



40th

power generation order survey

Diesel & Gas Turbine
WORLDWIDE

engine systems technology for marine,
stationary power, oil & gas and rail since 1969

40th power generation order survey

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.

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. The Mechanical Drive and Marine Propulsion surveys will appear soon on www.diesलगasturbine.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 2016 survey.

Country
Information For
Regions/Regional
Codes, *D>W*
Annual Market
Surveys

Western Europe

Andorra
Austria
Belgium
Denmark
Finland
France
Germany
Greece
Iceland
Liechtenstein
Luxembourg
Italy
Ireland
Netherlands
Malta
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
Slovak Republic
Tajikistan
Turkmenistan
Ukraine
Uzbekistan

Middle East

Bahrain
Cyprus
Egypt
Iran
Iraq
Israel
Jordan
Kuwait
Lebanon
Oman
Qatar
Saudi Arabia
Syria
Turkey

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%).

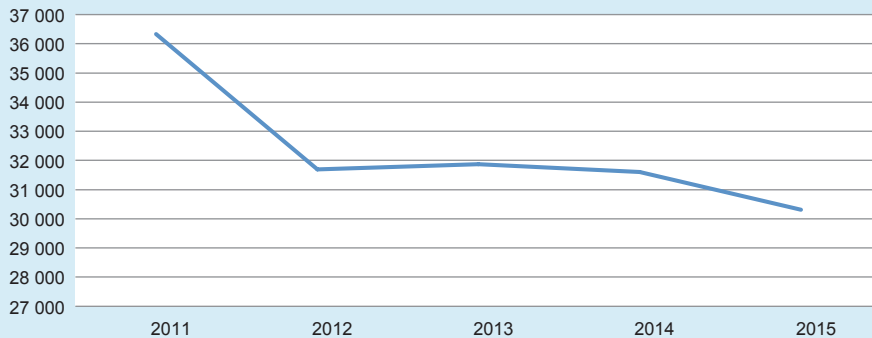
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RECIPROCATING ENGINE (DIESEL, DUAL-FUEL & GASEOUS-FUEL) POWER GENERATION ORDERS, January – December 2015																									
Output Range (MW)	Units Ordered	Total Engine Output (MWe)	Type Of Generating Service			Engine Operating Speed Ranges (r/min)				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	Continuous	Below 300	300 - 600	720 - 1000	Above 1000	Diesel Fuel	Heavy Fuel	Dual Fuel	Liquid Biofuel	Natural Gas											
0.50 to 1.00	15 646	11 171	8442	213	6991	0	0	0	15 646	14 871	3	0	0	772	2518	558	2492	3128	1296	476	51	700	3170	462	795
1.01 to 2.00	12 335	17 538	4929	214	7192	0	5	58	12 272	10 309	0	0	0	1975	2345	373	1943	2901	1544	241	48	395	1757	342	446
2.01 to 3.50	2883	7088	1940	83	860	0	40	19	2824	2586	0	0	0	253	585	45	217	577	180	23	6	49	1007	64	130
3.51 to 5.00	159	674	30	0	129	0	0	87	72	56	1	0	0	99	61	11	26	28	1	0	4	2	12	3	0
5.01 to 7.50	64	384	24	0	40	0	2	27	34	41	13	1	0	9	5	0	7	14	17	2	0	2	7	0	8
7.51 to 10.00	137	1286	0	0	137	0	3	134	0	16	13	7	0	101	26	5	8	0	2	22	4	20	21	15	14
10.01 to 15.00	7	75	0	0	6	0	1	5	0	0	5	1	0	0	0	0	5	0	0	0	0	0	0	1	0
15.01 to 20.00	74	1339	0	0	74	0	74	0	0	0	56	3	0	15	0	0	54	0	0	0	0	9	11	0	0
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	31 305	39 555	15 365	510	15 429	0	125	330	30 848	27 879	91	12	0	3224	5540	992	4752	6648	3040	764	113	1177	5985	887	1393

