

Engine solutions

Reliable performance of engines


HOERBIGER
because performance counts



Reliable. Efficient. Environmentally-sound.

Natural gas is a vital energy source that will continue to play a major role in the future demand for energy. For more than a century, HOERBIGER has a wide range of reliable and efficient products as well as partnership-like services to meet the demands of your specific application.

And we have the people to make the technology work for you. Wherever you are we are near you.

HOERBIGER develops design solutions and materials improving the efficiency, working time and environmental soundness of compressors and industrial engines.

“Above all we need partners, who not only deliver products, but listen to us. And who work together with us when it comes to innovation and problem solving. We have found such a partner in HOERBIGER.”

Satisfied customer, Germany

Compressors for natural gas applications are frequently high speed compressors with high power density. They operate under challenging conditions that render difficult requirements. For these compressors, HOERBIGER offers key performance components that meet these requirements.

HOERBIGER Engine Solutions, the business area for industrial engines which emerged with the addition of Altronic, LLC to the HOERBIGER Group., represents the accumulated knowledge and experience of many of the world's leading experts in combustion technology drawn from the automotive and industrial engine industries.

altronic

Altronic, a member of the HOERBIGER group, has long been regarded as the world's leading manufacturer of ignition and control systems for industrial engines. These products represent the industry standard for quality. All are designed to improve engine performance and enhance reliability. Many also improve operating efficiency, helping to reduce emissions, which contributes to a healthier environment.

HOERBIGER – successful in the natural gas industry:

Upstream

- Wellhead compression
- Gas gathering
- Gas lift and re-injection

Midstream

- Gas processing
- Gas transportation
- LNG
- Gas storage

Downstream

- CNG
- Decentralized power generation
- Gas power plants

D'Blue

The collaboration agreement between L'Orange and HOERBIGER allows D'BLUE to offer its customers high-performance, complete solutions, combining leading technologies from two worlds – that of electronic controls and that of diesel and gas injection – while also allowing future emission and efficiency requirements to be met.



Solutions for gas, diesel and dual fuel engines around the world

Exploration

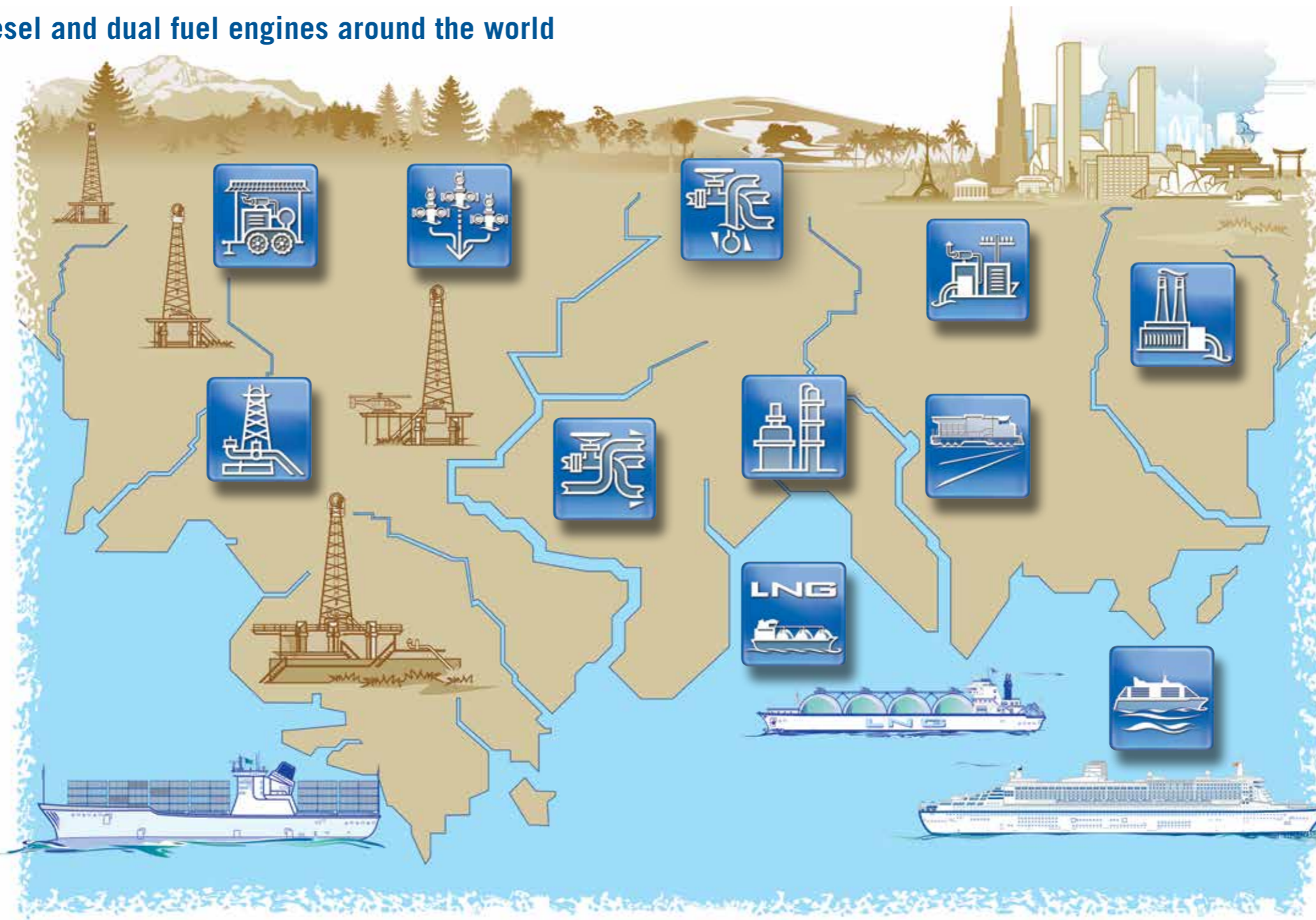
It all begins here. Drilling and exploration demands tough, reliable, products and solutions. Rugged instrumentation and controls, including the GTI Bi-Fuel system for diesel engines, are essential for sustained, on-time, on-budget operations.

