

# An Engine for Every Power Requirement

GE  
Marine

GE's marine engines are compact, high-performance aeroderivative gas turbine power plants.

Each, from the small LM500 to the LM6000, is a simple-cycle gas turbine derived from our highly reliable aircraft engines. In a wide range of applications, both on land and on the sea, LM engines have provided years of trouble-free operation with unsurpassed fuel efficiency.

With power levels from 6,000 to 57,330 shaft-horsepower, GE's LM gas turbines are excellent power producers for a wide variety of ship applications. In addition, LM gas turbines are in use at more than 1,000 industrial sites generating electricity in simple cycle, combined cycle and cogeneration applications, and as mechanical drives for pipeline pumping, gas compression and offshore platform needs.

In marine applications, the LM2500, LM2500+ and LM2500+G4 gas turbines are available as a base-mounted model or as a complete, packaged, shock-mounted propulsion system ready for shipboard use.

Built incorporating the latest design technologies and corrosion resistant materials, each LM engine provides maximum reliability and parts life along with outstanding performance.

The LM500, LM1600, LM2500 and the LM2500+ have gained shipboard propulsion experience. Our updated version of the LM2500+, the LM2500+G4, has been selected to power French and Italian frigates as a part of the Frigate European Multi-Mission (FREMM). Our largest engine, the LM6000, with its more than 57,330 horsepower output is unique among aeroderivative gas turbines in that it does not require a separate aerodynamically coupled power turbine; therefore it has many fewer parts. The LM6000 can be either a "cold end" or "hot end" driver, which allows added flexibility when designing the ship's propulsion system.

LM gas turbines are environmentally friendly. Emissions are inherently low and can be reduced even further in a variety of ways including water or steam injection or the addition of GE's industry leading Dry Low Emissions combustion system.

Combining high power-to-weight ratios, compact designs and ease of operation and maintenance, GE's LM gas turbines are ideally suited to meet your ship propulsion demands.

## LM Marine Milestones

1959	LM1500	Selected for H.S. Denison Hydrofoil
1966	LM1500	First of seventeen U.S. Navy Patrol Gunboats
1969	LM2500	Selected for GTS Callaghan Cargo Ship
1974	LM2500	Selected for Italian Navy's High Speed Frigates
1975	LM2500	U.S. Navy Spruance Class Destroyer
1977	LM2500	U.S. Navy Pegasus Class Patrol Hydrofoil Missile Ship
1978	LM2500	Royal Danish Navy KV72 Corvette
1980	LM2500	U.S. Navy Kidd Class Destroyer
1982	LM2500	U.S. Navy Ticonderoga Class Cruiser
1987	LM500	Royal Danish Navy Fast Patrol Boat
1987	LM2500	100th LM2500-powered U.S. Navy ship (Christening of "Leyte Gulf" Cruiser)
1988	LM1600	Selected for High Speed Yacht
1991	LM500	First Commercial Marine Application-Far East Hydrofoil, Foilcat
1991	LM2500	U.S. Navy Arleigh Burke Class Destroyer
1991	LM2500	U.S. Navy AOE-6 Auxiliary Ship
1992	LM1600	Destriero Sets New Transatlantic Speed Record
1992	LM2500	Selected for Fast Ferry Boat, Aquastrada
1993	LM2500	Selected for Sealift Ships
1993	2xLM2500 & 2xLM1600	Selected to Power World's Largest High Speed Ferry, Stena HSS
1994	LM1600	Selected to Power the High Speed Ferry, Seajet 250
1995	LM2500	Selected to Power the Tirrenia MDV 3000 Fast Ferry
1995	LM2500	Selected for Thailand Navy Helicopter Carrier
1997	LM2500	Selected for Spanish Navy F100 Frigate
1997	LM2500	Selected for German Navy F124 Frigate
1998	LM2500+	Selected for RCCL & Celebrity Cruise Liner
1998	LM2500	Selected for Austal 98m Catamaran
1998	LM2500+	Selected for SNCM Corsaire 13000 Fast Ferry
1999	LM2500	Selected for South African Corvette (WARP)
1999	LM2500+	Selected for NEL Corsaire 14000 Fast Ferry
2000	LM2500+	First Gas Turbine Cruise Ship, Celebrity's Millennium, Entered Service
2002	LM2500+	Selected to Power U.S. Navy's LHD 8 Amphibious Assault Ship
2003	LM2500	Selected for National Security Cutter, U.S. Coast Guard
2004	LM2500+	World's Largest Cruise Liner Enters Service, Queen Mary 2
2005	LM2500+	Selected for U.S. Navy's LCS, Littoral Combat Ship
2005	LM500	Selected to power Korean patrol Vessels (PKX)
2006	LM2500+G4	Selected to power Italian and French Navy Frigates (FREMM)

