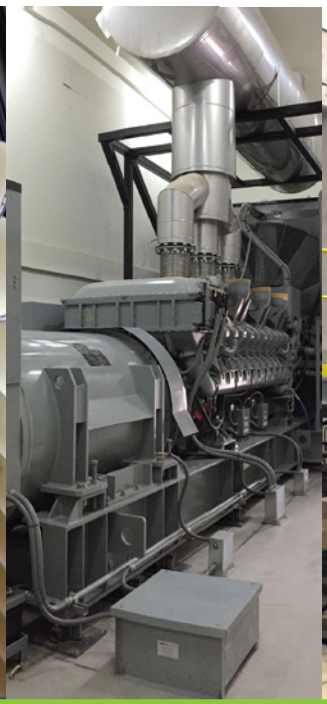
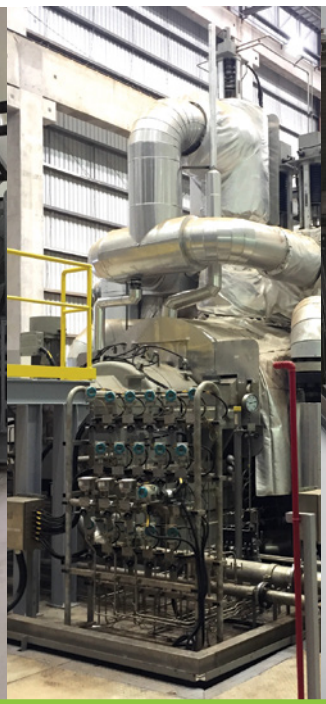
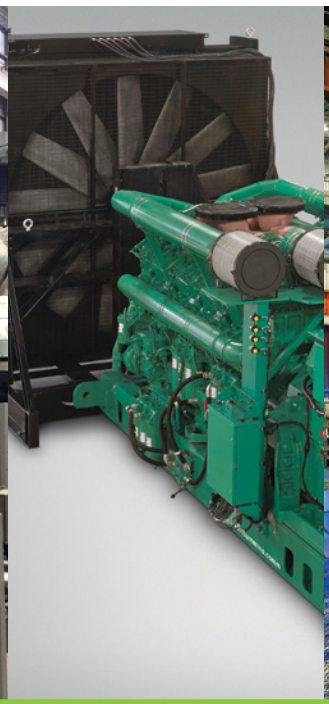
41st

power generation order survey


Diesel & Gas Turbine
WORLDWIDE
covering engine systems technology for marine, stationary power, oil & gas and rail since 1969

41st power generation order survey

Power Down

By Jack Burke

Snapshot of industry shows orders lagging

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.*

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 propulsions systems. All three surveys, along with previous surveys, are available at www.dieselgasturbine.com.

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 2017 survey.

It is important to note, some units reported in

the 2017 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. It should also be noted that 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. Other companies completed one segment of the Power Generation Order Survey, but cited difficulty in gathering information as the reason for not completing another segment. Still other companies said they did not have the ability to gather the information at all. The Power Generation Order Survey should be seen as a snapshot of the market in 2016.

Overview

Total orders (all reported driver types) reported in the 2017 Power Generation Order Survey (2016 data) were down about 19% compared to those reported in last year's survey (2015 data). The 2016 Survey (2015 data) showed a 2% drop compared to the 2015 Survey.

Reciprocating engine orders totaled 25 387 units in the 2017 Survey, down roughly 17% from last year's count.

Gas turbine orders were down about 6% compared to last year's report. The 2017 Survey found 581 gas turbine orders, while 620 orders were reported in the 2016 Survey. In comparison, the 2015 Survey found 569 orders.

Reported steam turbine orders were down 31% in 2016. The survey found 96 units in 2016, compared to 140 in 2015.

Top five regions revealed in the 2017 Power Generation Order Survey are: Western Europe (19%), North America (18.9%), Far East (16%), Middle East (15%) and South East Asia & Australia (11%).

