

simulations driven by engineering excellence

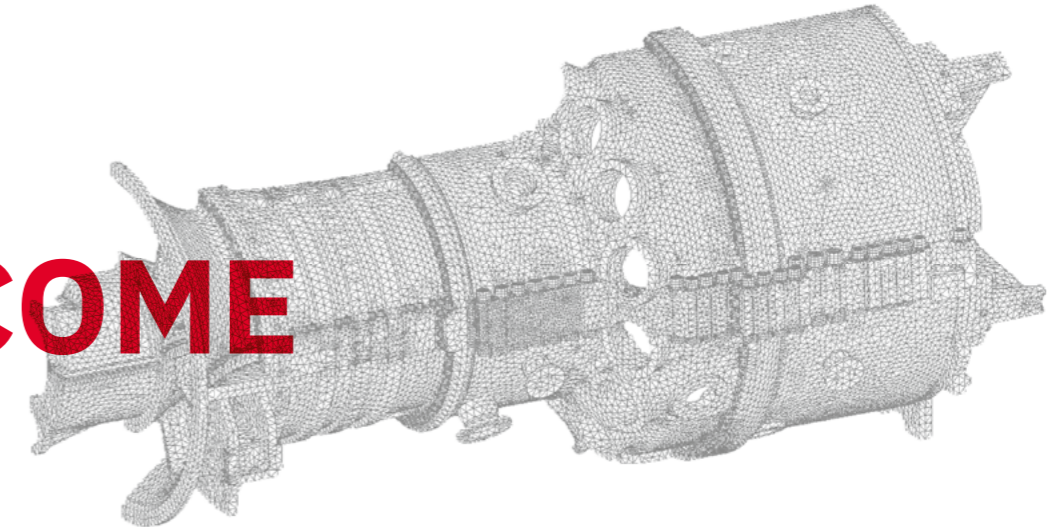


# **ITB GmbH – Comprehensive technical services for your projects**

**Your expert for specialised technical solutions in the fields of structural mechanics, flow simulation, light simulation and CAD design**



# WELCOME



## OUR PASSION

## OUR SERVICES



### FEM calculation

#### Knowledge gained through FEM-simulation

- Static and dynamic analyses
- Short-term dynamic analyses
- Thermal and fracture mechanics analyses
- Sensitivity and robustness analyses
- Optimisation with regard to quality, production costs and maintenance



### Flow simulation

#### Gaining insights through CFD Analysis

- Steady-state flow analysis
- Transient flow analysis
- Thermal flow analysis
- Rotating machinery
- Fluid-structure interaction
- Sensitivity and robustness analysis
- Optimisation with regard to quality, production costs and maintenance



### Light simulation

#### Realistic analysis of optical systems and special exposure situations

- Concept development for optical systems and light guides
- Optimisation of the geometry of light guides
- Calculation of illuminance, luminance and light distribution
- Simulation of photorealistic images



### CAD Design

#### More than 30 years of experience in plastic-compatible design

- Concept / design finding
- Prototype creation
- Plastic-compatible 3D construction, including assemblies with other materials
- Creation of 2D manufacturing drawings / Bill of Materials
- FMEA, FEM, EmPb assessment, and other process-related measures

