

Drivers of the future use hydrogen

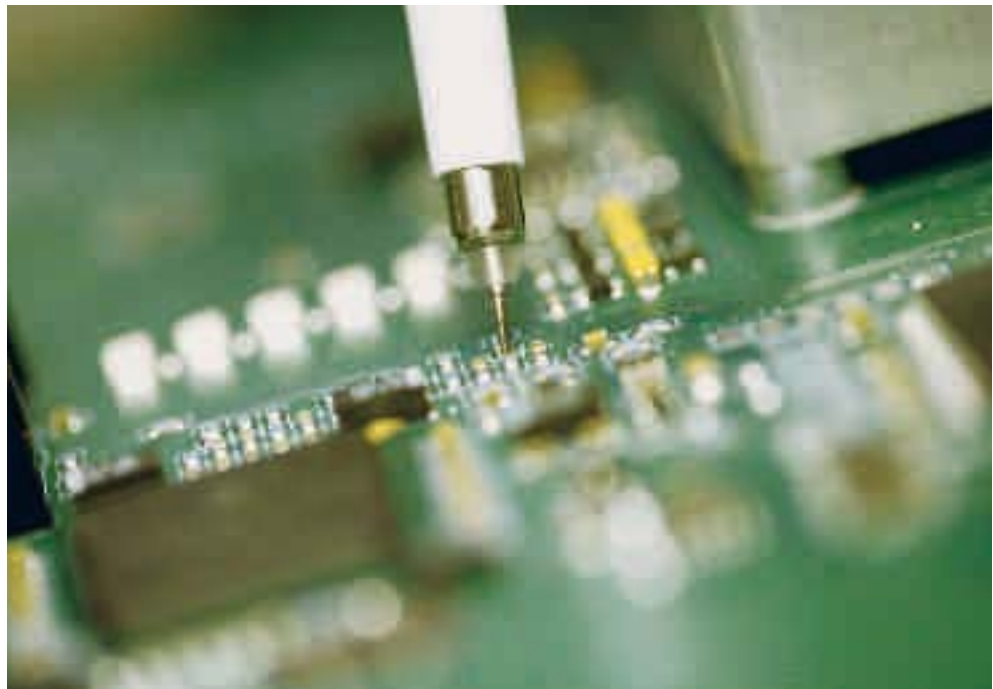
Setting the standards for automotive comfort.



The power is in the temperature

Alternative fuels are the future.

A research project of the European Union examines the use of hydrogen in internal combustion engines. HOERBIGER ValveTEC GmbH in Vienna, Austria, was responsible for developing the injection technology, while HOERBIGER Control Systems AB (formerly Mecel Engine Systems AB), headquartered in Amal, Sweden, developed the ignition system. Both developments are among the key components of the project and future hydrogen technologies.



During the project, direct H₂ injection as well as external mixing were developed and in each case an energy density of approximately 100 kW per liter of displacement was achieved, which doubles the achievable power output and at the same time reduces fuel consumption. The path for H₂-operated motor vehicles is now clear.

HOERBIGER ValveTEC also developed cryogenic injection valves for this project. The valve specially developed by HOERBIGER ValveTEC reliable meters

hydrogen at extremely low temperatures, but also at temperatures of up to 100°C.

Hydrogen-air mixtures are combustible across a wide concentration range. The benefit: The engines can be operated with a very lean mixture, however extremely high ignition power is required. In collaboration with the research department of a leading automobile manufacturer, HOERBIGER Control Systems developed the ignition system for this application.

To control the ignition process, the ION Sensing System is used, which determines the quality of the combustion process from the ionization state of the gases in the cylinder. This enables HOERBIGER Control systems to create engine management systems, which directly influence the fuel-air mixture, ignition timing and ignition intensity. These applications, however, are not limited to hydrogen technology and will be increasingly used in the future in modern internal combustion engines.



HOERBIGER is R&D expertise

HOERBIGER sets expertise standards in hydrogen research. The core competencies of fluid mechanics, combustion physics, materials expertise, progressive control and sensor know-how, and comprehensive production technology knowledge are some of the success factors with which the company develops products for advanced internal combustion engines.



Development and research partnerships with the leading automobile manufacturers and technical universities underscore the high technical demands that are placed on HOERBIGER products. The “house specialties” are product solutions tailored specifically to the customer, including and particularly for extreme physical conditions and a wide variety of media.

During the EU research project, the wear-free operation set a milestone toward the development of the cryogenic engine, which brings the series-produced hydrogen vehicle within reach.

Due to the difficult physical conditions encountered during hydrogen operation, many prerequisites for additional applications of gases as fuel have already been met, both in the automotive and stationary fields. This is another milestone on the path toward environmentally friendly and crude oil-independent mobility.



Products of HOERBIGER ValveTEC and HOERBIGER Control Systems

Advanced solutions for alternative fuels.



High speed high pressure solenoid valve for direct fuel injection of H₂ IC engines



High speed low pressure solenoid valve for direct fuel injection of H₂ IC engines

High speed solenoid valve for ported fuel injection of H₂ IC engines



High speed cryogenic solenoid valve for ported fuel injection of H₂ IC engines

Solenoid driver module to operate 10 to 20 solenoids for fuel injection



Refueling data interface providing IR communication between H₂ powered vehicle and refueling station



High power arc discharge ignition for H₂ IC engines



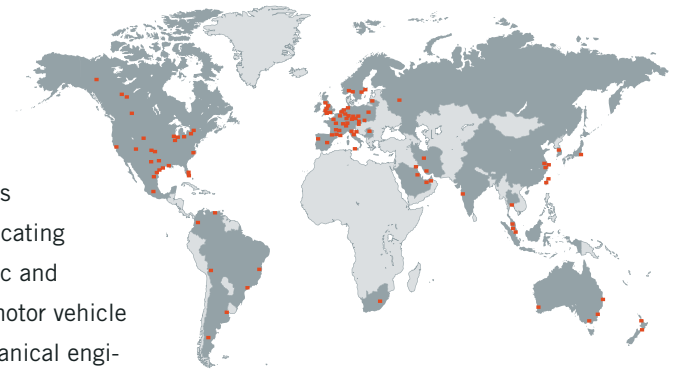


HOERBIGER— the technology group

With forward-looking ideas and innovative technologies as well as first-rate products and services, we are always within reach for our customers.

HOERBIGER ValveTEC GmbH and HOERBIGER CONTROL SYSTEMS AB are companies of HOERBIGER Holding AG in Zug, Switzerland. HOERBIGER is active throughout the world as a leading player in the fields of compression technology, automation technology and drive technology. In 2006, its 5,300 employees achieved sales of around 730 million Euros. Worldwide, HOERBIGER is represented in over 40 countries with more than 100 pro-

duction plants and service locations. The focal points of its business activities include key components and services for reciprocating compressors, pneumatic and hydraulic systems for motor vehicle construction and mechanical engineering, as well as components and systems for shift and clutch operations in vehicle drive trains of all kinds.



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