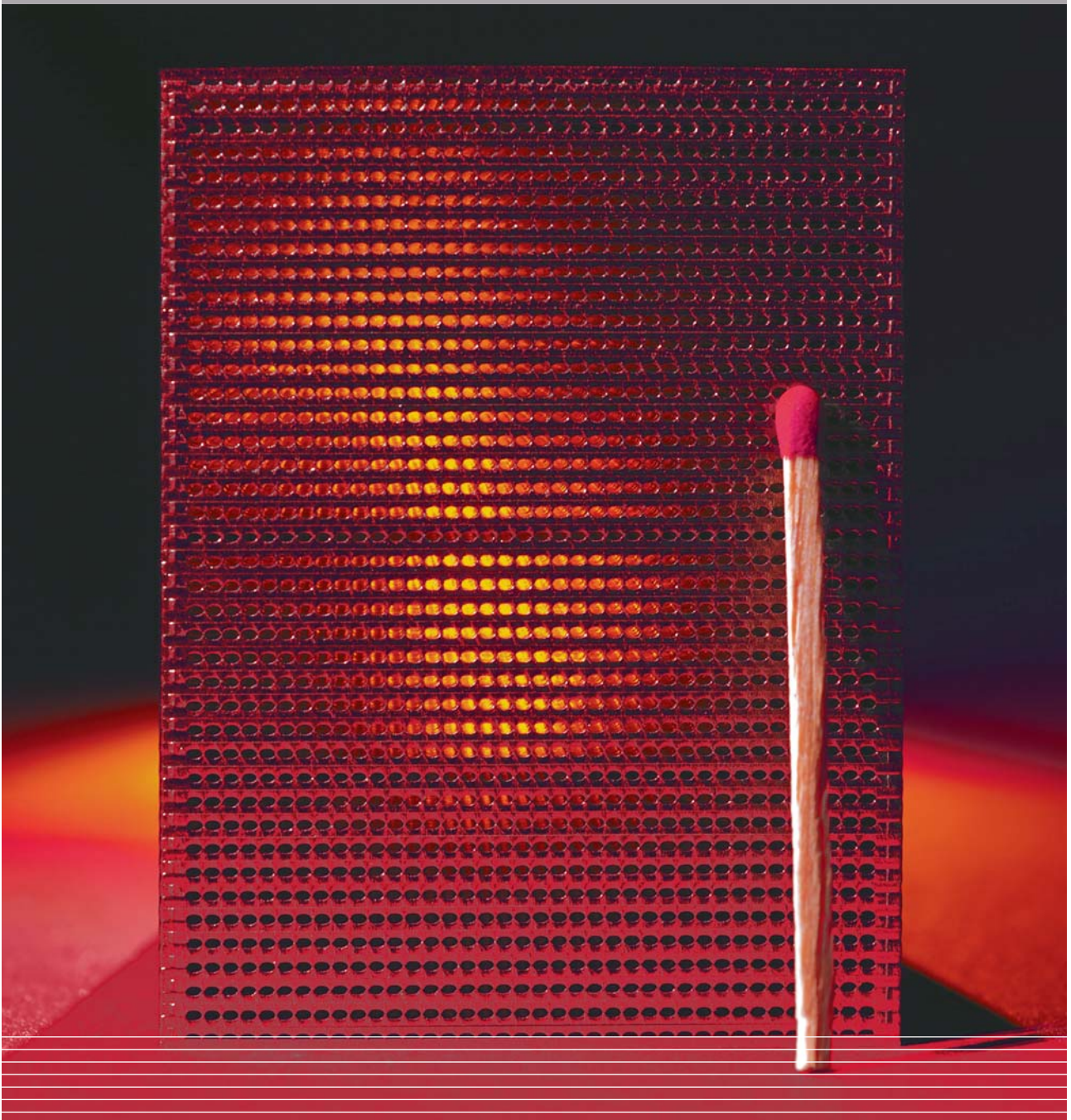


## WE POWER YOUR SUCCESS

> energy technology made by imm

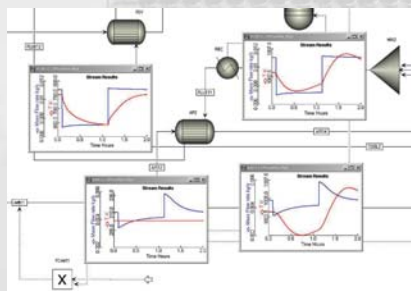


## System Integration

### Fuel Processing for > Methanol, Ethanol > Natural Gas > LPG (Propane / Butane) > Gasoline > Diesel

The integration of the fuel components to a complete, thermally integrated fuel processor is a critical step towards a marketable product. Compactness, maximum efficiency and low start-up time demand are major targets. We perform static and dynamic ASPEN-Simulations of complete fuel processors to achieve these targets.

Microtechnology offers enormous advantages in size reduction, efficient utilisation of heat sources and start-up strategies. Moreover, we can assist our customers in choice and integration of balance-of-plant periphery required to move and control the flow of feed components to the system.



