Mostly Steady

By Jack Burke

Diesel & Gas Turbine Worldwide’s Power Generation Order Survey is part one of three surveys designed to provide details on the markets of larger reciprocating engines, steam turbines and gas turbines used in power generation, marine propulsion and mechanical drive applications.

**Procedures**

The Power Generation Order Survey includes reciprocating engines starting at 500 kW; gas turbines rated 1.0 MW and above; and steam turbines.

New orders are broken into types of generating service — standby, peaking and continuous. Manufacturers provide their own distinction between peaking and standby service; however, standby service typically refers to power generation in backup or emergency service. Peaking service is associated with power generation used in conjunction with local utilities. The time that peak service operates is dependent on the condition of the local electrical grid. Continuous service typically refers to continuous power generation, stopping only for maintenance or unexpected outages.

An accompanying table shows the geographic breakdown we provide OEMs, highlighting the specific countries within the reported geographic regions.

Every effort is made to ensure that this survey is as complete and comprehensive as possible and would not have the level of detail it contains without the generous contributions of the participating companies. An accompanying table identifies those companies that participated in the 2016 survey.
It is important to note, some units reported in the 2016 Power Generation Order Survey did not have complete information. In some cases OEMs chose not to provide generating service, fuel type or geography for some of their reported orders. There was another wrinkle to the survey this year. When contacted after not responding, some companies simply said they had no sales in a particular segment, so felt no need to respond to the survey. Those companies were included in the list of participants.

Overview

Total orders (all reported driver types) reported in the 2016 Power Generation Order Survey (2015 data) were down about 2% compared to those reported in last year’s survey (2014 data). The 2015 Survey showed a 1% drop compared to 2013, which seems to indicate the continued impact of low oil prices, among other economic uncertainties.

Reciprocating engine orders totaled 31,305 units, down roughly 1% from to last year’s count.

Gas turbine orders were up about 9% compared to last year’s report. The 2016 Survey found 620 gas turbine orders, while 569 orders were reported in the 2015 Survey. In comparison, the 2014 Survey found 710 orders.

Reported steam turbine orders were down 23% in 2015. The survey found 140 units in 2015, compared to 181 in 2014. It is important to remember the 2014 figure was a high-water mark for steam turbine orders reported in our annual survey and represented an 11% increase from the 2013 Survey.

Top five regions revealed in the 2016 Power Generation Order Survey are: Southeast Asia & Australia (45%); the Middle East (13%); the Far East (12%); North America (10%) and Western Europe (9%).

continued on page 5
# Steam Turbine Types

## RECIPROCATING ENGINE (DIESEL, DUAL-FUEL & GASEOUS-FUEL) POWER GENERATION ORDERS, January – December 2015

<table>
<thead>
<tr>
<th>Output Range (MW)</th>
<th>Units Ordered</th>
<th>Total Engine Output (MW)</th>
<th>Type Of Generating Service</th>
<th>Fuel</th>
<th>Engine Operating Speed Ranges (r/min)</th>
<th>Standby</th>
<th>Peaking</th>
<th>Continuous</th>
<th>Gas</th>
<th>Heavy Fuel</th>
<th>Dual Fuel</th>
<th>Liquid Fuel</th>
<th>Natural Gas</th>
<th>Western Europe</th>
<th>Eastern Europe, Russia &amp; CIS</th>
<th>Middle East</th>
<th>Far East</th>
<th>Southeast Asia &amp; Australia</th>
<th>Central Asia</th>
<th>North Africa</th>
<th>Central, West &amp; South Africa</th>
<th>South America</th>
<th>North America</th>
<th>Central America &amp; Caribbean</th>
<th>South Africa</th>
<th>South America</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.50 to 1.00</td>
<td>15 646</td>
<td>11 171</td>
<td>Standby</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15 646</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>772</td>
<td>2518 558</td>
<td>2492 3128</td>
<td>1296 476 51</td>
<td>700 3170 462</td>
<td>795</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.01 to 2.00</td>
<td>12 335</td>
<td>17 538</td>
<td>Standby</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12 335</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>975</td>
<td>2345 373</td>
<td>1943 2901</td>
<td>1544 241 48</td>
<td>395 1575 342</td>
<td>446</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.01 to 3.50</td>
<td>2883</td>
<td>7098</td>
<td>Standby</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2883</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>585</td>
<td>45 217 577</td>
<td>180 23 6</td>
<td>49 1007 64</td>
<td>130</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.51 to 5.00</td>
<td>159</td>
<td>674</td>
<td>Standby</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>159</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>99</td>
<td>61 11 26</td>
<td>28 21</td>
<td>0 4 12 3</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.01 to 7.50</td>
<td>64</td>
<td>384</td>
<td>Standby</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>64</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>5 7 14 17</td>
<td>0 2 7</td>
<td>0 8</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.51 to 10.00</td>
<td>137</td>
<td>1286</td>
<td>Standby</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>137</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>101</td>
<td>26 5 8</td>
<td>0 2 22 4</td>
<td>20 21 15</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.01 to 15.00</td>
<td>7</td>
<td>75</td>
<td>Standby</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>0 5 0</td>
<td>0 2</td>
<td>0 1 0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.01 to 20.00</td>
<td>74</td>
<td>1339</td>
<td>Standby</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>74</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>54</td>
<td>0 0 0</td>
<td>9 11</td>
<td>0 0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.01 to 30.00</td>
<td>0</td>
<td>0</td>
<td>Standby</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 0</td>
<td>0 0</td>
<td>0 0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.01 and above</td>
<td>0</td>
<td>0</td>
<td>Standby</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 0</td>
<td>0 0</td>
<td>0 0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>31 305</strong></td>
<td><strong>39 553</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Country Information For Regions/Regional Codes, D&GTW Annual Market Surveys