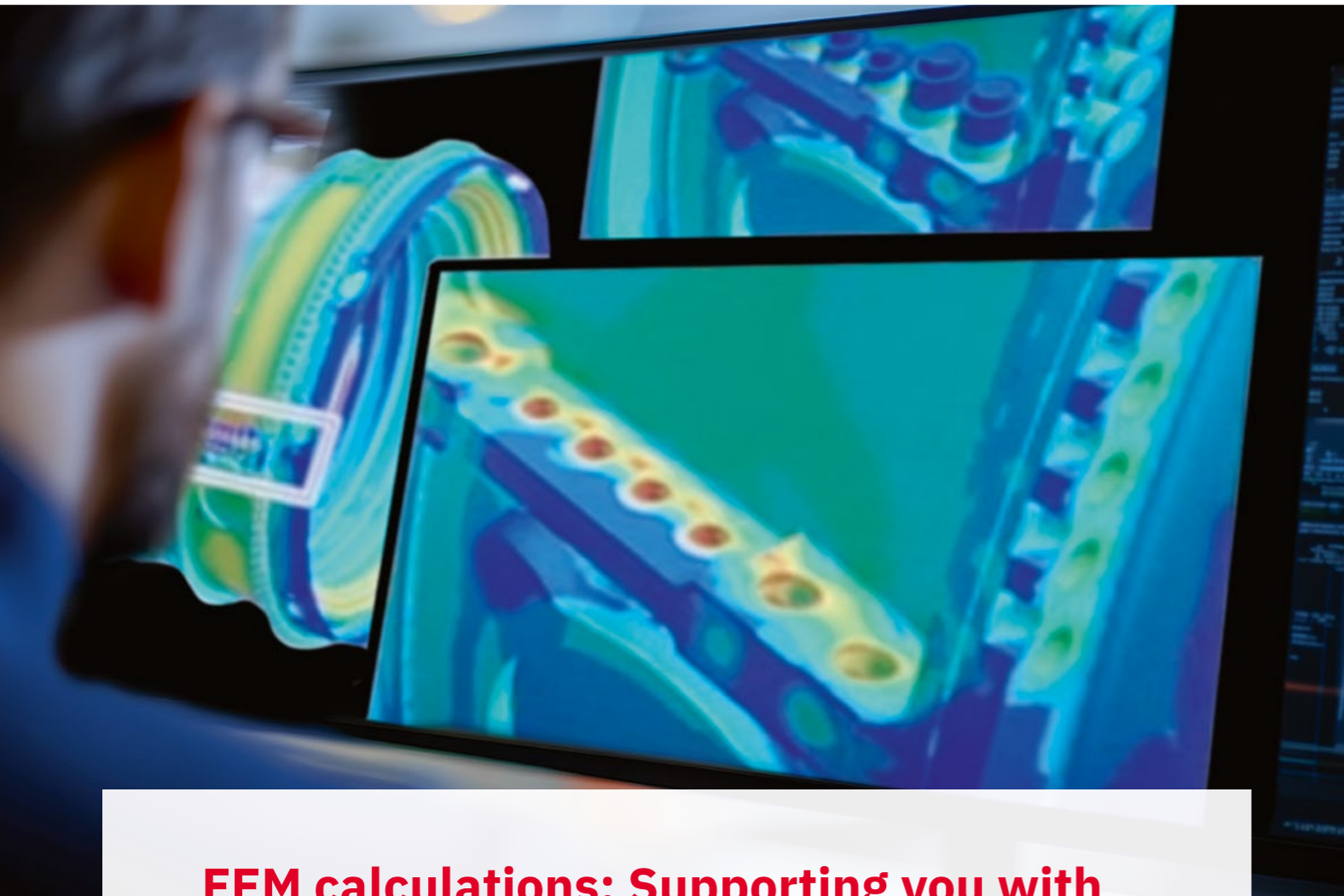


**Dr. Frank Brehmer,**  
Managing Director ITB

Welcome to ITB Ingenieurgesellschaft. We stand for technical expertise, well thought-out approaches and maximum precision in order to successfully master complex requirements in component analysis. Together we create the basis for innovative developments and future-orientated solutions.

We accelerate customer innovations through virtual simulations and calculations of the physical and technical requirements of components. We transform the results into applicable solutions, enabling our customers to achieve top engineering performance. That is why we say:

**simulations driven by  
engineering excellence**



## FEM calculations: Supporting you with trust, expertise, and precision.

Our customers' challenges are our top priority. With the help of our simulations, we develop solutions together and create innovative approaches that are precisely tailored to our customers' needs.

We share our customers' passion for technical excellence. We are dedicated to continuously

searching for optimal, innovative solutions that fulfil our customers' individual requirements.