Wellhead compression

As gas wells are produced and reservoir pressures decline, it is becoming necessary to install wellhead compression to maintain production. Operators need a compressor that runs reliably and efficiently with little or no maintenance. Fully equipped gas engine compressor units as part of a leasing contract.

Gas Production/Gathering

Gas engine compression packages are central to production. These packages deliver the fuel for power, industrial processing, and heating. High-quality, reliable ignition, instrumentation, and controls are essential for this critical customer base.



Gas processing

This operation extracts natural gas liquids and impurities from the natural gas stream.

Gas transportation

Natural gas transmission pipelines transport significant quantities of gas over long-distances. Effective ignition, control, and fueling solutions are essential for the large horsepower engines in this service worldwide.

Gas storage

Injection of natural gas into gas-tight formations or into artificially constructed caverns. Gas engine-driven compressors - small and large - are a key part of these operations. HOERBIGER products in all segments are critical for effective service.

LNG

Boil off gas compression from storage tanks at LNG receiving terminal. Dry gas is compressed with non-lube compressors at low suction temperature of -160° C.

Decentralized power generation

Natural gas is quickly becoming the global fuel of choice for electrical power generation. HOERBIGER ignition, fueling, and control products installed by the OEMs and in the aftermarket provide efficiency and reliability worldwide.

Gas power plants

Generation of electricity and Combined Heat and Power (CHP) at or near the point of use. Reliable supply of gas at constant pressure for gas turbine electricity generation is crucial.

Booster compressors work with changing pressures and operating conditions.

