2017 MARINE PROPULSION order survey

Covering Engine Systems Technology For Marine, Stationary Power, Oil & Gas And Rail Since 1969
Diesel & Gas Turbine Worldwide’s Marine Propulsion Order Survey is part of three reports designed to provide details on the markets of large reciprocating engines, steam turbines and gas turbines used in power generation, mechanical drive and marine propulsion applications. We divide the data into three reports in order to provide a more in-depth look at each market segment. The Power Generation Order Survey examines reciprocating engines, steam turbines and gas turbines for power generation service. The Mechanical Drive Order Survey is devoted to engine orders for mechanical drive applications including pumps, compressors, oil exploration machinery, rail and other industrial applications. The Marine Propulsion Order Survey examines mechanical drive, auxiliary and diesel-electric marine propulsion systems.

### Procedures

The Marine Propulsion Order Survey includes drivers beginning at 500 kW (0.5 MW). New orders are broken into diesel-electric, mechanical drive and auxiliary generating set orders. Fuel types include diesel fuel, heavy fuel and natural gas. All data found in the survey was provided by participating original equipment manufacturers (OEMs). An accompanying table identifies those companies that participated in the 2017 survey. Every effort is made to ensure this survey is as complete and comprehensive as possible and it would not have the level of detail it contains without the generous contributions of the participating companies. It is important to note that the data in this survey does not represent units shipped, but only the total orders received during calendar year 2016. Geographic location refers to the shipbuilding site. For reference, the geographic breakdown that was presented to participating OEMs along with the survey forms is included in this report.

*It is important to note,* some units reported in the 2017 Marine Propulsion Order Survey did not have complete information. In some cases OEMs chose not to provide engine output, fuel type or geography for some of their reported orders.

### Overview

Total units reported in the 2017 Marine Propulsion Order Survey (2016 data) equaled 13,306, an increase of nearly 18% over the reported total of 11,286 orders in 2015. That reverses last year’s decline, which was down about 7% from 2014 numbers.

The Far East was once again the top reported geographic location (all reported driver types.) With 5098 units destined for the Far East, the region claimed 58% of all orders last year. Western Europe and North America came in second and third, respectively. Western Europe logged 10% of the total orders reported, while North America received 19% of all orders reported. Southeast Asia and Australia was fourth with 14%. Again, it is important to note not all companies reported where their orders went.
### Marine Auxiliary Generating Set Orders, January – December 2016

<table>
<thead>
<tr>
<th>Output Range (MW)</th>
<th>Number of Units</th>
<th>Total Engine Output for Each Output Range (MWe)</th>
<th>Engine Operating Speed Ranges (r/min)</th>
<th>Fuel</th>
<th>Regions/Regional Codes</th>
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</thead>
<tbody>
<tr>
<td>.50 to 1.00</td>
<td>6100</td>
<td>3026</td>
<td>Below 300 300 to 600 720 to 1000</td>
<td>Diesel Fuel</td>
<td>Western Europe 1095 15 69 1815 1114 90 1 29 1718 60 100</td>
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<td>1.01 to 2.00</td>
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<td>2917</td>
<td>6 3 327 1748 2069 11 4 752 14 72 558 333 8 0 6 322 1 12</td>
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<tr>
<td>2.01 to 3.50</td>
<td>184</td>
<td>466</td>
<td>0 1 60 123 174 9 1 63 2 8 72 14 5 0 0 14 0 6</td>
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<tr>
<td>3.51 to 5.00</td>
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<td>413</td>
<td>0 0 31 66 85 12 0 26 0 4 45 4 0 0 0 18 0 0</td>
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<tr>
<td>5.01 to 7.50</td>
<td>31</td>
<td>211</td>
<td>0 0 12 19 24 7 0 11 1 0 7 4 2 0 0 2 0 0</td>
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<td>7.51 to 15.00</td>
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<td>15.01 to 30.00</td>
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<tr>
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<tr>
<td>50.01 and above</td>
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<td>0</td>
<td>0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td>
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<td></td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>3390</strong></td>
<td><strong>7425</strong></td>
<td>8 32 463 8033 8478 47 11 1967 32 153 2501 1473 105 1 35 2084 61 118</td>
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</table>

### Mechanical Drive Marine Propulsion Orders, January – December 2016

<table>
<thead>
<tr>
<th>Output Range (MW)</th>
<th>Number of Units</th>
<th>Total Engine Output for Each Output Range (MWe)</th>
<th>Engine Operating Speed Ranges (r/min)</th>
<th>Fuel</th>
<th>Regions/Regional Codes</th>
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</thead>
<tbody>
<tr>
<td>.50 to 1.00</td>
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<td>808</td>
<td>77 736 1901 1884 21 0 300 5 10 2074 105 1 3 25 172 6 14</td>
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<tr>
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<td>463</td>
<td>15 293 196 198 50 2 96 2 3 320 20 0 0 3 32 11 16</td>
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<tr>
<td>2.01 to 3.50</td>
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<td>184</td>
<td>1 46 33 39 20 4 24 0 0 50 5 0 0 0 1 0 0</td>
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<td></td>
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<tr>
<td>3.51 to 5.00</td>
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<td>269</td>
<td>24 58 0 4 47 7 0 0 0 75 3 0 0 0 4 0 0</td>
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<td></td>
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<tr>
<td>5.01 and above</td>
<td>10</td>
<td>53</td>
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<td></td>
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<tr>
<td><strong>Totals</strong></td>
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<td><strong>1777</strong></td>
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</table>