Our technical expertise and our pursuit of perfection set us apart. We combine in-depth engineering knowledge with state-of-the-art technology to achieve top performance and deliver excellent results.

## Reliable component verifications according to all rules

Are you required to provide evidence to your customer or are you a part owner / product owner and responsible for the development and optimisation of the product in your company? Thanks to our extensive experience we are your reliable partner for component verification.

Component / Proof	Guideline		
Basis / Action on Structures	DIN EN 1990 (EC)	DIN EN 1991 (EC1)	DIN EN 13001-2
Aluminium Components	FKM-Guideline	DIN EN 1999-1-1 (EC9)	DVS 1608 (weld seam)
Pressure Vessels	DIN EN 13445	AD 2000 Code	ASME BPV-Code
Bolts	VDI-Guideline 2230	DIN EN 1993-1-8 (EC3)	KTA 3201.2
Weld Seam, i. g.	FKM-Guideline	DIN EN 1993-1-8 (EC3)	IIW-Recommendations
Weld Seam, Railway Technology	DVS 1612 (steel)	DVS 1608 (aluminium)	
Load Attachment Point	DIN EN 1993-1-1 (EC3)	KTA 3905	
Lifting Equipment	DIN EN 13155	KTA 3902	ASME BTH-1
Fatigue Strength	FKM-Guideline	DIN EN 1993-1-9 (EC3)	DIN EN 1999-1-3 (EC9, aluminium)
Earthquake	DIN EN 1998-1 (EC8)	KTA 2201 Part 1 - 6	

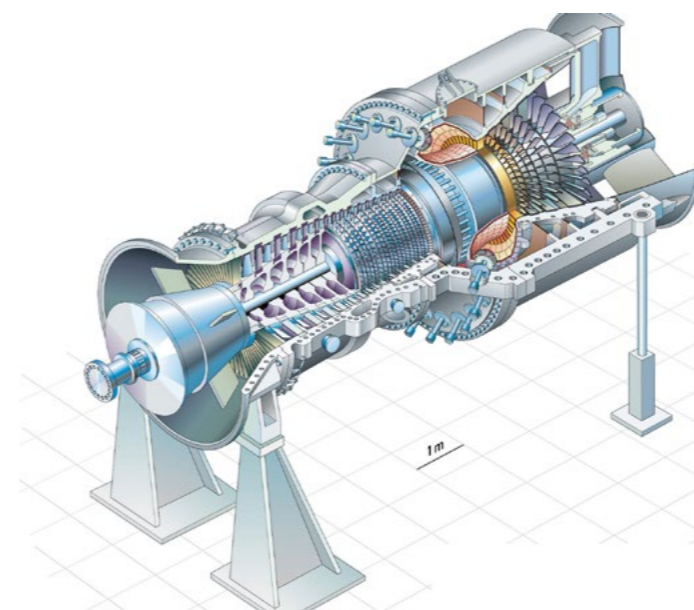


Photo by courtesy of Siemens Energy GmbH

### We are at your side

- Personal contact person:**  
 At ITB, you will be assigned a dedicated contact person who will provide personalised support for your projects.
- Weekly reports:**  
 Transparent reporting ensures that you are informed about the progress of your simulations and projects at all times.
- Support for large and small projects:**  
 Whether extensive development tasks or selective analyses – ITB offers customised solutions for your specific requirements.



## CFD Simulation: expert solutions for complex fluid dynamics

In a world where precision and efficiency are crucial, ITB GmbH offers innovative solutions in the field of computational fluid dynamics (CFD). With state-of-the-art technology and sound engineering know-how, we help our customers to analyse, optimise and efficiently design complex flow processes.