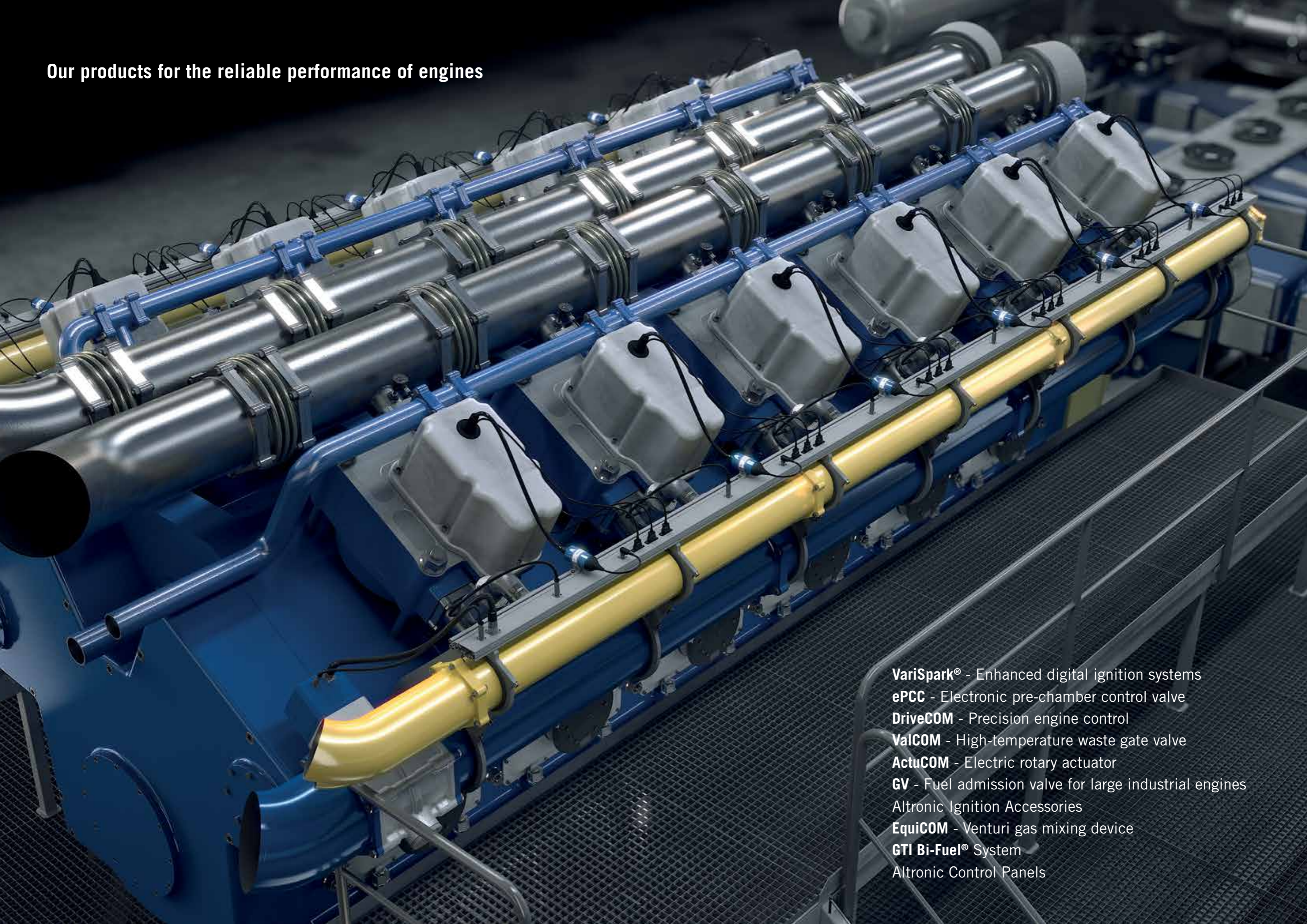
Railway

One of the world's main modes of transportation for passenger and cargo, locomotive propulsion is evolving from exclusively diesel, to include dual fuel, CNG and LNG. Innovative and reliable engine controls and accessories are essential to this evolution.

Marine vessel

The worldwide economy is heavily dependent on marine passenger and cargo transportation. Fuel costs are significant, and operators require solutions to legislative and logistical pressures for emissions reduction fuel cost control.

Our products for the reliable performance of engines



VariSpark® - Enhanced digital ignition systems
ePCC - Electronic pre-chamber control valve
DriveCOM - Precision engine control
ValCOM - High-temperature waste gate valve
ActuCOM - Electric rotary actuator
GV - Fuel admission valve for large industrial engines
Altronic Ignition Accessories
EquiCOM - Venturi gas mixing device
GTI Bi-Fuel® System
Altronic Control Panels

Unparalleled combustion assurance

The VariSpark family of products from Altronic uses exclusive, patented, directed-energy technology to deliver unparalleled combustion assurance to operators of natural gas fueled engines from 10 to 10,000 horsepower.



