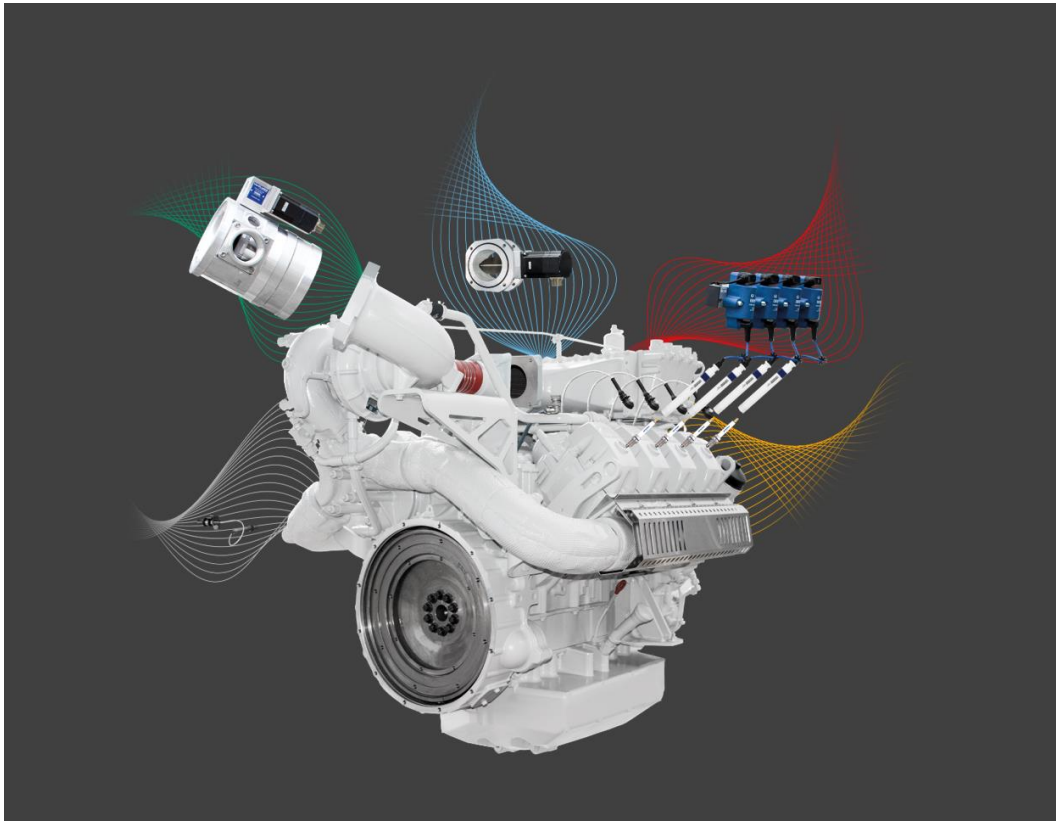
MOTORTECH GmbH

Igniting, Inspiring, Innovating



May 2023

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MOTORTECH®

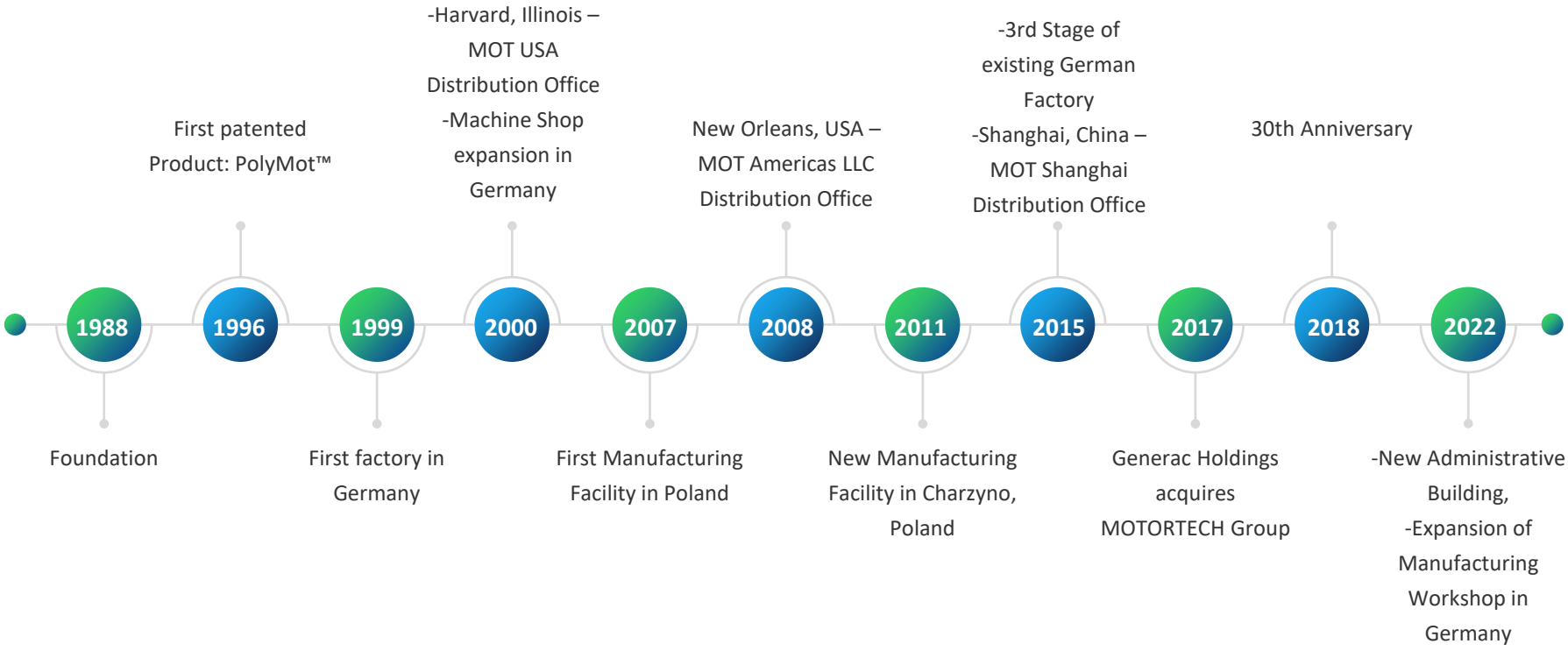
Igniting, Inspiring, Innovating

- **We are an international developer and manufacturer of ignition systems, air/fuel ratio control systems, gas engine control systems**, and other accessories for the worldwide power generation industry with stationary gas engines.

- Our solutions portfolio:
  - Ignition Systems
  - Industrial Spark Plugs
  - Gas Engine Control Systems
  - Speed Control Systems
  - Air/Fuel Ratio Control Systems
  - Sensor Systems
  - Gas Engine Accessories

Company Overview

Our History


1988
Foundation
1996
First patented Product: PolyMot™
1999
First factory in Germany
2000
-Harvard, Illinois – MOT USA Distribution Office
-Machine Shop expansion in Germany
2007
First Manufacturing Facility in Poland
2008
New Orleans, USA – MOT Americas LLC Distribution Office
2011
New Manufacturing Facility in Charzyno, Poland
2015
-3rd Stage of existing German Factory
-Shanghai, China – MOT Shanghai Distribution Office
2017
Generac Holdings acquires MOTORTECH Group
2018
30th Anniversary
2022
-New Administrative Building,
-Expansion of Manufacturing Workshop in Germany

MOTORTECH Group

MOTORTECH GmbH
Celle, Germany
www.motortech.de

- ~ 250 Employees
- Research & Development
- Manufacturing
- Warehousing
- Sales & Marketing
- Service
- Technical Training

