HYPERION
HEINZMANN Hybrid Drives for On- and Off-Highway Applications

Integrated motor generator (IMG) for different internal combustion engines

Increased
- Efficiency
- Dynamics
- Performance
- Torque
- Productivity

Reduced
- Fuel consumption
- Pollutant emissions
- Noise output
- Exhaust gas aftertreatment system

Mild, full or serial hybrid, integrated generator for power-network
**HYPERION Benefits**

- **Fuel savings:** energy recuperation, start/stop operation
- **Optimum operating point of the combustion engine due to downspeeding and right-sizing**
- **Corresponding reductions in pollutant emissions**
- **Noise reduction:** power peaks supported by the noiseless electric motor plus downspeeding
- **Improved dynamic performance due to the torque characteristics of the electric motor at low speeds**
- **High productivity due to higher dynamics**
- **Right-sizing of the combustion engine and better utilisation of rated power**
- **Positive impact on emission aftertreatment**
- **No starter or alternator required**
- **Potential efficiency savings by use of electrically driven water pumps, oil pumps, fuel pumps and cooling fans**
- **Right-sized, smaller combustion engine which may reduce exhaust after treatment system**
- **Minor impact on installation dimensions**

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**HYPERION**

**Hybrid drive**

HEINZMANN’s electric motor/generator for diesel hybrid drive combines the know-how of our Engine and Turbine Management division with that of the Electric Drives division. As a specialist in control systems for diesel engines, HEINZMANN now offers a major contribution to this pioneering drive technology for the off-road application sector.

The HEINZMANN electric motor can also be combined with gaseous fuelled and gasoline engines. Thus HEINZMANN supplies hybrid solutions for the full line of industrial engines.

HEINZMANN is developing hybrid concepts for industry, municipalities and the construction industry by this means being a partner to all combustion engine manufacturers.

The advantages of the hybrid drives are clear. The resource-efficient drive concept considerably reduces fuel consumption. The unique way in which the electric machine works leads to a significant improvement in the performance of the entire drive system. When the electric machine is working as a motor, power from the battery is transferred to the drive-train. Conversely, when operating as a generator, it uses the power of the drive-train in order to recharge the battery. Thus it is possible to right-size the internal combustion engine (smaller combustion engine) running at its most efficient operating point and to recuperate the energy during braking. Finally, the hybrid concept provides considerable emission reductions. The high dynamic of the electric motor leads to higher productivity.

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**HEINZMANN**  
trusted partner for over 100 years
**HEINZMANN HYBRID TECHNOLOGY**

**Hybrid designs**

HEINZMANN developed three different hybrid drives: Gasoline-electric, diesel-electric and LPG/CNG-electric hybrid. Various types of industrial engines are now available with HEINZMANN electric motors and controls. The hybrid engines combine in a unique way HEINZMANN’s experience in control units and electric motors.

The LPG or CNG-electric hybrid represents an especially interesting development, combining the clean LPG or CNG engine with the electric motor. This combination yields even higher overall efficiencies at lower emissions. For the general industrial application, HEINZMANN has selected the mild hybrid concept, where the electric motor is directly coupled to the combustion engine. Full hybrids or serial hybrids and variable speed generators are made according to the customer needs.

**Mild hybrid**

- Standard solution
- Combustion engine can be substituted by hybrid with minimum technical effort
- Only 80 mm longer than original combustion engine

**Full hybrid/serial hybrid**

- Customised solutions
- Integration of electric motor according to application

**Genset application**

- Compact variable speed generator
- AC and DC versions
- Highest efficiencies

**Mild hybrid: hybrid strategy**

With a mild hybrid system, the existing combustion engine can be right-sized. The torque of the electric motor adds to the torque of the combustion engine. This combination achieves a much higher available torque at low speed and comparable torque at high speed which leads to higher productivity.

At a given load demand curve, the combustion engine can work at constant power while the excess energy is used for charging the battery and the demanded peak energy is supplied by the electric motor using battery energy. The electrical boost during accelerations and the start-stop function are also shown in the graph.
APPLICATIONS

Motors and engines
HEINZMANN provides hybrid solutions for the full line of industrial engines.

The electric motors are available in different power ranges and can be combined with multiple combustion engines. The HEINZMANN electric motor guarantees compact assembling dimensions.

Available electric machines (e-motor/generator)
- 20 kW continuous power and 30 kW peak power plus combustion engine power
- 40 kW continuous power and 60 kW peak power
- 50/100 kW under development
- 1 to 20 kW in HEINZMANN disc motor layout

These electric machines can be assembled in combustion engines of all manufacturers.

Engine types
- Diesel engines (e.g. Deutz, Volkswagen Industrial Engines, Cummins)
- LPG/CNG engines (e.g. Volkswagen Industrial Engines)
- Gasoline engines

Utilisation
HYPERION mild hybrid drives can be used for various applications:

Off-road applications
- Construction vehicles
  e.g. wheel loaders, hydraulic excavators
- Material handling
  e.g. forklift trucks
- Aerial work platforms

Genset applications
- Variable speed generator (VSG)

Diesel engine with HEINZMANN electric motor

Wheel loader with HEINZMANN hybrid drive

LADOG multi purpose community vehicle

A HEINZMANN hybrid drive is the heart of the multifunctional excavator “12MTX” from MECALAC
**Example of a mild hybrid system**

**HYPERION system components**

**Electric machine**
- Operation as an electric motor/generator or starter motor

**Hybrid control unit**
- Control and management of the complete system
- Provides boost, charging, recuperation and starter functionality

**Diesel control unit**
- Speed/torque governor for the diesel engine

**E-machine inverter**
- Speed/torque governor for the electric motor/generator

**Mains inverter (optional)**
- Converts the DC bus voltage to mains voltage
  - 400 VAC, 50/60 Hz

**DC/DC converter (optional)**
- Converts 400 VDC bus voltage to vehicle power system voltage
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