- Assured combustion of leaner mixtures
- Ability to operate at higher efficiencies
- Extended service intervals

VariSpark is available as a cost-effective upgrade to existing engines, for new installations, and as an integrated part of an engine management system.

VariSpark represents a wholesale departure from the traditional CD ignition system, which discharges a

storage capacitor through the ignition coil during firing. Instead, VariSpark technology utilizes a specialized power supply and high-speed switching technology for positive control of the delivered spark energy. This provides the ability to control spark intensity and duration independently.

VariSpark delivers five to ten times more ignition energy than traditional CD and other competing technologies.

Maximum precision and reliability

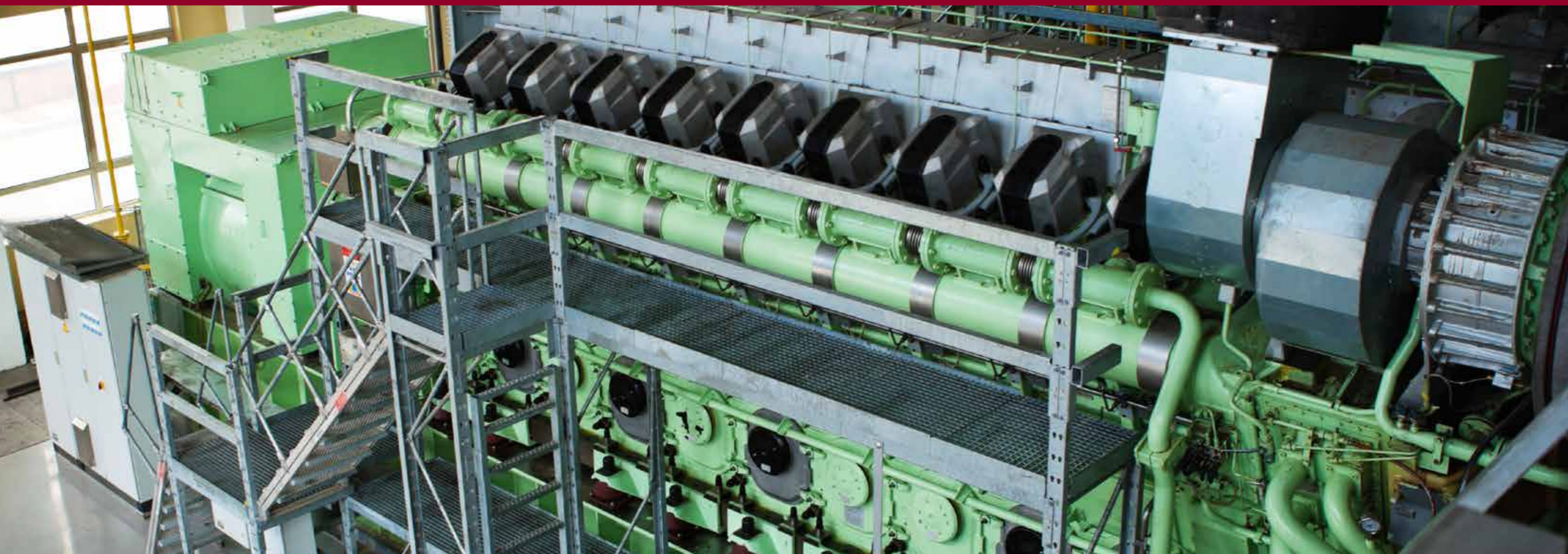
Precise control of the pre-chamber air-fuel ratio can significantly improve combustion stability and the reliability of industrial gas engines.

- Precise control of the air-fuel mixture in the pre-combustion chamber
- High efficiency for all load ranges
- Easy installation directly onto the pre-chamber

The Electronic Pre-Chamber Control (ePCC) Valve reinforces HOERBIGER's position as a leading manufacturer of gas engine valves. Unlike conventional systems equipped with mechanical check valves, the ePCC allows control of the entire injection process. By precisely

controlling the timing and volume of the fuel charge, independently of the gas supply pressure, the ePCC lowers hydrocarbon emissions, satisfying even stringent environmental standards.