## Marine Task Force



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imagination at work

GE's family of efficient and reliable aeroderivative gas turbines... the right choice for every marine application.

GE's marine engines have vast experience powering nearly 500 military surface combatants, aircraft carriers, patrol boats, fast ferries, and cruise ships. These engines are superior for marine propulsion due to their compact size, high power-to-weight ratio, high efficiency, outstanding reliability and availability, environmental compatibility with the regulations in ports and on the high seas, and lower operation and maintenance requirements. And these are not just boasts, they have been proven on the sea—where it counts.

These same aeroderivative gas turbines have over 68,000,000 hours operating on land and offshore platforms worldwide. They are in power generation, pipeline and platform service in every type of environment. This experience adds to the confidence of their performance as marine engines.

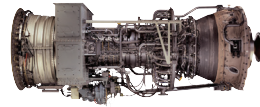
GE's marine engines can also be provided with electric generators. These turbine-generator sets are ideal for integrated ship service and electric propulsion systems.

### Propulsion System Flexibility

GE's marine engines have been used to propel military ships from 230 tons to 62,400 tons full load displacement for 85 ship programs around the world. In addition, they propel many commercial vessels. To accomplish this large range of missions, GE's marine engines are applied in a wide variety of propulsion system arrangements such as CODOG – Combined Diesel or Gas Turbine, CODAG – Combined Diesel and Gas Turbine, COGAG – Combined Gas Turbine and Gas Turbine, COGOG – Combined Gas Turbine or Gas Turbine, and many more. One of the arrangements that is very important for some commercial vessels is the COGES system, which is a Combined Gas Turbine Electric System that provides for electric ship propulsion and for the vessel's ship service loads. System flexibility is an important plus for LM gas turbine-based marine propulsion.

## Marine Engine Performance Characteristics – Liquid Fuel

### LM6000



Weight (lb/kg)	18,010/8,169
Length (ft/m)	24/7.3
Height (ft/m)	8.3/2.5

<b>Output</b>	
(shp)	57,330
(kW)	42,750

<b>SFC</b>	
(lb/shp-hr)	0.329

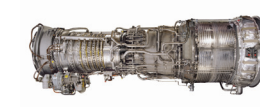
<b>Heat Rate</b>	
(Btu/shp-hr)	6,060
(Btu/kWs-hr)	8,125
(kJ/kWs-hr)	8,570

<b>Exhaust Gas Flow</b>	
(lb/sec)	273

<b>Exhaust Gas Temperature</b>	
(°F)	853

<b>Power Turbine Speed</b>	
(rpm)	3,600

### LM2500+G4



<b>6-Stage PT</b>	
Weight (lb/kg)	11,545/5,237
Length (ft/m)	22/6.7
Height (ft/m)	6.7/2.04