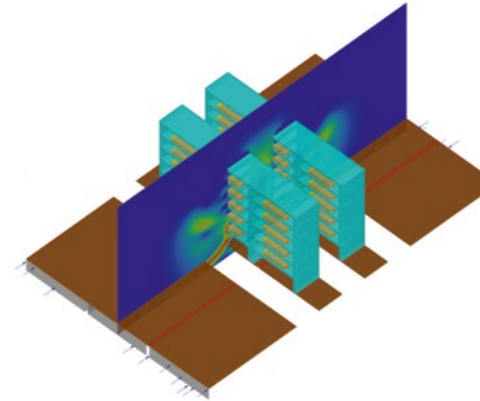
From conceptualisation and simulation to detailed evaluation, we support you in sustainably improving the performance of your products and

processes. Our expertise extends across a wide range of application areas – from energy technology, railway technology and the automotive industry to nuclear technology and nuclear fusion.

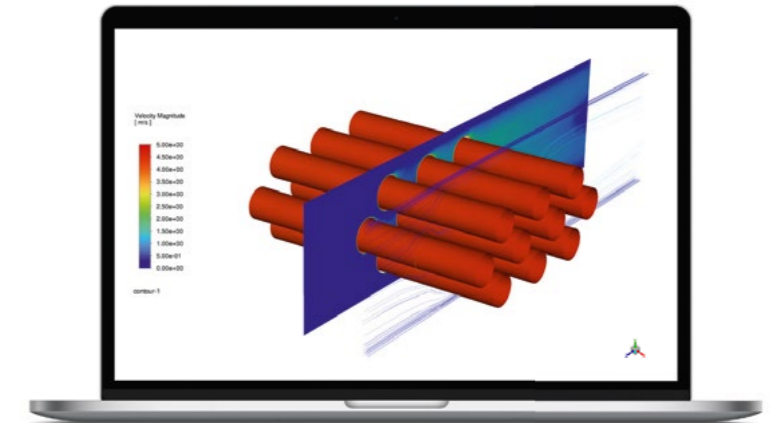
With ITB at your side, you benefit from simulation-driven excellence. Our customised CFD solutions provide clarity on challenging issues, minimise development risks and reduce time and costs in the product development process.



**Make complexity simple**  
Even the most complex flows can be visualised and analysed using CFD simulations.



**Examine airflow dynamics in server rooms**  
Even complex systems such as server rooms can be analysed in detail. Various operating cases can be evaluated cost-effectively as early as the planning phase.



**Design optimisation in the concept phase**  
The reliable and fast analysis of a large number of variants enables efficient design optimisation at an early stage of development.

### Virtual analyses and simulations – your benefits

- Cost savings:**  
Virtual flow analyses reduce the need for physical prototypes and expensive experiments.
- Design optimisation:**  
Testing and improving design options before prototypes are created.
- Efficiency improvement:**  
Improvement of flow processes to energy savings and reduction of environmental impact.
- Risk minimisation:**  
Investigation of extreme scenarios without endangering people or the environment.
- Faster innovation:**  
Acceleration of product development and adaptation to market requirements.
- Optimised process control:**  
Higher product quality and productivity through precise process predictions.
- Better understanding:**  
Analysing complex flow phenomena for research and development.
- Environmental friendliness:**  
Minimisation of environmental impact through improved efficiency and sustainable solutions.



## Light simulation: Realistic analysis of optical systems and special exposure situations

Light not only influences how we see, but also how we perceive, experience and interact. With high-precision light simulations, we support you in developing lighting systems and optical designs that harmoniously combine functionality, efficiency and aesthetics.

Today, light simulation is an indispensable tool in design and engineering science. It enables complex lighting effects to be precisely analysed and clearly visualised. In this way, we create the basis for well-founded decisions that optimise both the design and functionality of lighting concepts.

Our range of services extends from the analysis and optimisation of light distributions to the simulation of sophisticated optical systems and the validation of your products under realistic conditions. Whether automotive industry, architectural lighting or medical technology – with our innovative technology and in-depth expertise, we accompany you through the entire development process.

## Lighting solutions for better designs and sustainable results

With state-of-the-art light simulation, we open up new possibilities for optimising your lighting solutions. Our precise analyses include realistic illustrations of different light frequency ranges, efficiency increases through resource-saving tests and the targeted improvement of design, energy efficiency and comfort. Realistic visualisations support you in presentations and promote innovative, sustainable and safe lighting concepts - perfectly tailored to your requirements.