MOTORTECH Americas LLC
New Orleans, LA, USA
www.motortechamericas.com

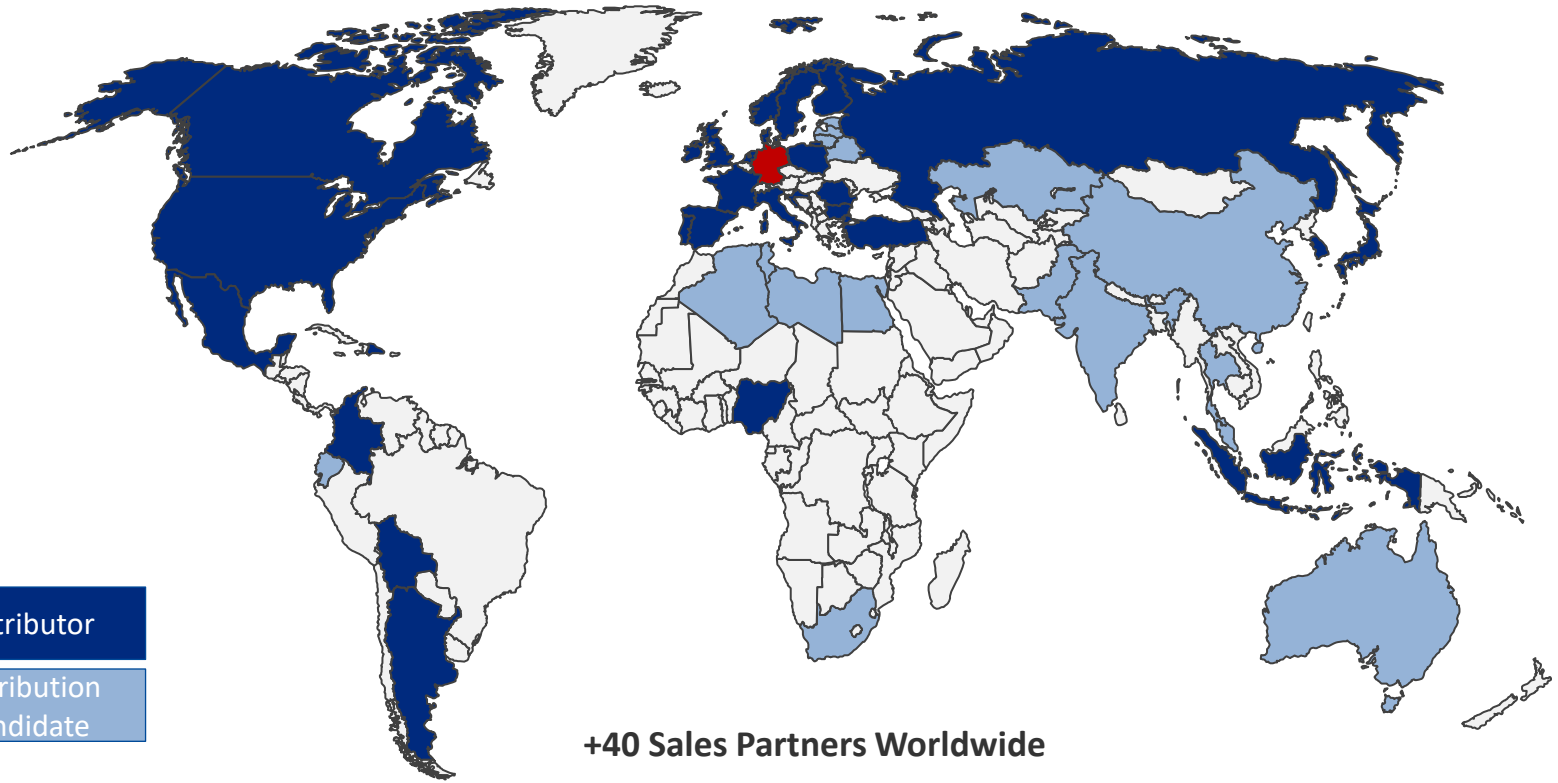
- 6 Employees
- Distribution Center
- Sales & service assistance
- Training facility

MOTORTECH Shanghai Co. Ltd
Shanghai, China
www.motortechshanghai.com

- 4 Employees
- Distribution Center
- Sales & Service Assistance
- OEM Support

MOTORTECH®

Distribution System



+40 Sales Partners Worldwide

Our Products

Gas Engines Applications

- **Fossil Fuels**

Natural Gas

LPG, CNG, LNG

Well-Head Gas

Mine gas

- **Renewable Fuels**

Hydrogen

Biogas

Landfill Gas

Sewage gas

MOTORTECH®

Gas Engine

Heat

Alternator

Heat & Power (CHP)

Power-Gen (COP)