<b>Output</b>	
(shp)	47,370
(kW)	35,320

<b>SFC</b>	
(lb/shp-hr)	0.352

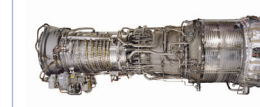
<b>Heat Rate</b>	
(Btu/shp-hr)	6,469
(Btu/kWs-hr)	8,675
(kJ/kWs-hr)	9,150

<b>Exhaust Gas Flow</b>	
(lb/sec)	205

<b>Exhaust Gas Temperature</b>	
(°F)	1,020

<b>Power Turbine Speed</b>	
(rpm)	3,600

### LM2500+



<b>6-Stage PT</b>	
Weight (lb/kg)	11,545/5,237
Length (ft/m)	22/6.7
Height (ft/m)	6.7/2.04

<b>Output</b>	
(shp)	40,500
(kW)	30,200

<b>SFC</b>	
(lb/shp-hr)	0.354

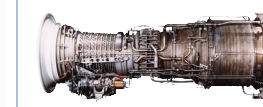
<b>Heat Rate</b>	
(Btu/shp-hr)	6,522
(Btu/kWs-hr)	8,746
(kJ/kWs-hr)	9,227

<b>Exhaust Gas Flow</b>	
(lb/sec)	189

<b>Exhaust Gas Temperature</b>	
(°F)	965

<b>Power Turbine Speed</b>	
(rpm)	3,600

### LM2500



Weight (lb/kg)	10,300/4,672
Length (ft/m)	21.4/6.52
Height (ft/m)	6.7/2.04

<b>Output</b>	
(shp)	33,600
(kW)	25,060

<b>SFC</b>	
(lb/shp-hr)	0.373

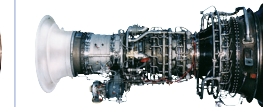
<b>Heat Rate</b>	
(Btu/shp-hr)	6,860
(Btu/kWs-hr)	9,200
(kJ/kWs-hr)	9,705

<b>Exhaust Gas Flow</b>	
(lb/sec)	155

<b>Exhaust Gas Temperature</b>	
(°F)	1,051

<b>Power Turbine Speed</b>	
(rpm)	3,600

### LM1600



Weight (lb/kg)	8,200/3,720
Length (ft/m)	13.84/4.22
Height (ft/m)	6.67/2.03

<b>Output</b>	
(shp)	20,000
(kW)	14,920

<b>SFC</b>	
(lb/shp-hr)	0.376

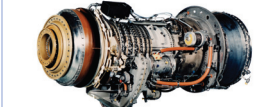
<b>Heat Rate</b>	
(Btu/shp-hr)	6,928
(Btu/kWs-hr)	9,290
(kJ/kWs-hr)	9,801

<b>Exhaust Gas Flow</b>	
(lb/sec)	104

<b>Exhaust Gas Temperature</b>	
(°F)	950

<b>Power Turbine Speed</b>	
(rpm)	7,000

### LM500



Weight (lb/kg)	1,990/903
Length (ft/m)	9.7/2.96
Height (ft/m)	3.0/0.91

<b>Output</b>	
(shp)	6,000
(kW)	4,470

<b>SFC</b>	
(lb/shp-hr)	0.443

<b>Heat Rate</b>	
(Btu/shp-hr)	8,140
(Btu/kWs-hr)	10,916
(kJ/kWs-hr)	11,520

<b>Exhaust Gas Flow</b>	
(lb/sec)	36

<b>Exhaust Gas Temperature</b>	
(°F)	1,049

<b>Power Turbine Speed</b>	
(rpm)	7,000

Average performance, 60Hz, 59°F, sea level, 60% relative humidity, no inlet/exhaust losses.

PT=Power Turbine

### World's Most Experienced Marine Engines

- 66 military ship programs worldwide
- 30 navies
- 1,400+ marine engines
- Over 90 engines on commercial vessels
- 17 cruise ships
- 8 sealift ships
- 3 yachts
- 18 fast ferries
- Over 11,500,000 marine operating hours
- Reliability in excess of 99%