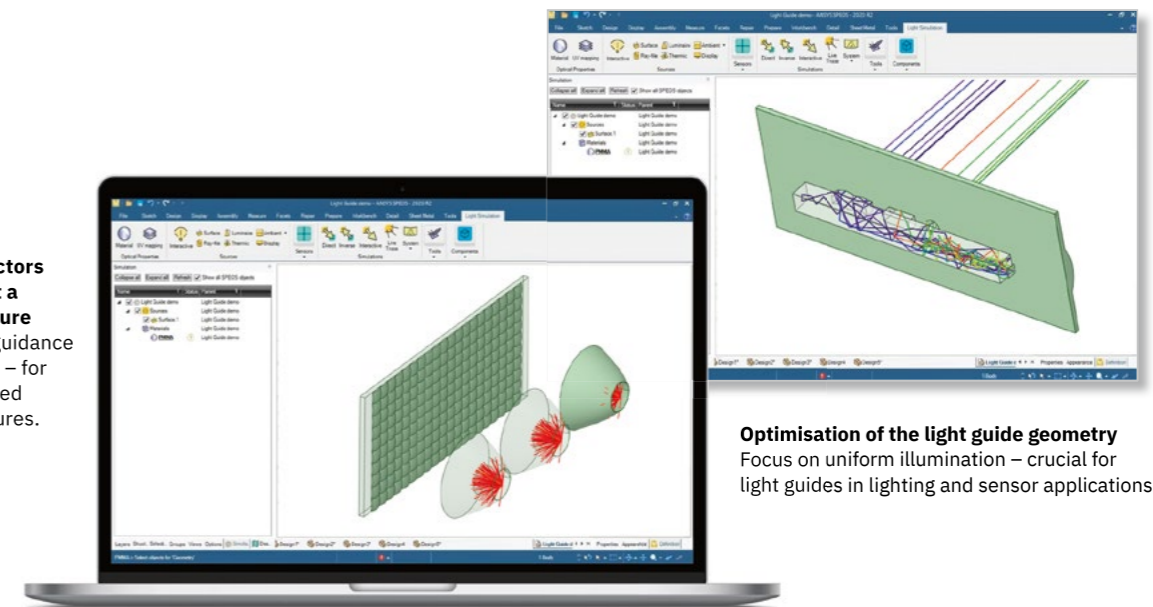


**Optimisation of brightness and light distribution**  
Creation of functional and aesthetic lighting environments.



**Calculation of lighting parameters**  
Analysis of illuminance, luminance and light distribution to optimise lighting systems.

**Design of reflectors with or without a faceted structure**  
Optimum light guidance and distribution – for smooth or faceted reflector structures.

