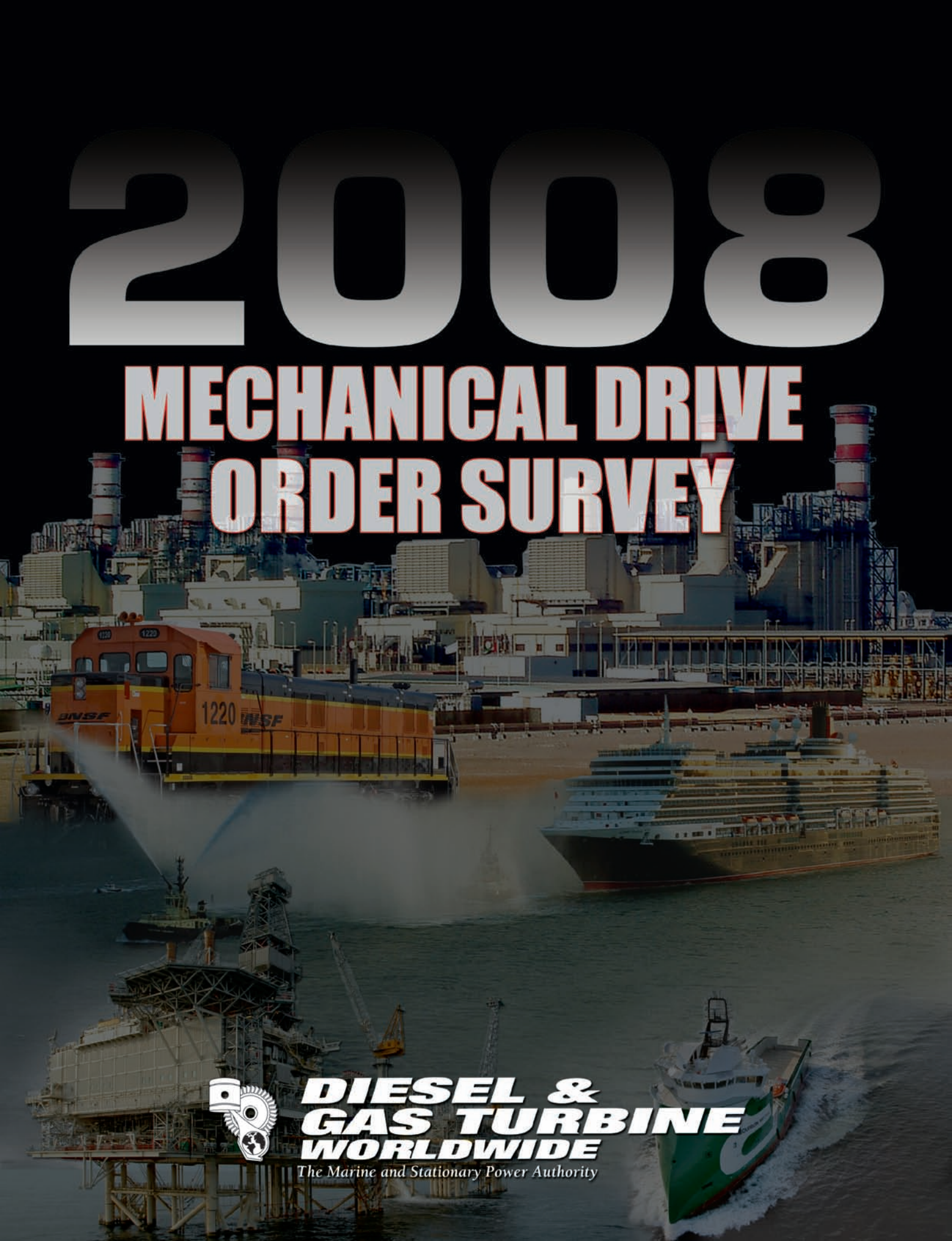
2008

MECHANICAL DRIVE ORDER SURVEY



DIESEL & GAS TURBINE WORLDWIDE

The Marine and Stationary Power Authority

BY SHEILA GAILLORETO

MECHANICAL DRIVE RECIPROCATING ENGINE ORDERS, June 2007 – May 2008

Output Range (MW)	Units Ordered	Total Engine Output (MW)	Speed Range (r/min)			Fuel		Western Europe	Eastern Europe & Russia	Middle East	Far East	Southeast Asia/ Australia	Central Asia	North Africa	Central, W., E., & S. Africa	North America	Central America & Caribbean	South America
			300 to 600	720 to 1000	Above 1000	Liquid Fuel	Natural Gas											
.50 to 1.00	3994	2570	1	26	3967	3634	360	753	10	37	299	118	13	1	11	2733	2	17
1.01 to 2.00	2694	3481	0	188	2506	1335	1359	177	30	6	238	48	19	12	32	2092	0	40
2.01 to 3.50	154	378	0	94	60	83	71	17	2	0	22	9	0	18	0	77	0	9
3.51 to 5.00	5	20	0	5	0	0	5	0	5	0	0	0	0	0	0	0	0	0
5.01 to 7.50	4	22	0	4	0	4	0	0	0	0	0	0	0	0	0	4	0	0
7.51 and above	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	6851	6471	1	317	6533	5056	1795	947	47	43	559	175	32	31	43	4906	2	66

MECHANICAL DRIVE RECIPROCATING ENGINE ORDERS, June 2006 – May 2007

Output Range (MW)	Units Ordered	Total Engine Output (MW)	Speed Range (r/min)			Fuel		Western Europe	Eastern Europe & Russia	Middle East	Far East	Southeast Asia/ Australia	Central Asia	North Africa	Central, W., E., & S. Africa	North America	Central America & Caribbean	South America
			300 to 600	720 to 1000	Above 1000	Liquid Fuel	Natural Gas											
.50 to 1.00	2809	1908	7	1	2801	2286	523	418	5	13	141	65	11	0	0	2115	28	13
1.01 to 2.00	3322	4386	0	33	3289	1994	1328	163	62	2	192	45	23	18	25	2733	8	51
2.01 to 3.50	199	514	0	54	145	122	77	25	10	10	20	24	12	0	0	81	0	17
3.51 to 5.00	41	171	0	41	0	41	0	15	0	2	4	18	0	0	0	0	0	2
5.01 to 7.50	14	84	0	14	0	14	0	6	0	0	8	0	0	0	0	0	0	0
7.51 and above	4	32	0	4	0	4	0	2	0	0	2	0	0	0	0	0	0	0
Totals	6389	7095	7	147	6235	4461	1928	629	77	27	367	152	46	18	25	4929	36	83

New Record Drives 3rd Annual Survey

We are pleased to bring you the 3rd annual Mechanical Drive Order Survey, an exclusive to *Diesel & Gas Turbine Worldwide*. This is a continuation of our other survey efforts, including the 32nd Power Generation Order Survey and the annual Marine Propulsion Order Surveys, published in our October and November issues, respectively.