As well as optimizing combustion efficiency and lowering emissions, the HOERBIGER ePCC also reduces maintenance requirements, extending run times before valves need to be cleaned or replaced.



Engine management system for large bore engines

HOERBIGER DriveCOM is a modular, scalable, integrated control system for internal combustion engines. DriveCOM works with lean/rich-burn gas, diesel, and dual-fuel engines in stationary, traction, and marine applications.



- Flexible and configurable hardware
- Open software architecture
- State-of-the-art model-based auto-coding techniques
- Standard and customized solutions

With a wide variety of standardized engine control and monitoring functions, DriveCOM can manage all critical engine parameters. The DriveCOM

modules allow custom combinations. The modular system takes into account both OEM requirements and end customers' requests for maximum compatibility with existing applications. The open software architecture of the DriveCOM system allows customers to include their own control applications.

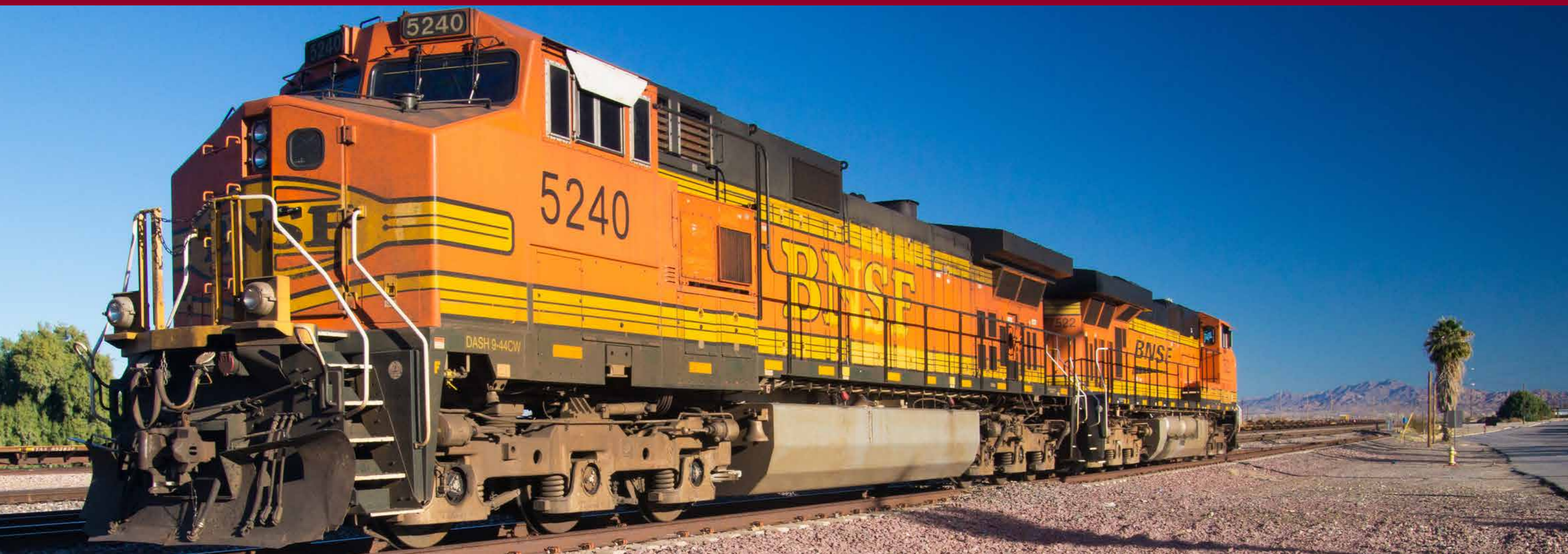
Exact control of backpressure

ValCOM controls backpressure by bypassing the turbo on the exhaust side.

- Low internal leakage
- Low external leakage
- Optimized sealing geometry to avoid sticking

The ValCOM valve increases the efficiency of gas and diesel engines by reducing backpressure. ValCOM can be used either in stoichiometric or lean-burn engines at temperatures up to 700°C.

ValCOM can be used with HOERBIGER's ActuCOM actuators. Special linkages, and couplings for direct mounting, are available.



Dynamic drive system for throttle valves

ActuCOM is an actuator specially developed by HOERBIGER to drive the throttle valves of large gas engines. It operates considerably faster than traditional actuators, improving response times and safety.