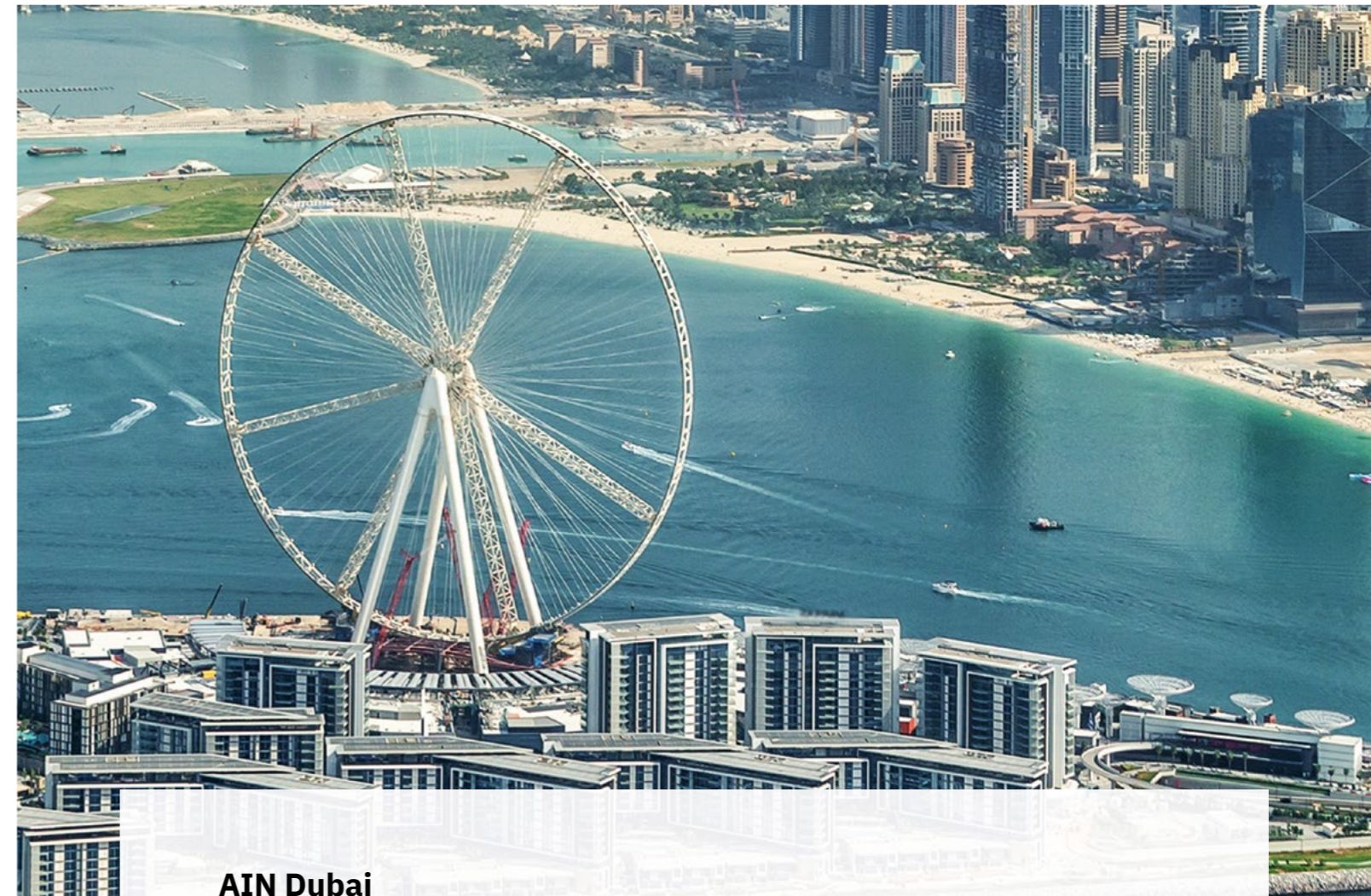


**Optimisation of the light guide geometry**  
Focus on uniform illumination – crucial for light guides in lighting and sensor applications.

## Our Expertise & References

Through our many years of experience, we have gained extensive experience in technical calculations. In addition to technical expertise, soft skills and knowledge of operational processes also play an important role in efficient collaboration. We are also happy to support new industries and develop innovative approaches for your ideas and projects!

<b>APPLIANCE AND PLANT ENGINEERING</b>	<b>AUTOMATION</b>	<b>AUTOMOTIVE</b>	<b>CONSTRUCTION MACHINERY</b>
<b>DEFENCE</b>	<b>PRESSURE VESSELS</b>	<b>ELECTRIC MOBILITY</b>	<b>GAS TURBINES</b>
<b>NUCLEAR TECHNOLOGY</b>	<b>CONSUMER GOODS</b>	<b>AGRICULTURAL MACHINERY</b>	<b>LOAD HANDLING EQUIPMENT</b>
<b>LOGISTICS</b>	<b>AVIATION</b>	<b>MECHANICAL ENGINEERING</b>	<b>NUCLEAR CONTAINMENT VESSELS</b>
<b>RAIL VEHICLE ENGINEERING</b>	<b>SHIPBUILDING</b>	<b>FIXTURE ENGINEERING</b>	<b>HEAT TREATMENT</b>



### **AIN Dubai** **Largest Ferris wheel in the world**

The world's largest Ferris wheel, the AIN Dubai, was completed in the United Arab Emirates in autumn 2020. The AIN Dubai measures approx. 260 metres in height and has a capacity for 1400 passengers in 48 cabins. A round trip takes 45 minutes.