The Mechanical Drive engine order reporting follows the identical format to the power and marine surveys with regard to the timeframe surveyed — orders received during the period covering June 2007 through May 2008. The survey also follows a similar format to other order surveys, providing detail on fuel type, speed and geographic breakdown. A list of survey participants is provided at the end of the data summary.

This survey, combined with the comprehensive surveys of the power generation and marine propulsion industries, represents another record-breaking total of 198 155 MW of reciprocating and gas turbine engines ordered during the 12-month timeframe referenced above. The total number of above-500 kW power generation, marine and mechanical drive units ordered and reported for the 2008 surveys is 16% higher than last year's record-breaking total — a whopping 67 600 units.

The Mechanical Drive Order Survey offers a glimpse into the robust market of larger engines intended for use in mechanical drive installations. As in the past, we have noted that while a large subset of these engines is utilized for what we might consider "traditional" mechanical drive applications, specifically pumps and compressors, it is also true that many of the engines reported will see service in industrial applications, such as off-highway equipment and oil exploration activity.

Reciprocating Engines

A total of 6851 engines above 500 kW were reported this year for a total output of 6471 MW. This represents an increase of 7% in unit orders with a 9% decrease in overall output, dropping to 6471 MW vs. 7095 MW in last year's survey. The drop in power output is driven by an increase of 42% in the 0.50 to 1.0 MW range and a decrease in all other power segments. Engine orders into the 1.01 to 2.00 MW range decreased from 3322 to 2694 units, or 19%, and orders into the 2.01 to 3.50 MW range decreased from 199 to 154 units, a decrease of 23%. For all reciprocating engines, the average power per unit is 940 kW, comparable to the 2006 average of 950 kW. In 2007, the average power per unit increased to 1.11 MW.