- Extremely fast drive system with minimal closing time
- Integrated diagnostic functions
- Compact design

Today's gas engine manufacturers and operators require rapid throttle response and minimal closing times.

As well as improving controllability, short response times aid compliance with future safety regulations for emergency shutdown.

In addition to its excellent dynamics, the HOERBIGER ActuCOM system features integrated diagnostic functions, and the ability to be customized to users' requirements.

Short response times and maximum availability

Solenoid injection valves are essential for all technologies that require extremely reliable control of gases, including dual-fuel and industrial gas engines.

- Extremely short response times and precise controllability
- Large flow area
- High differential pressures integrated filter barrier

HOERBIGER PFI (Ported Fuel Injection) valves stand out in terms of their fast response and high reliability, even for dry or corrosive gases.

HOERBIGER PFI valves allow extremely precise control of gas volume, even at high differential pressures. The

valves are installed upstream of the intake valve. In combination with an electronic fuel injection system, PFI valves inject gas directly into the intake manifold.

HOERBIGER PFI valves are suitable both for original equipment and as replacements of mechanical injection systems. In industrial engines with EFC (electronic fuel control) they can be used in addition to mechanical injection systems.



Ignition coils, secondary leads, and spark plugs

With tens of thousands in daily service worldwide, ignition coils, secondary leads, and spark plugs are recognized by industrial engine operators as the finest such products in the world.



- Highest quality possible
- Customer-driven products
- Fifty-plus years of design and engineering expertise

Altronic offers a commitment to customer satisfaction that is made possible in large part by combining the finest materials available with industry-leading experience in engineering and design. Add an ISO 9001-certified manufacturing process and the result is products that deliver the kind of extended, trouble-free service that the

oil and gas/power generation industries expect and demand. These products reduce operating costs by minimizing downtime while shortening and simplifying troubleshooting.

This attention to detail is evident in every ignition system component and accessory, as well. FLASHGUARD® secondary leads and spark plugs, and Passive Pre-Chamber Spark Plugs are designed and built to insure that every ignition system delivers the energy necessary for consistently efficient combustion.

Venturi gas mixer and internal gas flow control valve

EquiCOM controls gas flow via an annular gap adjusted by a high-precision stepping motor with integrated electronics. It provides fast response to changes in gas quality, as for instance in biogas applications.

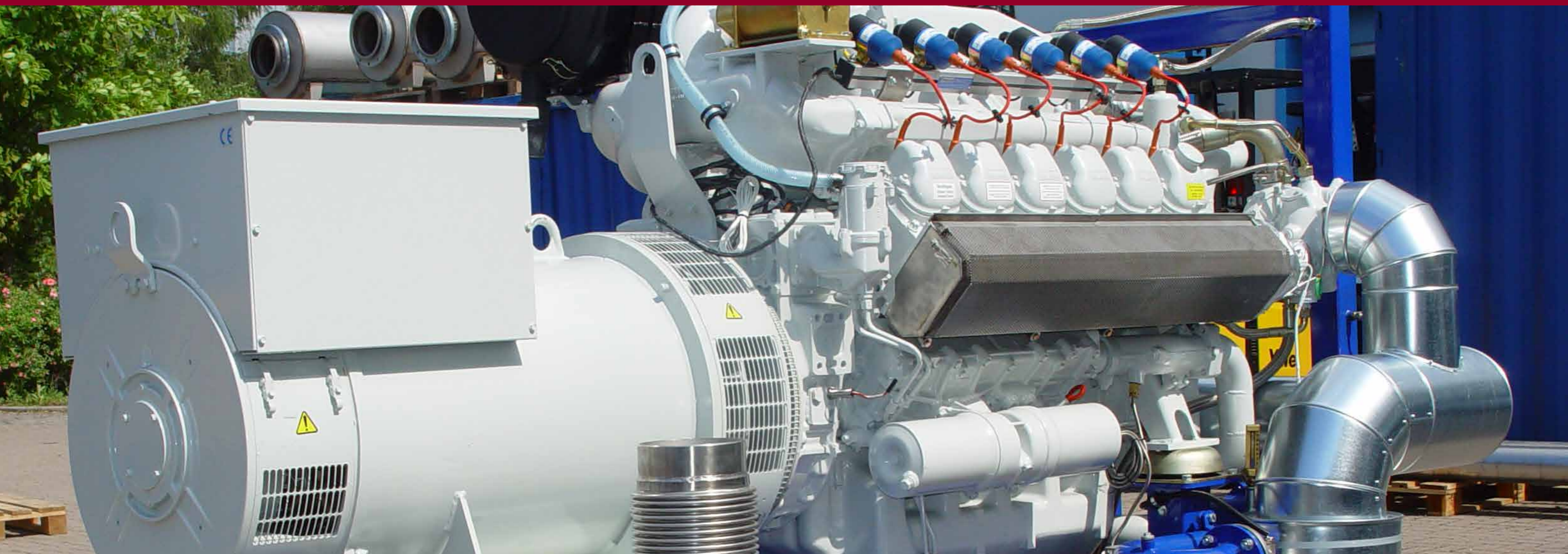
- Precise air/fuel ratio control
- CAN interface using standardized communication protocol
- Low pressure loss and Ex-Zone certified