The company Paul Vahle GmbH & Co. KG supplied various components for the power supply of the Ferris wheel for AIN Dubai. On behalf of VAHLE, our company carried out the mechanical design for safety-relevant components of the 15 km long circulating conductor rail system and supported VAHLE in the approval process for these components.

The verifications included static strength verifications and fatigue strength verifications for the components as well as for bolted and welded joints. The evaluation basis for the steel components was DIN EN 1993-1, while plastic components were evaluated on the basis of the 'BÜV recommendation for load-bearing plastic components in construction [TKB]'.





Photo by courtesy of Siemens Mobility GmbH

## High-speed train Velaro CRH3

**World's fastest train connection in 2008**

The Velaro CRH3 is a high-speed train that was developed for use in China and has parallels with the ICE 3 series. The first trains were put into operation in 2008, in time for the Olympic Games in Beijing, on the route between Beijing and Tianjin. With a top speed of over 390 km/h, this connection was the fastest in the world at the time.

ITB GmbH developed the crossbeam of the Velaro CRH3, which connects the carriage body to the chassis. The project lasted two years and included feasibility studies, mathematical designs, construction, fatigue strength analyses and a successful fatigue test. The component was optimised to withstand the highest loads and reduce weight at the same time.

The collaboration with Hoheisel Engineering GmbH and the Swiss company AMG Alu Metall Guss AG, which contributed casting expertise, is particularly noteworthy. This close cooperation made it possible to replace the originally planned cast steel component with an innovative aluminium solution. The 3 m long, 600 kg component was ultimately realised using the aluminium sand casting process and sets new standards in light-weight construction.