As discussed later in the conclusion portion of this summary, overall global demand for natural gas is on the rise. Also, as the world's population increases,

MECHANICAL DRIVE GAS TURBINE ORDERS, June 2007 – May 2008

Output Range (MW)	Units Ordered	Total Engine Output (MW)	Fuel		Western Europe	Eastern Europe & Russia	Middle East	Far East	Southeast Asia/ Australia	Central Asia	North Africa	Central, W., E., & S. Africa	North America	Central America & Caribbean	South America
			Liquid Fuel	Natural Gas											
1.00 to 2.00	3	3	3	0	0	0	0	3	0	0	0	0	0	0	0
2.01 to 3.50	2	6	2	0	0	0	0	2	0	0	0	0	0	0	0
3.51 to 5.00	2	10	0	2	0	0	0	0	0	0	2	0	0	0	0
5.01 to 7.50	12	71	0	12	0	8	0	0	0	0	4	0	0	0	0
7.51 to 10.00	18	155	3	15	0	6	1	3	1	4	3	0	0	0	0
10.01 to 15.00	34	424	4	30	0	11	6	0	0	6	2	2	0	4	3
15.01 to 20.00	26	423	0	26	0	25	1	0	0	0	0	0	0	0	0
20.01 to 30.00	132	3288	0	132	2	25	95	2	5	0	1	2	0	0	0
30.01 to 60.00	23	816	0	23	2	2	7	2	4	0	5	0	1	0	0
60.01 to 120.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120.01 to 180.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180.01 and above	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	252	5196	12	240	4	77	110	12	10	10	17	4	1	4	3

MECHANICAL DRIVE GAS TURBINE ORDERS, June 2006 – May 2007

Output Range (MW)	Units Ordered	Total Engine Output (MW)	Fuel		Western Europe	Eastern Europe & Russia	Middle East	Far East	Southeast Asia/ Australia	Central Asia	North Africa	Central, W., E., & S. Africa	North America	Central America & Caribbean	South America
			Liquid Fuel	Natural Gas											
1.00 to 2.00	5	7	5	0	0	0	0	5	0	0	0	0	0	0	0
2.01 to 3.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.51 to 5.00	3	14	0	3	3	0	0	0	0	0	0	0	0	0	0
5.01 to 7.50	19	142	0	19	0	2	0	0	0	0	0	0	0	0	17
7.51 to 10.00	6	53	0	6	0	6	0	0	0	0	0	0	0	0	0
10.01 to 15.00	21	225	0	21	3	11	3	0	0	4	0	0	0	0	0
15.01 to 20.00	54	868	0	54	0	44	8	2	0	0	0	0	0	0	0
20.01 to 30.00	58	1478	0	58	8	16	2	0	11	0	17	3	0	0	1
30.01 to 60.00	47	1527	0	47	1	0	8	0	3	27	5	2	1	0	0
60.01 to 120.00	4	347	0	4	0	0	0	0	2	0	0	2	0	0	0
120.01 to 180.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180.01 and above	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	217	4661	5	212	15	79	21	7	16	31	22	7	1	0	18

global water problems are starting to attract attention — from the basic supply of clean water to building functional water infrastructure systems. In fact, comparisons have been made suggesting water, once a cheap and abundant resource, could be this century's oil. A shift in the reciprocating mechanical drive numbers is not indicative of a fundamental change in market conditions, but merely a shift in the mix of mechanical drive applications. Mechanical drive power is essential for the applications related to the production and processing and movement of our natural resources — from CH_4 to H_2O. The 7% increase in units shipped for the 2008 survey period is on top of a 13% increase in units from 2006 to 2007, which undoubtedly speaks to a strong mechanical drive market for reciprocating engines.

Engine speed data remained comparable to the previous year, with 95% of the engines falling in the above-1000 r/min category compared to 98% in 2007.

Twenty-six percent, or 1795, of the 6851 units shipped were reported as gaseous fueled. Natural gas engines represented 30% and 35% of the total units in 2007 and 2006, respectively. The gas engines have implications for natural gas production and transmission applications, while liquid fuel engines more typically see industrial applications, such as large rock crushers, tub grinders, oil fracture rigs and other applications where the engine drives a transmission or hydraulic pump drive for mechanical power output.

From a geographic perspective, North America dominated order activity with 4906 units, representing 72% of the total ordered units. Since this is an order activity report, it should be recognized that the engines may be put in service or shipped to a final destination that could be different than the originally reported region.

