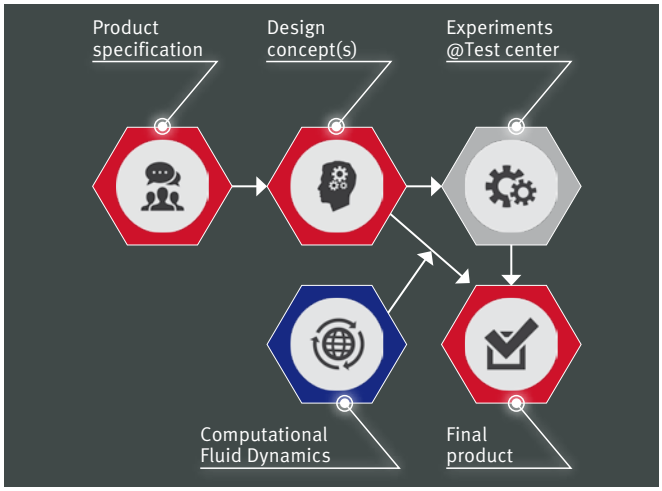
Expertise
- › 40 years of know-how in industrial furnace construction
- Consistent integration of long-standing ONEJOON experts with practical experience
- Constant further development of models through comparison of the CFD results in the company's own technical centre with the latest measurement technology.
- Validation of the simulation results by practical measurements in the field
- Outstanding references of successful performance enhancements on the basis of the CFD simulations performed =› see References

Advantages
- **Increase in efficiency:**
  - Optimization of media consumption
  - Avoidance of costly and complex preliminary tests
  - Fast and reliable design specification for new developments
  - Fast problem analysis and specific solution finding
  - Consistent product quality
  - Maximization of product throughput

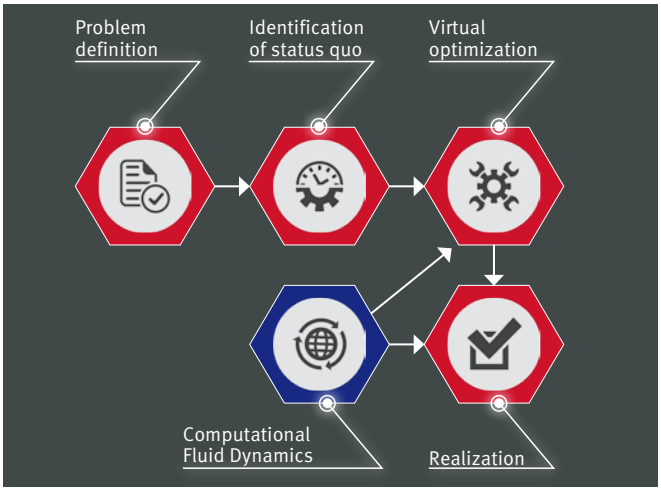
- **Better process understanding:**
  - Higher plant availability
  - Higher degree of process control
  - Improvement of product quality

ONEJOON Product Development
High Performance Furnace Solutions

How is a new product created?



How can I optimize my existing product?



$$\rho\frac{\partial v}{\partial t}+\rho u\frac{\partial v}{\partial x}+\rho v\frac{\partial v}{\partial y}+\rho w\frac{\partial v}{\partial z}=-\frac{\partial p}{\partial y}+\frac{\partial}{\partial x}\left[\mu\left(\frac{\partial v}{\partial x}+\frac{\partial u}{\partial y}\right)\right]+\frac{\partial}{\partial y}\left(\lambda\nabla\circ\mathrm{V}+2\mu\frac{\partial v}{\partial y}\right)+\frac{\partial}{\partial z}\left[\mu\left(\frac{\partial w}{\partial y}+\frac{\partial v}{\partial z}\right)\right]$$

