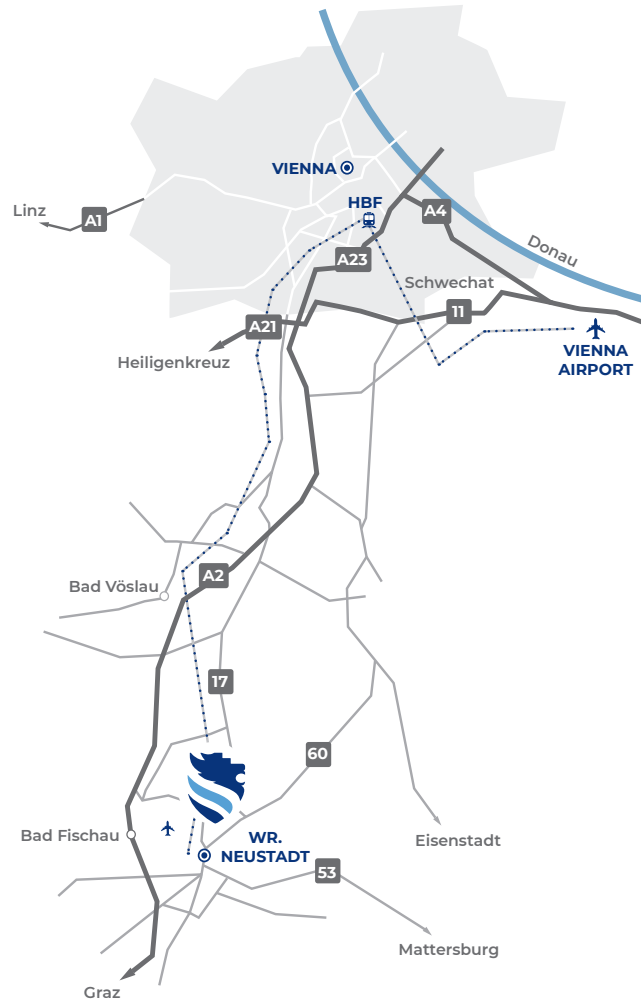


ABOUT FOTEC

FOTEC Forschungs- und Technologietransfer GmbH is the research and technology subsidiary of the University of Applied Sciences in Wiener Neustadt. The company was founded in 1998.

Our interdisciplinary team of experts carries out industrial and funded research and development projects. The execution of such projects is done in close cooperation with the University of Applied Sciences Wiener Neustadt, especially with the departments of Mechatronics, Microsystems Engineering, Informatics, Business Engineering and Aerospace Engineering.

FOTEC serves orders from industry and also takes on technological and scientific challenges within the framework of national and international research and cooperation projects. These are enabled and supported by the national funding agency FFG, the government and Economic Chambers of Lower Austria, the European Space Agency ESA and the European Commission.



HOW TO REACH US

FOTEC resides in the city of Wiener Neustadt in the direct vicinity of the University of Applied Sciences, 40 km south of Vienna.

CONTACT

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please visit our web site: fotec.at



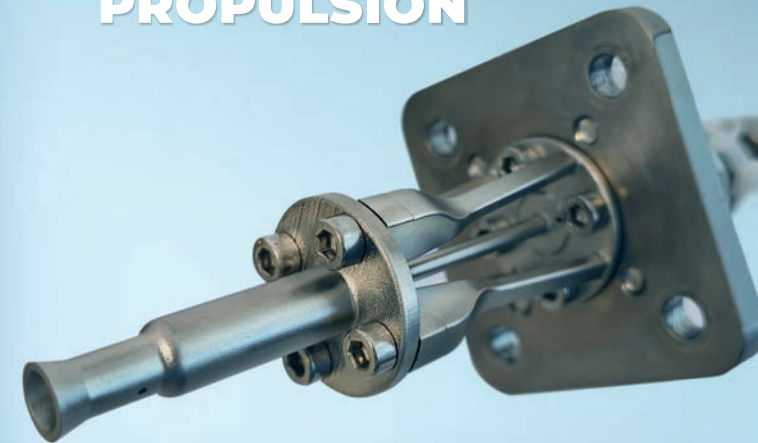
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FOTEC

Research Subsidiary of
— FH Wiener Neustadt —

CHEMICAL PROPULSION



THRUSTER TECHNOLOGY

GREEN PROPULSION SYSTEMS

FOTEC is actively engaged in developing non-toxic, green chemical propulsion systems. Our green propellants, including HTP-98% monopropellant and N₂O-based bipropellants, are safer handling options without compromising performance. These propellants provide a comparable specific impulse density and are much less toxic than hydrazine and do not require expensive SCAPE suits and handling procedures. This leads to reduced processing, logistics and storage costs, along with greater market accessibility and affordability, free from ITAR restrictions.

