



affiliated to RWTH Aachen



Technical solutions for fuels and fuel-handling components

Research – Engineering – Testing

We are **partners**
in the development
and application of

Fuels &
Lubricants

Materials

Technical components
in energy systems

Technical developments of automotive applications are continuously encountered with new challenges. The most frequent objectives are to increase efficiency, reduce emissions of CO₂ and other harmful substances and to extend the lifetime of components. OWI, the Oel-Waerme-Institut gGmbH, a non-profit affiliated institute of RWTH Aachen, and its parent company TEC4FUELS GmbH, support companies in their activities of research and development and testing. Working in the areas of fuels and technical components for fuel conveying parts, they offer intelligent technical solutions that help you to save time and money.



OWI and TEC4FUELS are specialists in providing intelligent solutions for complex questions resulting from the interaction between conventional and renewable fuels with fuel-handling components in mobile and stationary automotive applications. Their services include technical consulting, research, engineering and development, as well as the testing of fuels and lubricants, components and systems. As an affiliated institute of RWTH Aachen, OWI works in the area of fundamental and applied research and development, while TEC4FUELS focuses on technical services in engineering and testing. Therefore, our customers receive comprehensive premium engineering services for their innovation and optimisation processes.

Innovative solutions for your R&D needs

OWI and TEC4FUELS support you with fresh ideas, know-how and experience

Fuels & Lubricants

Avoid surprises from interaction between fuels and components

As technology consultants, OWI and TEC4FUELS can provide valuable input for the R&D departments of small, medium and large companies, with comprehensive know-how and experience to support you in your specialised areas of work. We can provide outsourcing for research and development tasks and a comprehensive testing offering in support of your development and approval procedures. Ranging from feasibility analysis and concept development to consulting and solution of special subtasks to the development of new or further development of existing process steps, components or entire systems. The focus is always on cost-effective, energy-saving, sustainable problem solutions for your company that will ensure your market success. We can drive your product development forward with our research infrastructure, even including the construction of test benches or prototypes as the basis for series production (small series). Upon request, we can support you during market introduction or optimisation of a product or component with error analysis and unexpected failure modes.

We offer you the following:

- Technical consulting: OWI and TEC4FUELS present technological development paths for components, products and systems and work with you to evaluate them;
- Cost-efficient, energy-efficient, environmentally friendly problem solutions to ensure your market success. Our know-how helps you to minimise your risk in R&D projects;
- Cost-efficient, rapid testing solutions for your products – from screening methods used during development to performance testing with a quality label;
- By using computer simulations based on real data from your product or system, we can significantly reduce the number of expensive tests and iterations, as well as costly measurements;
- Take advantage of attractive R&D funding: We bring knowledge of suitable support programs, application requirements, application procedures and approval procedures to the table in every cooperation with you;
- Collaborative partnership: We orient our work towards your individual needs and requirements and adapt to your service needs. Upon request, we can support you during individual development phases, or throughout the process.

New biofuels are a component of future markets. The ratio of biofuels blended with diesel and petrol fuels will continue to rise in future. Investigations and testing by OWI and TEC4FUELS can document the operability of fuel-handling components. For example, we can examine the extent to which higher ratio of alternative fuels such as hydrogenated vegetable oil (HVO) or fatty acid methyl esters (FAME) in diesel fuels affect the formation of deposits, material tolerances, pump performance and also the effects on fuel flow through the nozzle of the injection system. To ensure the readiness of fuels and technical components, we offer petroleum companies and component manufacturers various test procedures. For example: Forced ageing tests, combustion tests, durability tests, fuel analyses.

We offer you the following:

During the development process, we follow two different methodologies.

- Optimisation of fuels: By developing additives or avoiding critical ingredients in fuels, their properties can be changed so that the deposit formation or fuel ageing observed can be reduced to tolerable levels.
- Component development: Using systematic investigation, we can work out recommendations for the future selection of materials or changes to heat management, for example, for the design and layout of components.



Materials

We support you
in selecting materials



When the materials of fuel-handling components such as pumps, nozzles, tank and supply-lines come into contact with mixtures of conventional and alternative fuels, undesired interactions occur. Metals corrode, deposits form, plastics become brittle and leaks occur.