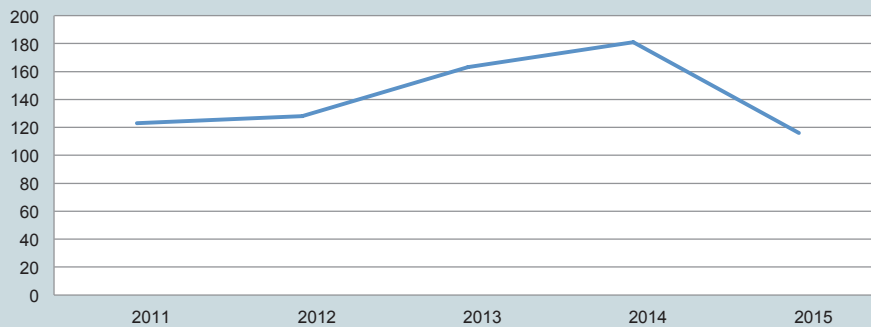
STEAM TURBINE POWER GENERATION ORDERS, January – December 2015																					
Output Range (MW)	Units Ordered	Total Engine Output (MWe)	Type Of Generating Service			Steam Turbine Types					Western Europe	Eastern Europe, Russia & CIS	Middle East	Far East	Southeast Asia & Australia	Central Asia	North Africa	Central, West, East & South Africa	North America	Central America & Caribbean	South America
			Standby	Peaking	Continuous	Condensing	Non-Condensing	Reheat	Extraction	Induction											
0.0 to 1.00	4	2645	0	0	4	0	4	0	0	0	0	0	0	0	1	0	0	1	1	0	1
1.01 to 5.00	20	36 923	0	0	20	2	18	0	1	0	1	0	0	0	18	0	0	0	1	0	0
5.01 to 10.00	4	6624	0	0	4	3	1	0	2	0	3	0	0	1	0	0	0	0	0	0	0
10.01 to 30.00	11	234	0	0	11	5	6	0	4	0	4	1	0	0	4	0	2	0	0	0	0
30.01 to 60.00	30	1214	0	0	30	0	30	0	30	0	4	0	0	0	24	0	0	0	2	0	0
60.01 to 120.00	2	136	0	0	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
120.01 to 200.00	13	2152	0	0	13	12	0	12	4	0	0	0	0	5	6	0	0	0	2	0	0
200.01 to 300.00	23	6264	0	0	23	18	0	11	0	0	0	0	16	2	0	0	3	0	2	0	0
300.01 to 500.00	14	5299	0	0	14	12	0	12	0	0	0	0	2	0	2	6	0	0	4	0	0
500.01 to 700.00	18	11 640	0	0	18	16	0	16	0	0	0	0	0	8	6	2	0	0	2	0	0
700.01 to 1000.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1000.01 and above	1	1070	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Totals	140	74 201	0	0	140	68	59	51	41	0	12	1	18	17	63	8	5	1	14	0	1

GAS TURBINE POWER GENERATION ORDERS, January – December 2015																				
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	Continuous	Diesel Fuel	Heavy Fuel	Dual Fuel	Natural Gas											
1.00 to 2.00	111	162	83	0	28	21	58	4	12	4	1	0	97	7	0	2	0	0	0	0
2.01 to 3.50	40	118	32	0	8	9	22	4	5	0	0	0	34	2	0	1	1	0	0	1
3.51 to 5.00	43	175	36	0	7	16	20	3	4	1	2	0	36	3	0	0	1	0	0	0
5.01 to 7.50	40	235	7	0	33	7	0	5	28	3	9	5	11	0	3	4	1	4	0	0
7.51 to 10.00	28	221	0	2	26	0	0	1	27	6	2	0	6	7	0	2	0	4	1	0
10.01 to 15.00	11	140	0	0	11	0	0	2	9	1	0	0	2	2	0	0	0	3	3	0
15.01 to 20.00	13	205	0	1	12	1	0	8	4	2	3	0	3	0	0	0	3	2	0	0
20.01 to 30.00	22	608	0	1	21	4	1	13	4	1	1	1	0	5	1	0	10	2	1	0
30.01 to 60.00	109	4249	0	18	91	13	0	41	55	2	9	19	5	44	4	0	20	8	2	2
60.01 to 120.00	46	3898	0	12	34	0	0	6	40	0	8	4	3	3	0	0	0	20	4	4
120.01 to 180.00	23	3625	0	4	19	0	0	4	19	0	7	4	1	0	3	4	4	0	0	0
180.01 and above	134	38 265	0	25	109	0	0	22	112	0	2	35	22	0	9	0	0	27	17	3
Totals	620	51 901	158	63	399	71	101	113	319	20	44	68	220	73	20	13	39	72	28	10