Varying the flow area by moving the crown of the venturi tube makes it possible to control lambda to tight tolerances (± 0.01) and so operate the engine at best performance over a wide range of different gas qualities. The achievable lambda and lambda control

tolerances can be adjusted to match customer requirements.

The optimized and patented shape of the venturi tube avoids flow separation and decreases pressure losses by up to 20% compared to standard venturi shapes, resulting in higher performance.

EquiCOM ensures high mixture homogeneity without the use of mixing inserts, and is therefore maintenance-free.



Heavy-duty diesel engines utilizing both diesel and natural gas

GTI Bi-Fuel is a patented product that enables operators of heavy-duty diesel engines to substantially reduce operating costs by substituting diesel fuel with lower cost, cleaner-burning natural gas.



- No engine modifications required
- No power or efficiency losses
- Reduces operating costs
- Lowers emissions
- No high-pressure gas supply
- Allows use of interruptible gas

Engines can operate on gas percentages up to a maximum of 70% of the total fuel requirement. Converted engines exhibit diesel-like performance in such critical areas as efficiency, stability and load acceptance.

An engine can be switched between diesel and gas automatically while maintaining speed and load as dictated. Power levels are maintained while operating in gas mode between the “continuous” and “prime” ratings of the engine. For operations above the programmed power limit, the engine is automatically switched to 100% diesel mode. In applications where the load varies substantially, the GTI+ System provides for adjustment of the gas substitution rate according to a map of fuel vs. load.

Custom-designed and manufactured premium control panels

Altronic Controls delivers premium custom engineered control panels built around both purpose-built, proprietary control products as well as PLC-based systems via a global distribution and support network.

- 100% custom solutions
- Unequaled engineering and design
- Concentration on quality
- Draws on the experience and expertise of Altronic

Altronic Controls is uniquely positioned to deliver extremely high quality control panel solutions for both packager and end-user, using proprietary controls, PLC-based products, or a combination of the two. Offerings include the

latest in HMI displays as well as advanced telemetrics. Truly a single-source provider, Altronic Controls will always meet or exceed the customers' exacting requirements and expectations, regardless of horsepower, location, or application.

Altronic Controls panels are supported globally by an experienced team of authorized aftermarket distributors and factory managers.



Always near you - throughout the world

With more than 100 production and service facilities worldwide and approximately 4,000 employees HOERBIGER is here to support you in the oil, gas and process industry. We are leading partners for the economic and reliable operation of your engines.

A highly organized exchange of technological experience and know-how within our organization guarantees our ability to deliver this knowledge anywhere throughout the world.

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- Regional Headquarters
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- Service
- Engine Solutions



www.hoerbiger.com



HOERBIGER is active throughout the world as a leading player in the fields of compression technology, drive technology and hydraulics. In 2014, its 7,004 employees achieved sales of 1.1 billion euros. The HOERBIGER brand is synonymous with performance-defining components in compressors, industrial engines and turbines, automobile transmissions, and multifaceted mechanical engineering applications. Innovations in attractive technological market niches are the basis for components, systems and services that offer unique selling propositions and long-term benefits for the customer.

We set standards.

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