United Arab Emirates
Yemen

Far East
China
Hong Kong
Japan
Mongolia
North Korea
South Korea
Taiwan

Southeast Asia & Australia
Australia
Brunei
Burma
Cambodia
Fiji Islands
Indonesia
Kiribati
Laos
Malaysia
Marshall Islands
Micronesia
Palau
Papua New Guinea
Philippines
Samoa
Singapore
Solomon Islands
Tahiti
Tonga
Thailand
Tuvalu
Vanuatu
Vietnam

Central Asia
Afghanistan
Bangladesh
India
Maldives Islands
Nepal
Pakistan
Sri Lanka

North Africa
Algeria
Libya
Morocco
Tunisia

Central, West, East & South Africa
Botswana
Comoros
Congo
Cote d’Ivoire
Djibouti
Eritrea
Ethiopia
Gambia
Ghana
Madagascar
Malawi
Mozambique
Seychelles
Somalia
Sudan
Tanzania
Diesel, Dual-Fuel And Gas Engine Orders

The number of diesel, dual-fuel and natural gas engines ordered in 2015 totaled 31,305, a decrease of just under 1% compared to last year’s survey. The majority of orders (50%) were once again in the power range of 500 kW to 1 MW, followed by 1.01 to 2.00 MW range (39%).

The 2016 Survey found that orders for continuous duty and standby service were nearly equally split, with roughly 49% each (continuous duty was slightly ahead). Peaking service represented less than 2% of the orders.

Engine operating speeds above 1000 r/min comprised 98% of the total units ordered in 2015.

Diesel fuel remained the preferred fuel for reciprocating engines in power generation applications, claiming 89% of the reported engines fuel type. Natural gas represented roughly 10%.

Top geographic locations for diesel, dual-fuel and gas engines were Far East (21%), North America (19%), Western Europe (17%), Middle East (15%) and Southeast Asia & Australia (10%).

The Far East was again the top geographic location for gas turbine orders (36%). Southeast Asia and Australia claimed the number two spot (12%), followed closely by North America (11.6%).

Steam Turbines

Steam turbine orders totaled 140 units in the 2016 Survey, down 23% compared to last year.

Units rated 30 to 60 MW saw the most demand, accounting for 21% of all steam turbine orders.

Southeast Asia & Australia was the top geographic location (45%), followed by the Middle East (13%), Far East (12%), North America (10%) and Western Europe (9%).

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 engine landscape, with fine-tuned detail provided for three market segments through each individual report — power generation, mechanical drive and marine propulsion. Electronic versions of past surveys are available at our website: www.dieselpub.com.

Questions, comments and suggestions should be directed to jburke@dieselpub.com.
### Power Generation Order Survey Participants

#### Diesel, Dual-Fuel And Gas Engine Manufacturers
- Caterpillar
- Cummins Power Generation
- Dresser-Rand
- Fairbanks Morse
- GE Power & Water
- Hyundai Heavy Industries, Engine and Machine Division
- MAN Diesel & Turbo
- Mitsubishi Heavy Industries Ltd.
- Niigata Power Systems Co. Ltd.
- Rolls-Royce Power Systems
- Wärtsilä Corp.

#### Gas Turbine Manufacturers
- Ansaldo Energia S.p.A.
- Aviadvigatel
- GE Oil & Gas
- GE Power & Water
- Kawasaki Heavy Industries Ltd.
- MAN Diesel & Turbo
- Mitsubishi Hitachi Power Systems Ltd.
- OPRA Turbines
- Siemens AG
- Solar Turbines Inc.
- Vericore Power Systems
- Zorya-Machproekt

#### Steam Turbine Manufacturers
- Ansaldo Energia S.p.A.
- Elliott Group
- Fincantieri S.p.A.
- GE Oil & Gas
- GE Power & Water
- MAN Diesel & Turbo SE
- Mitsubishi Heavy Industries
- Compator Corp.
- Mitsubishi Hitachi Power Systems Ltd.

### Country Information For Regions/Regional Codes, D&GTW Annual Market Surveys
- Angola
- Benin
- Burkina Faso
- Burundi
- Cameroon
- Cape Verde
- Central African Republic
- Chad
- Equatorial Guinea
- Gabon
- Guinea
- Guinea Bissau
- Ivory Coast
- Kenya
- Lesotho
- Liberia
- Mali
- Mauritania
- Mauritius
- Namibia
- Niger
- Nigeria
- Rwanda
- Senegal
- Sierra Leone
- South Africa
- Swaziland
- Togo
- Uganda
- Zaire
- Zambia
- Zimbabwe

#### North America
- Canada
- USA

#### Central America & Caribbean
- Bahamas
- Bermuda
- Belize
- Costa Rica
- Cuba
- 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
Diesel & Gas Turbine
WORLDWIDE
engine systems technology for marine, stationary power, oil & gas and rail since 1969
www.dieselgasturbine.com