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Country Information For Regions/Regional Codes, *D&GTW* Annual Market Surveys

Western Europe
Andorra
Austria
Belgium
Denmark
Finland
France
Germany
Greece
Ireland
Italy
Liechtenstein
Luxembourg
Malta
Netherlands
Norway
Portugal
San Marino
Slovenia
Spain
Sweden
Switzerland
United Kingdom

Eastern Europe, Russia & CIS
Albania
Armenia
Azerbaijan
Belarus
Bosnia And Herzegovina
Bulgaria
Croatia
Czech Republic
Estonia
Georgia
Hungary
Kazakhstan
Kyrgyzstan
Latvia
Lithuania
Moldova
Poland
Republic Of Macedonia
Romania
Russia
Serbia
Slovac Republic
Tajikistan
Turkmenistan
Ukraine
Uzbekistan

Middle East
Bahrain
Cyprus
Egypt
Iran
Iraq
Israel
Jordan
Kuwait
Lebanon
Oman

Continues

RECIPROCATING ENGINE (DIESEL, DUAL-FUEL & GASEOUS-FUEL) POWER GENERATION ORDERS, January – December 2016

Output Range (MW)	Units Ordered	Total Engine Output (MWe)	Type Of Generating Service			Engine Operating Speed Ranges (r/min)				Fuel					Western Europe	Eastern Europe, Russia & CIS	Middle East	Far East	Southeast Asia & Australia	Central Asia	North Africa	Central, West, East & South Africa	North America	Central America & Caribbean	South America
			Standby	Peaking	Contin-uous	Below 300	300 - 600	720 - 1000	Above 1000	Diesel Fuel	Heavy Fuel	Dual Fuel	Liquid Biofuel	Natural Gas											
0.50 to 1.00	11 006	7806	6800	188	3940	0	0	1	11 005	10 229	1	0	0	698	2229	282	1747	1332	1103	475	67	634	2259	221	657
1.01 to 2.00	11 077	15 529	6300	358	4419	0	0	12	11 065	9677	0	0	0	1372	2043	295	1941	2062	1506	229	43	718	1399	410	431
2.01 to 3.50	2761	6896	1976	207	578	0	0	17	2744	2510	0	0	0	247	607	50	121	622	150	25	7	22	1096	19	42
3.51 to 5.00	240	1047	47	0	193	0	0	23	217	60	1	0	0	179	67	41	15	23	14	14	13	0	51	1	1
5.01 to 7.50	47	284	6	0	41	0	0	43	4	29	6	6	0	6	2	0	9	10	5	5	0	0	7	1	8
7.51 to 10.00	97	893	2	0	95	0	0	95	2	9	11	40	0	37	12	0	5	2	25	11	0	11	1	4	26
10.01 to 15.00	18	244	0	0	18	0	0	18	0	0	18	0	0	0	0	0	0	0	8	0	0	10	0	0	0
15.01 to 20.00	141	2566	0	0	141	0	141	0	0	4	91	26	0	20	1	3	64	0	19	17	0	4	12	0	21
20.01 to 30.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30.01 and above	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	**25 387**	**35 266**	**15 130**	**754**	**9425**	**0**	**141**	**209**	**25 037**	**22 518**	**128**	**72**	**0**	**2559**	**4961**	**671**	**3902**	**4051**	**2830**	**776**	**130**	**1399**	**4825**	**656**	**1186**

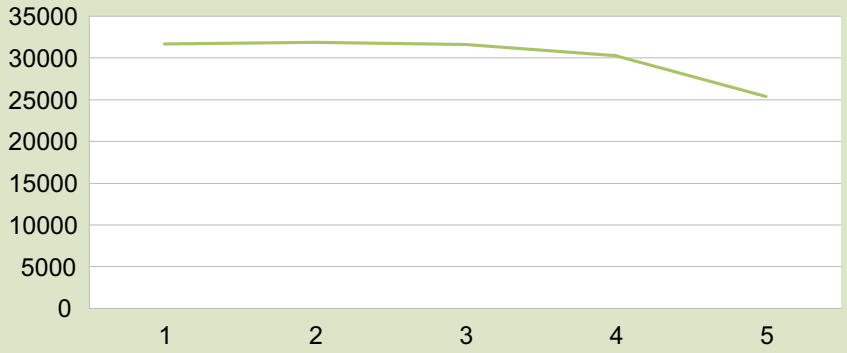
STEAM TURBINE POWER GENERATION ORDERS, January – December 2016