Gas Turbines

At 252 units, the total number of mechanical drive gas turbines reported increased 16% for this survey period. The total output for these gas turbines was 5196 MW, which is up 11% and reflects a large increase in the 20.01 to 30.00 MW output range, with 132 units reported this year compared to 58 units last year. Other notable increases were reported in the 7.51 to 10.00 MW and 10.01 to 15.00 MW ranges, with additional units of 12 and 13 respectively. Although the 2008 survey shows a net increase in turbine units ordered over both last year and the inaugural survey year of 2006, the 15.01 to 20.00 MW and 30.01 to 60.00 MW output ranges both showed year

Diesel, Dual-Fuel and Gas Engine Manufacturers Participating and Reporting Orders in this Mechanical Drive Survey

- Caterpillar Engine Division
- Cummins Engine
- Daihatsu Diesel Mfg.
- Dresser Waukesha
- Electro-Motive Diesel
- MTU Friedrichshafen (including Detroit Diesel)
- Wärtsilä

Gas Turbine Manufacturers Participating and Reporting Orders in this Mechanical Drive Survey

- Aviadvigatel
- GE Oil & Gas
- MAN Turbo
- Motor Sich
- Niigata Power Systems
- NPO Saturn
- Power Machines
- Rolls-Royce Energy
- Siemens PG (Industrial Applications)
- Vericor Power Systems
- Zorya-Mashproekt

over year unit order decreases of 28 and 24 units respectively. In 2008, the average output per unit is 20.62 MW compared to 21.48 MW in 2007 and 24.28 MW in 2006.

Fuel type for the gas turbine orders reported is overwhelmingly natural gas, which makes it fairly easy to draw the conclusion that the majority of the mechanical drive machines are seeing service in the natural gas industry.

From a geographic standpoint, most of the machines reported are going into areas that continue to develop gas as a natural resource. The Middle East region, with natural gas-rich countries like Qatar and Iran, represented 44% of the geographic split. Eastern Europe and Russia came in second, with 31% of the units ordered for this region. The survey data reported this year indicates a decrease in Central Asia and North Africa, which have typically represented 10 to 15% of the total units ordered.

Conclusions

With our survey timeframe running June through May and in a world where clearly, timing is everything, the results of the Mechanical Drive survey reveal similar results to that of the power generation and marine propulsion surveys — very strong order activity that would naturally translate to lucrative times for the engine manufacturers. But with a second quarter peak in the United States GDP followed by an unprecedented turn of events in the financial markets late in the third quarter, it begs the question as to what is around the corner. Although uses for reciprocating engines in mechanical drive applications are more varied, gas turbine numbers speak to strong activity in the gas production and transmission sectors — including LNG production. So whether it's EIA or IEA or your favorite energy analyst, worldwide natural gas consumption is projected to increase — some projections show consumption increasing as much as 52% by 2030. Although oil prices have softened lately, most forecasts don't have them staying low long-term, which will put persistent pressure on natural gas. Emissions will also continue to drive increased use of natural gas since it produces less carbon dioxide when burned, than either coal or petroleum.

An earlier reference was made to the number of natural gas reciprocating engine orders for North America — while some units may not, in fact, stay in North America, any recent read of *CompressorTechTwo*, our sister publication, plainly indicates that a good portion of these mechanical drive units do remain in North America and have played a key role in contributing to recent increases in domestic production.

EIA's most recent Short Term Energy Outlook (STEO) shows U.S. production numbers in the lower 48 states are projected to increase 6.7% in 2008 and 4.2% in 2009. This is primarily driven by improved drilling technologies that now allow for economic production of resources in the ever-growing unconventional gas plays such as the Marcellus Shale in the Appalachian region of the country and the Haynesville Shale play in the state of Arkansas, which could prove to be the largest gas field in the U.S. and possibly the fourth largest globally.

We will have to wait and see how the 4th annual Mechanical Drive Survey will look this time next year. As of this writing, U.S. gas rig counts are approximately 100 units higher than the same period last year — and the Oct. 31 Baker Hughes rotary rig counts showed a one-week increase of 23 rigs drilling for gas in the U.S. While there may be some near-term volatility or weakness due to ample supply from increased production, long-term fundamentals are very strong globally for natural gas.

Clean, ample and available water supplies and infrastructure are an absolute necessity to keep nations healthy and economies growing. Engines and turbines — driving the compressors, the pumps, the rigs — will continue to play a vital role in these industries and for these applications.

I would like to extend a sincere thank you from the staff at *Diesel & Gas Turbine Worldwide* to the manufacturers that participate in this survey and all the surveys. The intent of all of our surveys is to provide the most accurate and useful data possible. We look forward to offering these annual surveys as a service to our readers, but also realize that they would not be possible without the cooperation and participation of the manufacturers.

Electronic surveys are available on our website at: www.dieselgasturbine.com.