Compressor

Gas Transportation

Gas Lift

Gas Injection

Heat Pump

Heat

MOTORTECH®

Available Technology for Gas Engines

- Ignition Controllers & Harnesses
- Ignition Coils
- Pickups & Trigger Drives
- Primary Leads
- Spark Plug Leads & Extensions
- Ignition Wiring Rails & Hardware
- Ignition Tools & Test Equipment
- Spark Plugs & Accessoires
- Gas Engine Control Systems
- Sensor Systems
- Air / Fuel Ratio Control Systems
- Exhaust Gas Aftertreatment
- Gas Engine Accessoires

Ignition System

Legend

Necessary Components

- 1 MIC ignition controller
- 2 Pickup lead*
- 3 Pickup*
- 4 Reluctor pins/trigger magnets

alternative

- 5 Trigger disc

alternative

Trigger drive

- 6 Output harness*
- 7 Ignition coil*
- 8 1 primary lead/spark plug lead per ignition coil*

Accessories

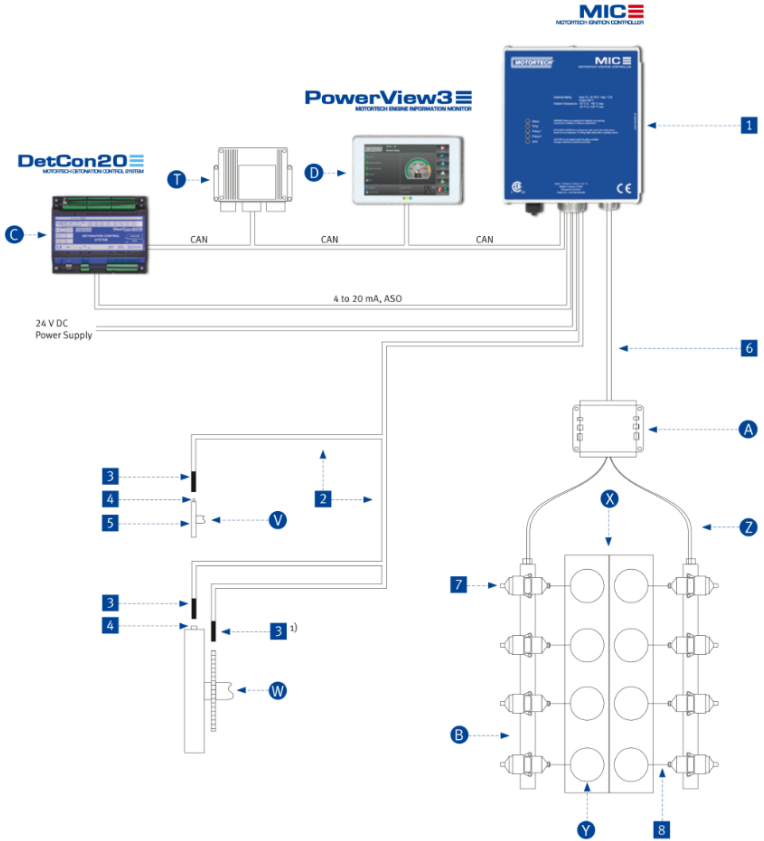
- A Junction box
- B AlphaRail/LiteRail – ignition wiring rail

System Enhancement

- C DetCon20 – Detonation controller
- D PowerView3 – HMI module

Description

- T Electronic Control Unit (ECU)
- V Camshaft
- W Crankshaft
- X Engine
- Y Cylinder
- Z Harness to connect the ignition wiring rails and the junction box



Established Pickup Arrangements

3-Pickup Arrangement for 4-Stroke Engines

1) Crankshaft (Reset)
Magnetic pickup
(holes, pins, teeth, screws)
2) Crankshaft (Speed)
Magnetic pickup
(holes, pins, teeth, screws)
3) Camshaft (Reset)
Hall effect pickup
(magnets)

alternative

3) Camshaft (Reset)
Inductive pickup
(pins, screws, slots)

1-Pickup Arrangement for 4-Stroke Engines

1) Camshaft (N+1/N-1)
Hall effect pickup
(disc with magnets)

alternative

1) Camshaft (N+1/N-1)
Inductive pickup
(disc with pins, screws, slots)