### Diesel-Electric Marine Propulsion Orders, January – December 2016

<table>
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<tr>
<th>Output Range (MW)</th>
<th>Number of Units</th>
<th>Total Engine Output for Each Output Range (MWe)</th>
<th>Engine Operating Speed Ranges (r/min)</th>
<th>Fuel</th>
<th>Regions/Regional Codes</th>
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<td></td>
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<td>2.01 to 3.50</td>
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<td>498</td>
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<td></td>
</tr>
<tr>
<td>3.51 to 5.00</td>
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<td>103</td>
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<tr>
<td>5.01 to 7.50</td>
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<td>114</td>
<td>2 13 0 7 6 2 3 0 0 12 0 0 0 0 0 0 0</td>
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<tr>
<td>7.51 and above</td>
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<td>739</td>
<td>50 6 0 0 54 2 52 0 0 4 0 0 0 0 0 0 0</td>
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<tr>
<td><strong>Totals</strong></td>
<td><strong>422</strong></td>
<td><strong>1567</strong></td>
<td>**56 113 253 297 121 90 67 5 78 77 0 0 2 75 10 4 **</td>
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</tbody>
</table>
Mechanical Drive Orders

Total reported mechanical drive orders were 8536 units, a 34% increase compared to last year’s survey. The 2016 survey (2015 numbers) showed a 19% decrease compared to the 2015 survey (2014 numbers). Units sized 0.50 to 1.00 MW accounted for 64% of the reported mechanical drive orders. Engine operating speeds above 1000 r/min comprised 71% of the total mechanical drive units ordered in 2016. Diesel fuel again was the fuel type of choice, representing 94% of the reported orders — up from 65% of orders in 2015. Mechanical drive marine propulsion engines destined for the Far East accounted for 29% of 2016 orders. North America claimed the number two spot (24%) with Western Europe third (23%) followed by Southeast Asia & Australia (17%).

Auxiliary Generating-Set Orders

Marine auxiliary gen-set orders totaled 3390 units, a decrease of 35% from last year’s report of 5226. Engines in the output range of 0.50 to 1.00 MW once again recorded the most orders (80%). Engines operating at speeds between above 1000 r/min received 63% of the reported orders. The Far East was the top geographic location for marine auxiliary genset orders, accounting for 74% of the total. Rounding out the top three spots: second place was Western Europe (12%) followed by North America (6%).

Diesel-Electric Orders

Diesel-electric marine propulsion orders totaled 422 units, a 10% increase from the 385 reported last year. This year’s survey shows an uptick in sales for the first time in more than two years. Demand was highest in the output range of 2.01 to 3.50 MW (50%). Engines operating at speeds above 1000 r/min received 60% of the orders. Diesel fuel was the top choice, claiming 70% of the total orders. Western Europe was the top geographic location with 21% of the orders, followed by the Far East and Southeast Asia and Australia and North America with roughly 18% of the orders each.

Annual Surveys

On behalf of Diesel & Gas Turbine Worldwide, thank you to all contributors for your continued participation in this annual survey process. It is our hope that the three surveys combined will provide an accurate snapshot of the entire large-horsepower prime-mover landscape, with fine-tuned detail provided for three market segments through each individual report: power generation, marine propulsion and mechanical drive.

Electronic versions of past surveys are available at our website: www.dieselsgturbine.com. Questions, comments and suggestions should be directed to jburke@dieselpub.com.
Country Information
For Regions/Regional Codes, D&GTW Annual Market Surveys

Mechanical Drive
Marine Propulsion Manufacturers
Caterpillar
Cummins Marine
Fairbanks Morse
MAN Diesel & Turbo
Mitsubishi Heavy Industries
Engine & Turbocharger
Niigata Power Systems
Rolls-Royce
Wärtsilä IN
Yanmar Co. Ltd.

Marine Auxiliary Generating Unit
Engine Manufacturers
Caterpillar
Cummins Marine
Fairbanks Morse
Niigata Power Systems
Rolls-Royce
Wartsila
Yanmar

Diesel-Electric
Marine Propulsion Manufacturers
Caterpillar
Cummins Marine
Rolls-Royce
Wartsila
Yanmar

Central Asia
Afghanistan
Bangladesh
India
Maldives Islands
Nepal
Pakistan
Sri Lanka
North Africa
Algeria
Libya
Morocco
Tunisia

Central, West, East & South Africa
Angola
Benin
Botswana
Burkina Faso
Burundi
Cameroon
Cape Verde
Chad
Comoros
Congó
Cote d'Ivoire
Djibouti
Equatorial Eritrea
Ethiopia
Gabon
Gambia
Ghana
Guinea
Guinea Bissau
Ivory Coast
Kenya
Lesotho
Liberia
Madagascar
Malawi
Mali
Mauritania
Mauritius
Mozambique
Namibia
Niger
Nigeria
Rwanda
Senegal
Seychelles
Sierra Leone
Somalia
South Africa
Swaziland
Sudan
Tanzania
Togo
Uganda
Zaire
Zambia
Zimbabwe

North America
Canada
USA

Central America & Caribbean
Bahamas
Bermuda
Belize
Costa Rica
Cuba
Dominica
Dominican Republic
El Salvador
Guatemala
Haiti
Honduras
Jamaica
Mexico
Nicaragua
Panama
Puerto Rico
Virgin Islands
West Indies

South America
Argentina
Bolivia
Brazil
Chile
Colombia
Ecuador
Guyana
Paraguay
Peru
Surinam
Uruguay
Venezuela

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\[ T = \frac{\pi}{4} \cdot D^2 \cdot \left( v + \frac{\Delta v}{2} \right) \cdot \rho \cdot \Delta v \]