▲ *3D-Navier-Stokes equation*

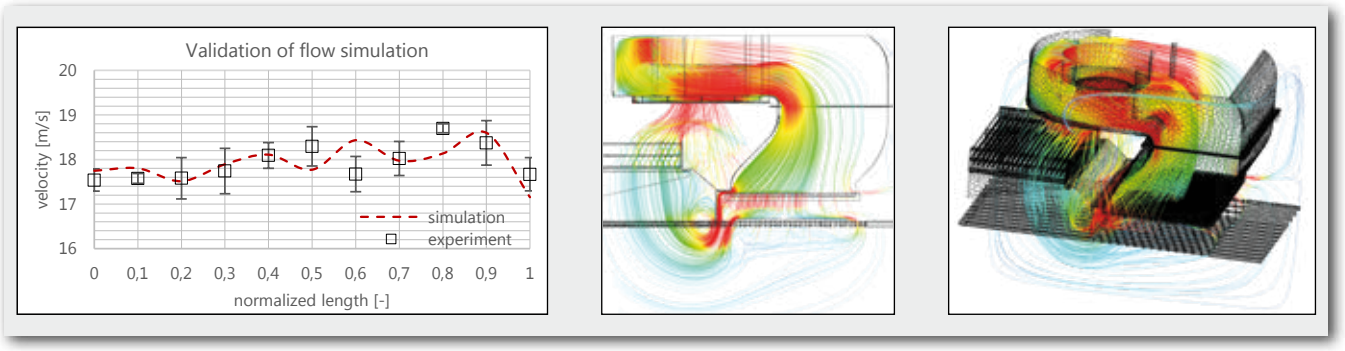
$$\rho\frac{\partial k}{\partial t}+\rho u\frac{\partial k}{\partial x}+\rho v\frac{\partial k}{\partial y}+\rho w\frac{\partial k}{\partial z}=\frac{\partial}{\partial x}\left[\frac{\mu_t}{\sigma_k}\frac{\partial k}{\partial x}\right]+\frac{\partial}{\partial y}\left[\frac{\mu_t}{\sigma_k}\frac{\partial k}{\partial y}\right]+\frac{\partial}{\partial z}\left[\frac{\mu_t}{\sigma_k}\frac{\partial k}{\partial z}\right]-\rho\varepsilon+\mu_t\left[2\left(\frac{\partial u}{\partial x}\right)^2+2\left(\frac{\partial v}{\partial y}\right)^2+2\left(\frac{\partial w}{\partial z}\right)^2+\left(\frac{\partial u}{\partial y}+\frac{\partial v}{\partial x}\right)^2+\left(\frac{\partial u}{\partial z}+\frac{\partial w}{\partial x}\right)^2+\left(\frac{\partial v}{\partial z}+\frac{\partial w}{\partial y}\right)^2\right]$$

▲ *k-ε turbulence model*

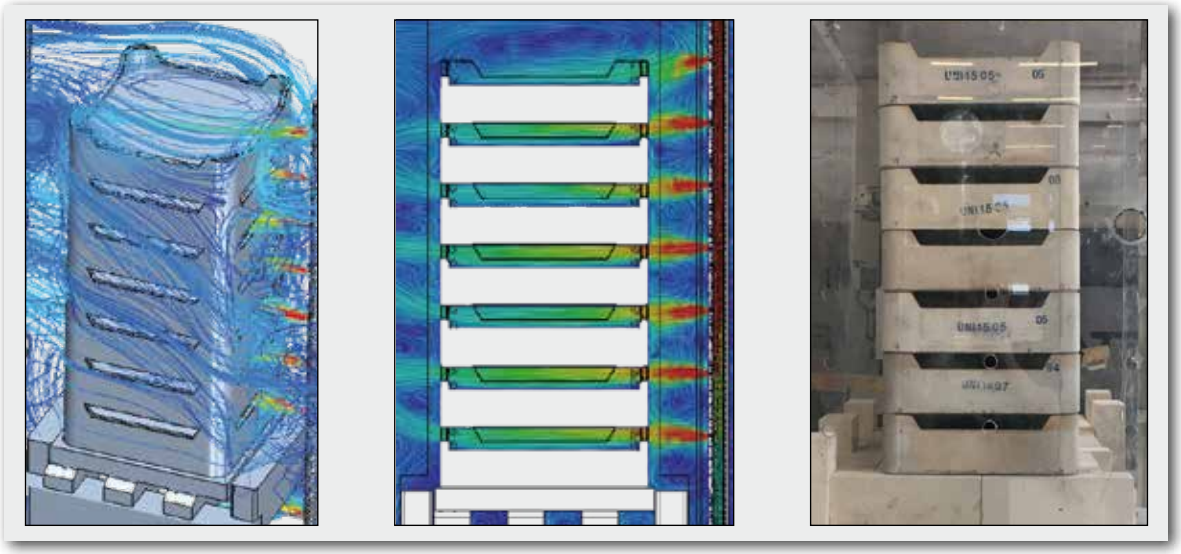
Are you interested in a CFD flow simulation? Our team will be happy to advise you on all matters relating to this topic.

Contact person: Daniel Hipp
Phone: +49 70 31 78 21 31
E-mail: simulation@onejoon.de

Results
and references



Rough cooling – Identification of stalls above the product and constructional adjustment of the flow channel



Removal of reaction gases - dimensioning of the sparger for optimum product overflow

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