2-Pickup Arrangement for 2-Stroke Engines

1) Crankshaft (Reset)
Magnetic pickup
(holes, pins, teeth, screws)
2) Crankshaft (Speed)
Magnetic pickup
(holes, pins, teeth, screws)

Motortech Ignition Controller

General
- For 2- and 4-stroke engines
- Ignition technology pulse width modulated
- Technical restriction to 6000 rpm
- Max. trigger impulses 16+1 or 500 teeth on the flywheel

Technical Data & Features
- Ignition timing to 0.1° crankshaft
- Triggered by magnetic, Hall effect or inductive pickup
- Multiple ignition timing control via
  – Potentiometer (except MIC3+ and MIC6 series)
  – Speed curve
  – 0 to 20 mA analog input
  – 0 to 10 V analog input
- Multiple energy control via MOST (MOTORTECH Output Stage Technology, see Page 6)
- Programmable firing order
- Overspeed shutdown function
- Access controlled
- Programmable spark duration
- Energy output control
- 2 programmable speed curves with max. 8 speed points (speed/ignition timing)
- Diagnostic memory
- System status display
- Error memory

Ignition Diagnostics
- Runtime data
- Alarm and error messages
- Data logging
- Primary and secondary misfire detection
- Cylinder individual high-voltage calculation (kV)

Interfaces
- CAN Bus 2.0b interface (CANopen®/SAE J1939 protocol)
- RS485 interface (Modbus RTU)
- USB 1.1 interface

Inputs
- Binary ignition release (start/stop)
- Configurable binary input (GPI)
- Binary input for schedule A/B

Outputs
- Max. 2 Auxiliary Synchronization Outputs (ASO) which can support a detonation control system (e.g. DetCon) or fuel injection pump controllers (device dependend)
- Max. 3 multipurpose outputs (GPO) (device dependend)
- Go/NoGo output

Configuration
- Using the graphic user interface MICT (MOTORTECH Integrated Configuration Tool, see page 7)

Certifications
- CSA (Class I, Division 2, Group C, D; T4)
- ATEX – on request
- CE

Scope of Supply
- Configuration software MICT (MOTORTECH Integrated Configuration Tool)
- USB interlink cable
- Vibration dampers
- Ground strap
- Fastening material
- Operating manual

	Feature	MIC3+ Series	MIC4 Series	MIC5 Series	MIC6 Series
General	Max. number of ignition outputs	12	16	20	24
	Max. number of pickups	2	3	3	6 (2 sets with max. 3 pickups)
	Power supply	10 to 32 V DC	10 to 32 V DC	16.8 to 32 V DC	18 to 32 V DC
	Permitted housing surface temperature	-40 °C to +60 °C -40 °F to +140 °F	-40 °C to +60 °C (LD) -40 °F to +140 °F (LD)	-40 °C to +60 °C -40 °F to +140 °F	-40 °C to +60 °C -40 °F to +140 °F
Output	Max. primary voltage	250 V DC	250 V DC	250 V DC	250 V DC
	Max. ignition energy	300 mJ (500 mJ boost for start phase)	300 mJ (500 mJ boost for start phase)	500 mJ (600 mJ boost for start phase)	1000 mJ (1200 mJ boost for start phase)
	Max. programmable spark duration	100 to 800 µsec	100 to 1000 µsec	100 to 1500 µsec	100 to 1500 µsec
Housing	Available housing versions [1]	Light Duty (LD)	Panel Mount (PM), Light Duty (LD), Heavy Duty (HD)	Heavy Duty (HD)	Heavy Duty (HD)
	Dimensions (length x width x height)	250 x 240 x 89.5 mm (LD) 9.84 x 9.45 x 3.52 in (LD)	304 x 240 x 95.5 mm (LD) 11.97 x 9.45 x 3.76 in (LD)	371 x 240 x 114.5 mm (HD) 14.61 x 9.45 x 4.51 in (HD)	385 x 240 x 114.5 mm (HD) 15.16 x 9.45 x 4.51 in (HD)
	Protection class	IP54 (LD)	IP20 (PM), IP54 (LD), IP65 (HD)	IP65 (HD)	IP65 (HD)
	Engine installation	not permitted	not permitted	not permitted	not permitted
	Number of potentio-meters for manual timing adjustment	0	2 (continuous)	2 (continuous)	0
	Input connection	MIL, 35 pole, pin (standard)	terminal strip (standard)	terminal strip (standard)	MIL, 35 pole, pin (standard)
	Output connection	MIL, 17 pole, socket	MIL, 17 pole, socket	MIL, 35 pole, socket	MIL, 35 pole, socket
	Number of status LEDs	5	6	6	11