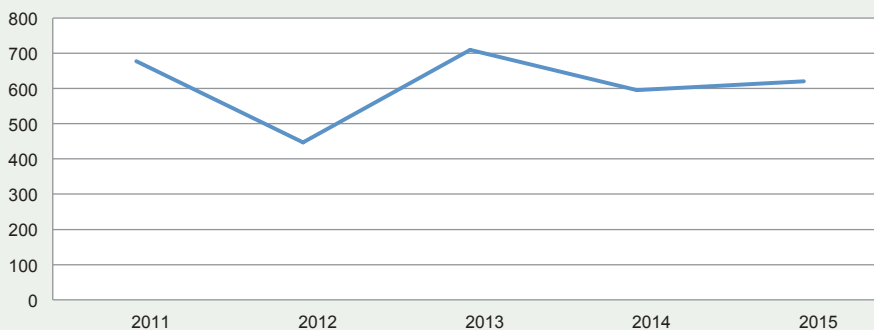
Recip Engine Orders, Five-Year Data



Steam Turbine Orders, Five-Year Data



Gas Turbine Orders, Five-Year Data



Country
Information For
Regions/Regional
Codes, *D>W*
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

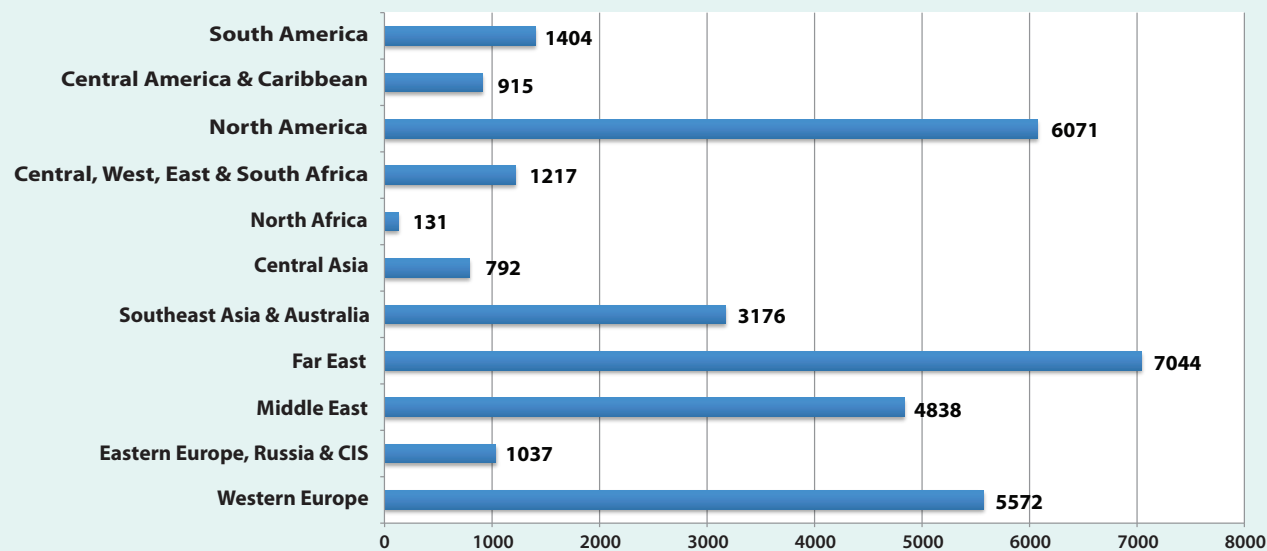
Algeria
Libya
Morocco
Tunisia

**Central, West, East &
South Africa**

Botswana
Comoros
Congo
Cote d'Ivoire
Djibouti
Eritrea
Ethiopia
Gambia
Ghana
Madagascar
Malawi
Mozambique
Seychelles
Somalia
Sudan
Tanzania

Continues

2015 Combined Regions/Regional Codes



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 2014 Survey found North America to be to top destination for diesel, dual-fuel and gas engines, but perhaps the market was affected by the slowdown of the shale boom.

Gas Turbines

Gas turbine orders reported in the 2016 Survey totaled 620 units, up about 9% from last year. Gas turbines rated 180.1 MW and above saw the most activity, accounting for 22% of the orders.

Natural gas was the dominant fuel type (51%), followed by dual fuel (18%), heavy fuel (16%) and diesel fuel (11%).