ASPEN Dynamics simulation



100 W Complete Methanol Fuel Processor



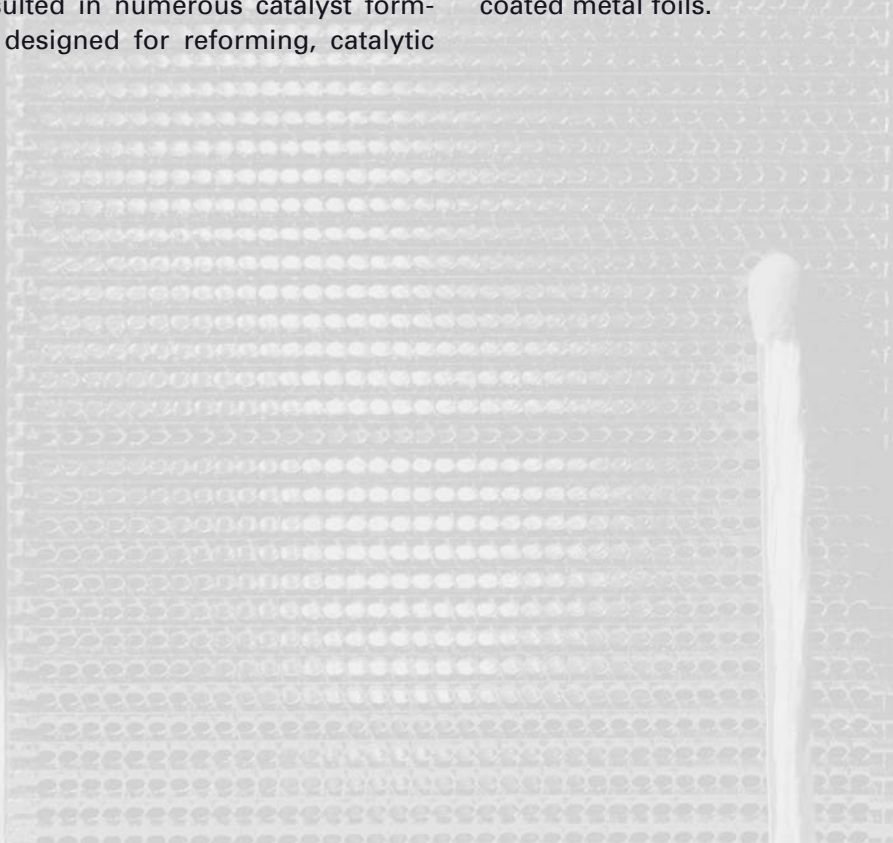
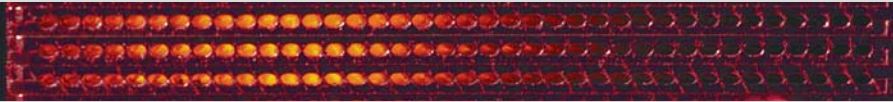
250 W Complete LPG Fuel Processor

## Catalyst Development

### Catalyst Coating > Catalyst Development > Catalyst Evaluation > Catalyst Stability Testing

We have gained expertise in preparation of catalyst coatings onto microchannels. Wash-coating is mainly applied as coating procedure. Our catalyst development efforts have resulted in numerous catalyst formulations designed for reforming, catalytic

combustion and CO clean-up, which have passed 1.000 hours durability tests successfully. Automated coating techniques have been developed for mass production of coated metal foils.



Screen Printing Machine



Screen Printed in Micro Channel



Six-Fold Screening Reactor

## Components

### Catalytic Gas Phase Reactors > Heat Exchangers > Evaporators

We have developed a large variety of micro-structured reactors for various fuels such as methanol, ethanol, propane / butane (LPG), gasoline and diesel. The power range covered reaches from 30 W to 10 kW to date and operating temperatures from 100° C to 900° C. Thermal management of the reformers and CO clean-up reactors is a

critical issue. The plate heat exchanger technology applied makes the devices highly compact, efficient and allows the integration of multiple functions. Production techniques for future mass markets are under development to meet the stringent cost requirements of future systems.



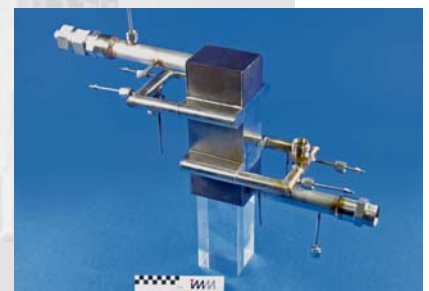
*Small-Scale Heat Exchangers*



*5 kW Preferential Oxidation Reactor*



*5 kW Water-Gas-Shift Reactor*



*2 kW Heat Exchanger*

## Facilities and Services

### > Feasibility Studies > Reactor Testing > System Testing > Reactor Fabrication

Our laboratories provide modern analytical equipment such as on-line gas-chromatography, mass spectrometry and FT-IR spectroscopy. Six test benches are available for catalyst evaluation. Reactor and complete fuel processor testing is performed in dedicated test benches for the size ranges below and above one kilowatt.

Modern CAD software, CFX simulation and ASPEN Dynamics modelling tools assist our physicists, chemists and chemical engineers in creating and designing tailor-made solutions for our customers. Reactor fabrication applies cost-efficient production techniques such as etching, embossing and laser welding. A 1 kW fibre laser is available at IMM for reactor sealing.



*Pilot Plant for Liquid Hydrogen*



*Test Bench for Liquid Hydrogen*



*Test Bench for Fuel Processors (kW range)*



*Test Bench for Fuel Processors (kW range)*

We can provide you with all services required for component and system development

- > Feasibility Studies
- > Dynamic system modelling
- > Basic Engineering
- > Detailed Engineering
- > Prototype Design and Manufacturing
- > Reactor Testing
- > Catalyst Stability Testing
- > Catalyst Development
- > System Testing

For further questions please do not hesitate to contact us:

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