Output Range (MW)	Units Ordered	Total Engine Output (MWe)	Type Of Generating Service			Steam Turbine Types					Western Europe	Eastern Europe, Russia & CIS	Middle East	Far East	Southeast Asia & Australia	Central Asia	North Africa	Central, West, East & South Africa	North America	Central America & Caribbean	South America
			Standby	Peaking	Contin-uous	Condensing	Non-Condensing	Reheat	Extraction	Induction											
0.0 to 1.00	4	2	0	0	4	0	4	0	0	0	0	0	0	0	1	0	0	0	3	0	0
1.01 to 5.00	11	19	0	0	11	2	9	0	0	0	0	0	0	0	10	0	0	0	0	0	1
5.01 to 10.00	5	42	0	0	5	4	1	0	1	0	2	0	0	1	1	0	0	0	1	0	0
10.01 to 30.00	9	155	0	0	9	8	1	0	4	0	1	0	3	1	0	0	2	0	2	0	0
30.01 to 60.00	13	562	0	1	3	11	0	0	4	4	2	0	1	1	2	4	0	0	2	1	0
60.01 to 120.00	6	490	0	2	4	6	0	2	0	3	0	0	1	0	0	0	0	2	2	0	1
120.01 to 200.00	16	2737	0	0	16	11	0	12	0	0	0	3	4	0	4	0	0	0	5	0	0
200.01 to 300.00	10	2423	0	0	10	8	0	4	2	0	0	2	2	2	0	0	2	0	2	0	0
300.01 to 500.00	7	1137	0	0	7	4	0	5	0	0	0	0	1	0	3	0	0	0	0	2	1
500.01 to 700.00	9	594	0	0	9	9	0	9	0	0	0	0	4	0	0	5	0	0	0	0	0
700.01 to 1000.00	5	4325	0	0	5	3	0	3	0	0	0	0	0	0	3	2	0	0	0	0	0
1000.01 and above	1	175	0	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
Totals	**96**	**12 661**	**0**	**3**	**84**	**67**	**15**	**36**	**11**	**7**	**6**	**5**	**16**	**5**	**24**	**11**	**4**	**2**	**17**	**3**	**3**

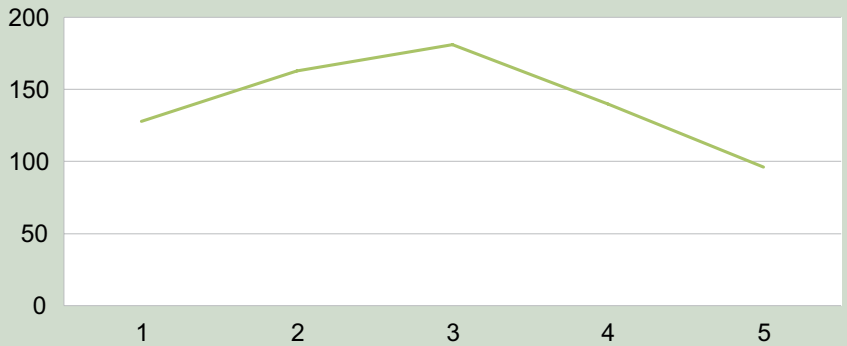
GAS TURBINE POWER GENERATION ORDERS, January – December 2016

Output Range (MW)	Units Ordered	Total Engine Output (MWe)	Type Of Generating Service			Fuel				Western Europe	Eastern Europe, Russia & CIS	Middle East	Far East	Southeast Asia & Australia	Central Asia	North Africa	Central, West, East & South Africa	North America	Central America & Caribbean	South America
			Standby	Peaking	Contin-uous	Diesel Fuel	Heavy Fuel	Dual Fuel	Natural Gas											
1.00 to 2.00	67	86	60	0	7	28	26	7	6	1	0	0	65	1	0	0	0	0	0	0
2.01 to 3.50	47	125	41	0	6	15	15	13	4	0	4	0	43	0	0	0	0	0	0	0
3.51 to 5.00	49	176	37	0	10	10	23	6	7	0	3	0	39	0	0	0	0	5	0	0
5.01 to 7.50	50	293	2	0	46	2	0	7	39	6	3	16	8	1	0	0	6	8	0	0
7.51 to 10.00	30	214	0	0	17	0	0	1	16	6	0	0	6	0	0	0	0	5	0	0
10.01 to 15.00	19	243	0	1	18	0	0	0	19	8	0	3	5	0	0	0	0	0	3	0
15.01 to 20.00	20	286	1	0	11	0	0	4	8	0	2	0	4	0	0	0	0	5	0	1
20.01 to 30.00	12	302	0	0	12	0	0	7	5	3	0	2	2	0	0	0	0	5	0	0
30.01 to 60.00	135	5800	0	57	75	8	0	35	89	2	0	12	21	14	2	0	30	19	0	32
60.01 to 120.00	28	1719	0	2	17	0	0	4	15	0	0	2	15	1	2	0	0	4	0	4
120.01 to 180.00	11	601	0	5	6	0	1	1	9	0	4	0	2	0	0	0	5	0	0	0
180.01 and above	113	36 266	0	13	100	2	3	18	90	1	5	38	14	10	4	4	5	22	3	7
Totals	**581**	**46 111**	**141**	**78**	**325**	**65**	**68**	**103**	**307**	**27**	**21**	**73**	**224**	**27**	**8**	**4**	**46**	**73**	**6**	**44**