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

Country
Information For
Regions/Regional
Codes, D>W
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
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

Power Generation Order Survey Participants

**Diesel, Dual-Fuel
And Gas Engine
Manufacturers**

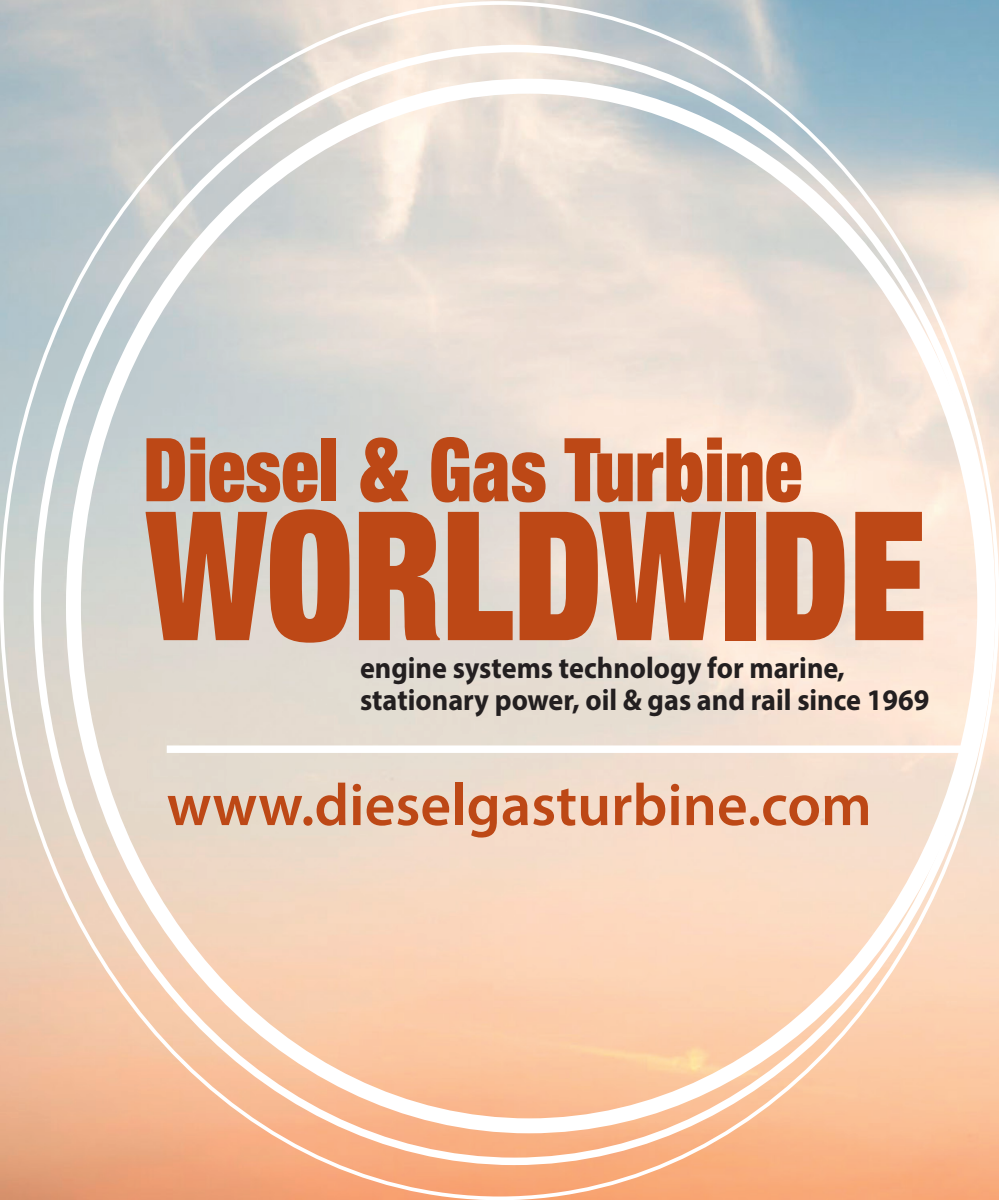
Caterpillar
Cummins Power
Generation
Dresser-Rand
Fairbanks Morse
GE Power & Water
Hyundai Heavy Industries,
Engine and Machine
Division
MAN Diesel & Turbo
Mitsubishi Heavy
Industries Ltd.
Niigata Power
Systems Co. Ltd.
Rolls-Royce
Power Systems
Wärtsilä Corp.

**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
Compressor Corp.
Mitsubishi Hitachi
Power Systems Ltd.



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engine systems technology for marine,
stationary power, oil & gas and rail since 1969

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