NITROUS OXIDE BASED

Exploiting the natural pressurization of nitrous oxide, FOTEC's bi-propellant thrusters offer a cheap, but reliable alternative to current technologies. They utilize high temperature nozzles made from iridium-rhenium-tungsten alloys, which ensure high thruster performance.

HYDROGEN PEROXIDE BASED

With thrust levels up to 1 N, FOTEC's mono-propellant systems are reliable, small and lightweight. They are ideal for attitude control of small to medium sized satellites but also allow orbital maneuvers for nano and small-sats. The main benefits stem from our innovative catalysts developed in-house.

CATALYSTS DEVELOPMENT

In the realm of mono-propellant catalysts, FOTEC employs monolithic design using platinum-iridium alloys. Such a design has the following benefits:

- ▶ Robust and cohesive catalyst bed
- ▶ No pellet fragmentation or breakage
- ▶ No channeling phenomena
- ▶ Higher propellant throughput
- ▶ Stable performance
- ▶ Higher efficiency
- ▶ High temperatures: up to 1600 °C



TESTING

FOTEC's cutting-edge test facilities enable efficient testing of different chemical propulsion systems. Our extensive expertise, built over years of research and development, ensures a flexible testing environment that can be tailored to customer needs.



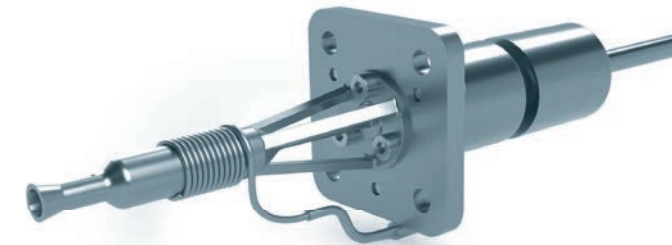
FACILITY

- ▶ **Thrust measurement:** 1-20 N, accuracy: 0.02% full scale, bandwidth: 10 kHz
- ▶ **Background pressure:** < 5 mbar
- ▶ **Propellant mass flow measurement:** 0.3-8 g/sec, accuracy: 0.5%, bandwidth: 200 Hz
- ▶ **Pressure measurement:** 0-50 bar, accuracy: 0.025% full scale, bandwidth: 500 Hz
- ▶ **Temperature measurement:** 0-1200 °C, accuracy: ±0.15 K, bandwidth: 15 Hz
- ▶ Thermal camera measurements

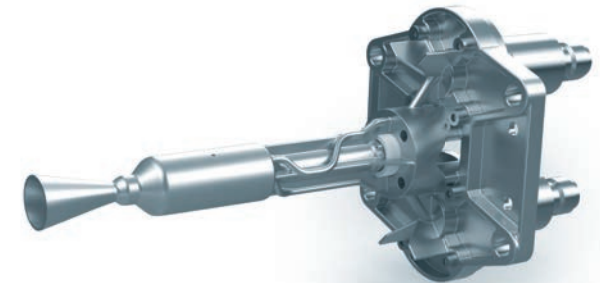
SERVICES

- ▶ Thruster steady state performance characterization
- ▶ Thruster lifetime assessment
- ▶ Propellant throughput assessment
- ▶ Impulse bit testing
- ▶ Post testing inspection of thruster incl. SEM/EDX imaging

THRUSTERS



HTP mono-propellant 1 N thruster



N₂O-based bi-propellant 1 N thruster

PARAMETER	MONO-PROP	BI-PROP 1 N	BI-PROP 10 N
Propellant	98%HTP	N ₂ O + C ₂ H ₆	N ₂ O + C ₂ H ₆
Thrust	0.25 – 1 N	0.1 – 1 N	1 – 10 N
Pressure	5.5 – 22 bar	4 – 10 bar	4 – 10 bar
Expansion ratio	80	100	100
Isp	160 – 173 s	>260 s	>260 s
Mass	0.4 kg	0.4 kg	0.6 kg
Min. impulse bit	< 0.05 Ns	< 0.05 Ns	< 0.1 Ns
Flow control valves	Dual seat	Single seat dual valves	Single seat dual valves
Propellant throughput	20 kg	10 kg	20 kg