Motortech Output Stage Technology (MOST)

Capacitor Discharge Ignition System (CDI)

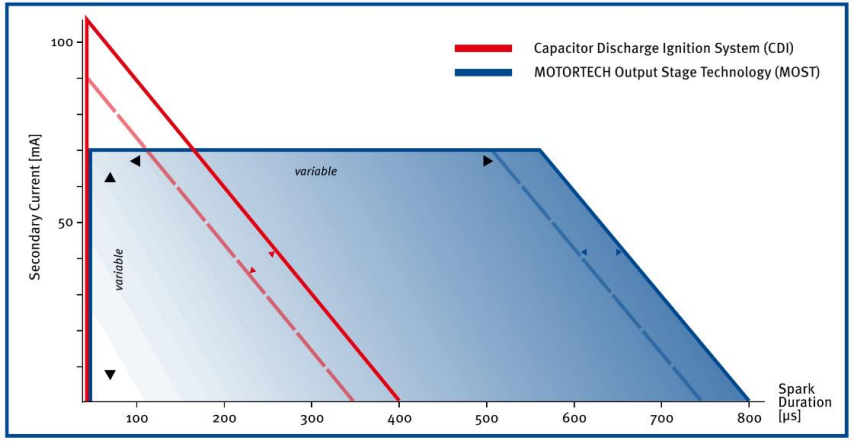
The red curve shows that a high peak current is reached during ignition. Afterwards, the current decreases sharply. To achieve longer spark duration, the energy supply must be increased. The result of this is a higher peak current.

Ignition System with MOST

The blue curve shows that a lower peak current is reached during ignition with MOST. The current remains at a constant level until the energy supply ends. Thereafter, the current drops. In this case as well, more energy is supplied for a longer spark duration, however the peak current is not increased in the process.

MOST works with the following principles:

- Adjustable ignition spark duration with different available ignition voltages
- Constant spark intensity via adjusted ignition spark duration
- 300 to 1000 mJ of primary energy (device dependent) are available



The graphic compares the behavior of a conventional Capacitor Discharge Ignition System (CDI) and Ignition System with MOST

Patented Technology for MIC3+/MIC4/MIC5/MIC6*

Efficiency-enhanced engines, highly compressed mixtures, as well as the use of a great variety of gas types are putting greater demands on the entire ignition system, including:

- Reliable ignition even with weak or fluctuating calorific values of the gas
- Compliance with the strictest emission regulations
- Avoidance of knocking and misfiring
- Reduction of maintenance costs through longer spark plug runtimes