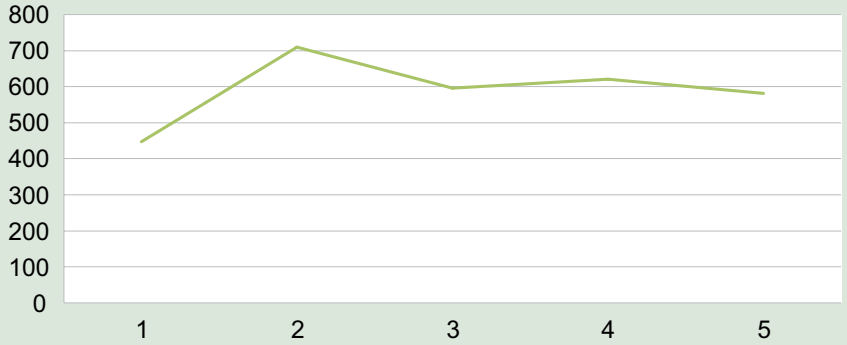
Recip Engine Orders, Five-Year Data



Steam Turbine Orders, Five-Year Data



Gas Turbine Orders, Five-Year Data



Country Information For Regions/Regional Codes, *D&GTW* Annual Market Surveys

Qatar
Saudi Arabia
Syria
Turkey
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 Asia
Afghanistan
Bangladesh
India
Maldives Islands
Nepal
Pakistan
Sri Lanka

Continues

2016 Combined Regions/Regional Codes

Diesel, Dual-Fuel And Gas Engine Orders

The number of diesel, dual-fuel and natural gas engines ordered in 2016 totaled 25 387, a decrease of about 19% compared to last year's survey. The largest segment of orders (44%) were in the power range of 1.01 to 2.00 MW range, followed closely by orders in the 500 kW to 1 MW range (43%).

The 2017 Survey found that standby service accounted for roughly 59% of all orders with continuous duty accounting for 37% of orders. Peaking service represented about 3% of the orders.

Engine operating speeds above 1000 r/min comprised 98% of the total units ordered in 2016.

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%. Heavy fuel, dual fuel and liquid biofuel made up the rest.

Top geographic locations for diesel, dual-fuel and gas engines were Western Europe (19.5%), North America (19%), Far East (16%), Middle East (15%) and Southeast Asia & Australia (11%).

Gas Turbines

Gas turbine orders reported in the 2017 Survey totaled 581 units, down about 6% from last year. Gas turbines rated 180.1 MW and above saw the most activity, accounting for 13% of the orders.

Natural gas was the dominate fuel type (53%), followed by dual fuel (18%), heavy fuel (12%) and diesel fuel (11%).

The Far East was again the top geographic location for gas turbine orders (38%). The Middle East and North America tied for second with each area receiving 73 orders, or about 13%.

Steam Turbines

Steam turbine orders totaled 96 units in the 2017 Survey, down 31% compared to last year's submissions.

Units rated 120 to 200 MW saw the most demand, accounting for 17% of all steam turbine orders.

Southern Asia & Australia was the top geographic location (25%), with North America (18%), the Middle East (17%), Central Asia (11%) and Western Europe (6%) following.

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.dieselgasturbine.com. Questions, comments and suggestions should be directed to jburke@dieselpub.com.

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Country Information For Regions/Regional Codes, *D&GTW* Annual Market Surveys

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
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
Dominica
Domin. 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

Power Generation Order Survey Participants

Diesel, Dual-Fuel And Gas Engine Manufacturers

Caterpillar

Cummins Power Systems

GE Power

Mitsubishi Heavy Industries Engine & Turbocharger

Niigata Power Systems

Rolls-Royce

Siemens Reciprocating Engines

Wärtsilä

Yanmar

Gas Turbine Manufacturers

Ansaldo

Aviadvigatel

GE Oil & Gas

GE Power

Kawasaki Heavy Industries

Mitsubishi Hitachi Power Systems (MHPS)

Solar Turbines

Vericore Power Systems

Zorya-Machproekt

Steam Turbine Manufacturers

Ansaldo

Elliott Turbo

GE Power

GE Oil & Gas

Man Diesel & Turbo

Mitsubishi Heavy Industries Compressor Corp.

Mitsubishi Hitachi Power Systems (MHPS)

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