Highly-Efficient Diesel-Electric Propulsion
Lower fuel oil consumption, better performance

Benefits of EPROX
Variable speed gensets for extra efficiency

In today’s world, fuel-saving propulsion systems are a must, and that requires new and innovative solutions. But is it possible to design a highly-efficient diesel-electric propulsion plant without sacrificing performance?

A renaissance in direct current

For many years, electric propulsion plants employed alternating current (AC) distribution systems. AC systems were long regarded as the best solution, and a large number of diesel-electric vessels with AC systems and variable speed drives were built, for diverse purposes. But times are changing, thanks to new direct current (DC) components and an innovative engine control philosophy. Diesel-electric propulsion has evolved, creating a much more compact solution with a range of potential applications.

The benefits of EPROX

• Very low fuel oil consumption – Diesel engines run at a set speed defined by the control system according to the current system load – maximising efficiency, minimising fuel oil consumption.
• Engines can operate at variable speeds; gensets run independently without needing to be synchronised.
• Engines’ ability to operate at a wide range of speeds ensures enhanced and robust dynamic response.
• Energy storage sources, such as batteries or fuel cells, can be used to reduce transient loads on diesel and dual-fuel engines; in DP operations, this improves the propulsion system’s dynamic response, generating significant benefits.
• Load peaks are shared so power can be sourced from energy storage devices. Load acceptance is diverted away from the engines.
• The number of online engines is reduced by the electrical spinning reserve. Peak loads can be managed without starting a standby generator.
• EPROX plants comprise fewer components and require a smaller space. The total footprint of a system of this type is up to 20 per cent smaller in comparison to classical diesel-electric systems. This reduces installation costs.
• In addition to buffering against load peaks, batteries can act as the sole power source if they have sufficient capacity. During periods of low load, full electric propulsion is possible, with zero emissions.
• Energy storage sources contribute to a reduction in diesel engine maintenance.

Variable speed diesel engines combined with DC technology

The new EPROX variable speed diesel-electric propulsion system is a host of key design elements, such as the latest DC distribution and circuit breakers, and the intelligent arrangement of inverters and inverters. What’s more, heavy components such as supply transformers have been removed. This innovative equipment was developed by leading e-suppliers such as ABB and Siemens. MAN Diesel & Turbo is cooperating with these key players to provide a fully-optimised system.

EPROX

EPROX is the new fuel-efficient diesel-electric propulsion system from MAN Diesel & Turbo, developed in partnership with leading e-suppliers. Efficient propulsion plants with integrated energy storage sources are now a reality due to advances in DC distribution technology. This couples some of the load applications on the propeller from the diesel engine, reducing peak loads, and making the entire propulsion plant more responsive and dynamic. When powered solely by electricity from storage sources, the system produces zero emissions.

Energy storage devices – offering flexibility and performance

It is often beneficial to run gensets on high loads, using surplus power to charge batteries. If less energy is required, one genset can be shut down, with the remaining gensets running again at high load, supported by the battery.

Variable speed gensets cut fuel oil consumption

Variable speed diesel engines minimise fuel oil consumption. Dependent on the current load, the control system can set the speed for optimum SFOC.

Typical SFOC map: four stroke diesel engine

Variable speed gensets cut fuel oil consumption

Variable speed diesel engines minimise fuel oil consumption. Dependent on the current load, the control system can set the speed for optimum SFOC.
Example: EPROX for a Platform Supply Vessel

Potential fuel savings

<table>
<thead>
<tr>
<th>Operational profile</th>
<th>Power [kW]</th>
<th>Engines running</th>
<th>Engine speed [rpm]</th>
<th>SFOC* [g/kWh]</th>
<th>SFOC saving [g/kWh]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standby offshore</td>
<td>2640</td>
<td>670</td>
<td>1</td>
<td>720</td>
<td>209</td>
</tr>
<tr>
<td>Dynamic positioning</td>
<td>1848</td>
<td>1480</td>
<td>2</td>
<td>720</td>
<td>205</td>
</tr>
<tr>
<td>Transit eco 10 kts</td>
<td>1920</td>
<td>2416</td>
<td>2</td>
<td>720</td>
<td>190</td>
</tr>
<tr>
<td>Transit full 15 kts</td>
<td>96</td>
<td>7560</td>
<td>4</td>
<td>720</td>
<td>189</td>
</tr>
<tr>
<td>In port</td>
<td>2136</td>
<td>150</td>
<td>1</td>
<td>720</td>
<td>263</td>
</tr>
<tr>
<td>Out of service</td>
<td>120</td>
<td>0</td>
<td>0</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Note: All SFOC figures are calculated and for information purpose only; incl. attached pumps.

EPROX plant

Main generator engines: 4 × 6L27/38, 4 × 2190 kW, 480-800 rpm
Voltage: 1000 V DC, with variable speed drives

EPROX – Energy-saving electric propulsion system

MAN Diesel & Turbo
86224 Augsburg, Germany
Phone: +49 821 322-0
Fax: +49 821 322-3382
marineengines-de@mandieselturbo.com
www.mandieselturbo.com

EPROX - Energy-saving electric propulsion system

Engineering the Future – Since 1758.
MAN Diesel & Turbo