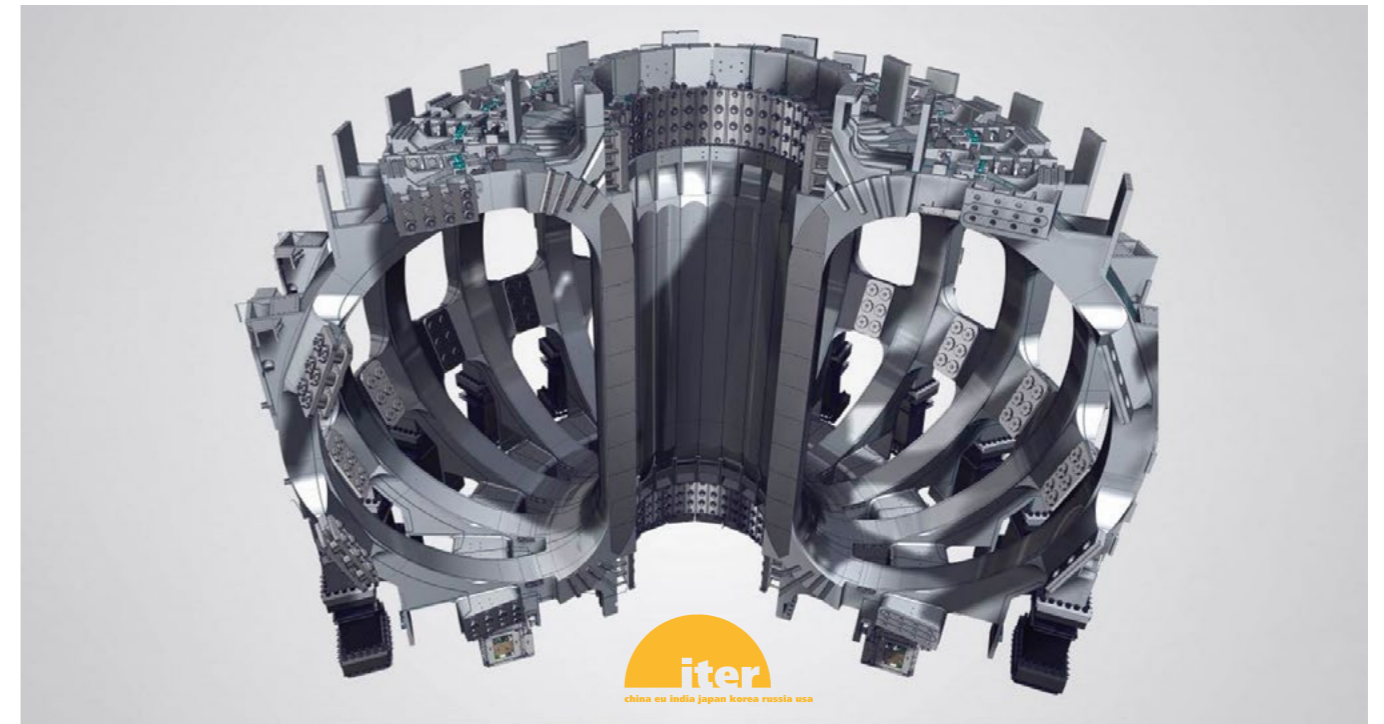


Photo by courtesy of ITER Organization

## Nuclear fusion reactor ITER

**Construction of the world's largest nuclear fusion reactor**

An ITER (International Thermonuclear Experimental Reactor) nuclear fusion reactor has been under construction in Cadarache in the south of France since 2007 as part of an international research project. The long-term goal of the project is to utilise the energy produced by the fusion of hydrogen atoms to generate electrical energy. To fuse hydrogen, the fuel (hydrogen) is to be heated to a temperature of 150 million °C in the ITER reactor. This creates a plasma that must not come into contact with other components.

For this purpose, the ITER reactor utilises the tokamak principle, which is a circular type of

fusion reactor that uses the magnetic plasma confinement method to keep the fuel in a vacuum. When it is completed in 2025, ITER is expected to be the world's largest tokamak fusion reactor with a plasma radius of 6.2 metres, a plasma volume of 840 m<sup>3</sup> and a fusion energy output of 500 MW. This requires an enormously complex machine with a total weight of 23,000 tonnes and over 10 million components.

ITB GmbH, in co-operation with CADFEM GmbH, carries out a wide range of calculations for the ITER Organisation in the field of thermal and structural mechanics for the ITER Organisation.



## We deliver reliable calculations for your innovative solutions.

We work alongside our customers to master technical challenges with sound expertise and innovative approaches. Together we develop solutions that are precisely tailored to the individual requirements of our customers and create measurable added value.

### SAFETY

We create safety. Our simulations and technical calculations of machine components and applications ensure the protection of people and the environment.

### PARTNERSHIP

We rely on partnership-based relationships characterised by open communication and the joint pursuit of optimal results.

### INSPIRATION

Technical innovation inspires us. The challenge of using our expertise and creativity to realise solutions for our customers' ideas spurs us on.

### RELIABILITY

We are engineers. Precision, reliability and comprehensive technical expertise are in our genes.

## Grow globally, strengthen locally: Our sites

With the opening of our branch in Pune, India, we are continuing our international growth course. This expansion enables us to provide our customers with even more comprehensive support and to expand our expertise in technical calculations and strength assessments on a global scale. Thanks to the close cooperation between our locations in Germany and India, we offer customised solutions with the usual high quality standards.

DORTMUND | GERMANY



**3000+**  
Projects

**30+**  
years of  
experience

PUNE | INDIA



Certified as  
subcontractor  
according to  
**ASME SEC. III  
NQA-1**

**20+**  
Employees

## Let's talk about your ideas

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