MOTORTECH®

Solutions for Demanding Applications - CSA

High Tension Leads

Ignition Controllers

Sparkplugs

Rails and Harnesses

Pickups

Primary Leads

HMIs

Accessories

Ignition Coils

MOTORTECH®

Specialized Tools

SparkView
MOTORTECH HIGH VOLTAGE INDICATOR

ICT
MOTORTECH IGNITION COIL TESTER

Spark Plug Cleaning Kit

ScopeLite
MOTORTECH TIMING LIGHT

Spark Plug Gap Setting Tool

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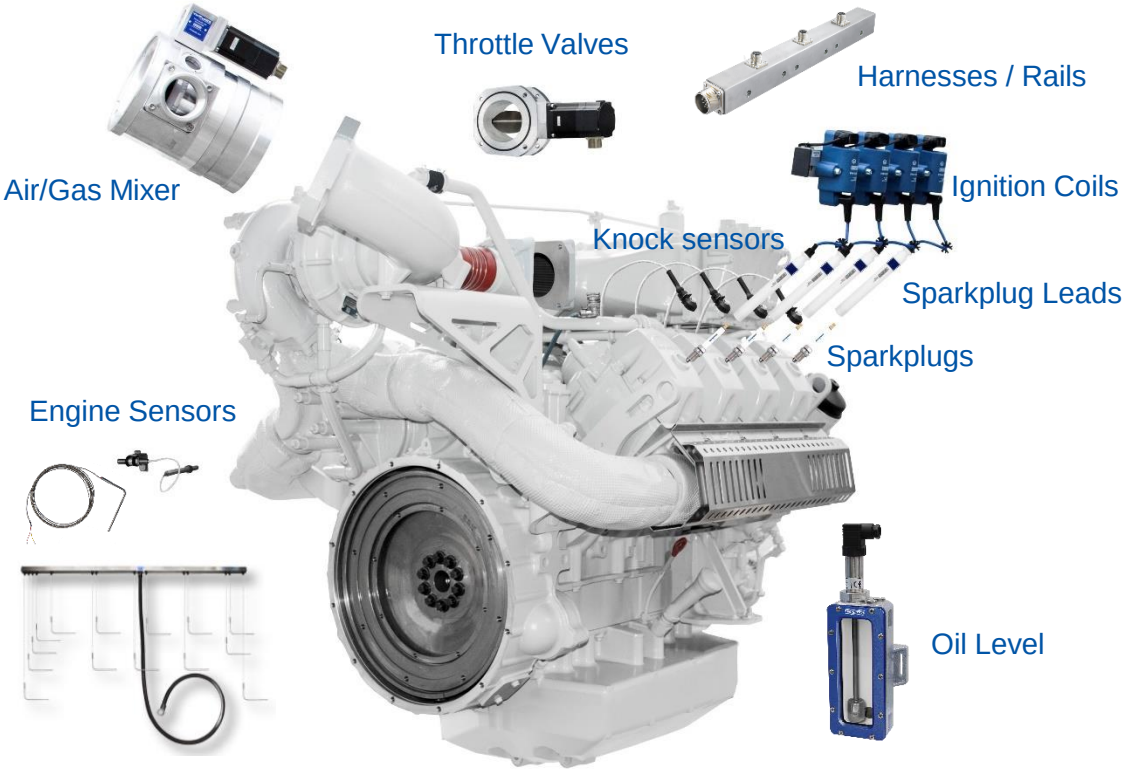
A look into reality

MOTORTECH®

Summarizing

Engine Mounted Accessories for Stationary Gas Engine



Control Panel

Motortech Ignition Controller (MIC)

Power View (HMI)

Stepper Motor Driver

Speed Controller

Detonation Controller

Emissions Controller

Extended Support

Technical Service and Training

Technical Service

Technical Training

We go wherever your equipment is installed!

- Product Support on-site
- Remote Product Support: Phone calls, Virtual meetings
- Commissioning Projects
- Service and Engine Upgrade Projects

Service Hotline: +49 5141 9399 222

For all our products:

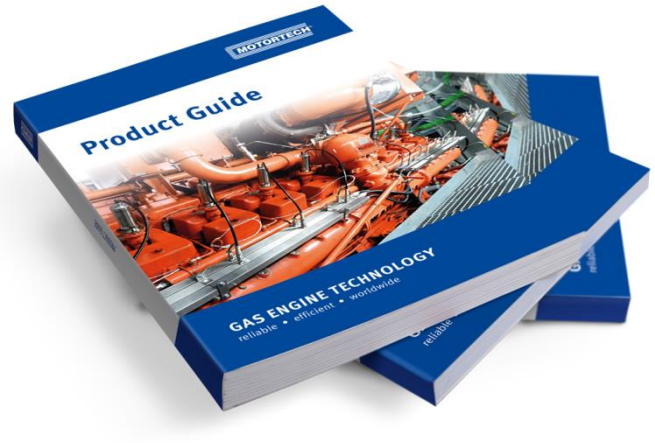
- Training at our German, Chinese, and US facilities.
- In-company Training
- Hands-on training required by the technicians
- Online Training

training@motortech.de

New Product Guide and Newsletter

… download our complete Product Guide:

- more than 200 pages with all relevant competitor cross-references
- Language: English & German
- PDF download from the MOTORTECH website



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