We examine the behaviour of materials under application conditions close to reality. The objective is to ensure that service life covers the intended operating duration of the components/systems under the given conditions of high temperatures, thermal alternation stress and the possible effects of high-temperature corrosion. Depending on the materials used and the availability of temperature-dependent material properties, thermo-mechanical simulations can be used to determine service life and supported with testing methods.

We offer you the following:

- **Consulting** in the selection of suitable materials
- **Investigation** of causes of damage and failure
- **Recommendations** regarding the maximum portion of biogenic fuels that can be used
- Tests to **determine** the resistance of materials



Fuel cell systems

New ways of using liquid fuels
to generate power and heat

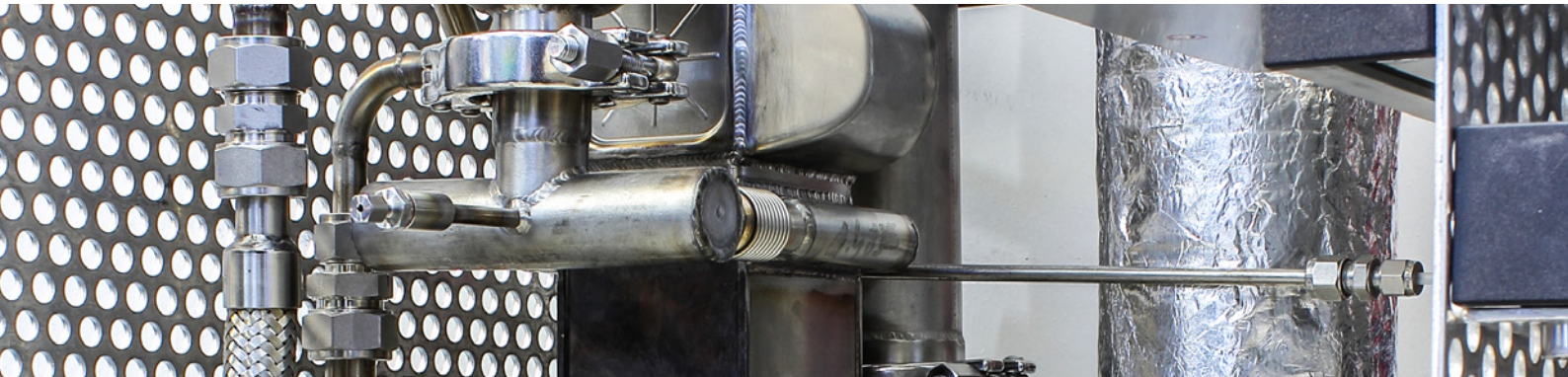
Liquid conventional and renewable fuels can be used in a variety of ways. With the know-how of OWI and TEC4FUELS, these fuels can be used for future-ready energy systems to generate power and heat.

Fuel cell systems can be operated with liquid fuels even without a hydrogen infrastructure. The heat of exhaust gas is used to convert the fuel into a synthetic gas consisting primarily of hydrogen which is then converted into electricity by the fuel cell. Applications can be found, for example, in motor-independent Auxiliary Power Units (APU) in trucks, ships, in aircraft, also in leisure applications such as camping (caravans, etc.) or on yachts. This system can also be used as a range extender for electric vehicles by feeding the electrical power into the drive battery. Diesel and petrol fuels already on board can be used, but so also for example methanol.

The use of heat from exhaust gas to generate hydrogen can also contribute to making motorised combined heat and power systems (CHP) more efficient and cost-effective. A reformer module integrated into the motor system increases its electrical efficiency and heat production falls, extending the seasonal operating time of the CHP.

We offer you the following:

- Analysis, idea generation, technologically open discussions for the (further) development of your products and systems
- Feasibility studies, concept development
- Development of new and existing process steps, components or entire systems for your specific application
- Correct functioning and required safety for your product: We provide the basis even during the concept phase, using CFD and FEM calculations
- Support during market introduction of products and systems in the form of failure/damage analysis and technical solutions
- Flexible R&D infrastructure for the construction of test benches, functional models or prototypes



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