

# FACTS ABOUT THE ENGINE ROOM

CELEBRITY CONSTELLATION

Celebrity **X** Cruises®

## FACTS ABOUT THE ENGINE ROOM

The Engine Room is situated on Tank Top Deck and runs almost the full length of the ship.

Celebrity Constellation is a twin screw vessel powered by a GOGES type (combined gas turbine, Diesel engine and steam turbine electric) plant. One Wärtsilä Diesel engine was installed in May, 2007 for more economical consumption. The waste heat of the gas turbine's exhaust gases is utilized to produce steam, which is then used in the steam turbine. The gas turbines are of a simple cycle, two shaft engine type, consisting of a gas generator and a power turbine with a shaft transmitting power by a flexible coupling extending through the gas turbine exhaust collector. The gas generator portion of the gas turbine consists of a variable geometry axial compressor, an annular combustor, a high power turbine and an accessory drive and control plus accessories. The power turbine is aerodynamically coupled to the gas generator and is driven by the gas generator's exhaust gases.

The characteristics of the above gas turbine engines are:

**Type:** GE LM 2500 PLUS

**Maximum continuous electrical power:** 25 MW or 33,525 HP

**Power turbine maximal RPM:** 3600 RPM

The steam plant consists of a seven stage Ficantieri back pressure steam turbine, which is coupled through a gear box to a generator. Two heat recovery steam generators (HRSG) are installed in the exhaust ducts of each of the gas turbines. The steam which is produced from the HRSG is used for the steam turbine or for heating of accommodation, heating in galley and laundry, fresh water production and sanitary water heating.

The characteristics of the Diesel engine are: **Type:** Wärtsilä 16V38

**Maximum continuous electrical power:** 11.6 MW or 15.770 HP, at 600 RPM

The characteristics of the Steam Turbine

**Steam turbine type:** Ficantieri 7 stage back pressure turbine.

Normal steam inlet condition 32.5 BAR (471 PSI) at 410° C (770°

F). Gear box ratio: S/T 8000 RPM to 1800 RPM generator.

**Generator type:** Brush 9.5 MW (12,739 HP)

**Heat Recovery Steam Generator:** Deltac forced circulation single pressure hot casing type exhaust gas boiler.

The electrical power which is produced by the gas turbines the Diesel Engine and the steam turbine, synchronous generators feed the high voltage (11'000 Volt) bus and further two electric propul-

sion drivers and two pod units. The speed of the propulsion is adjustable within its speed range. The pods ("Mermaid") are turned by the steering gear hydraulic motors unlimited number of 360 degrees. Together with the three bow thrusters provide Constellation with ultimate maneuverability sideways docking without the assistance of tugboats.

The total electric power of the Celebrity Constellation of 71 (95.212 HP) is enough to supply electricity to a town with than 40.000 inhabitants. The ship is equipped with Simplex compact fin stabilizers, which counteract the effects of wave and providing a smooth ride under all conditions.

The Celebrity Constellation carries 2500 m<sup>3</sup> (660.430 gallons) marine gas oil and 720 m<sup>3</sup> of Heavy Fuel (190.732 gallons), which is enough for a 12 day voyage at maximum speed.

The drinking water of the Constellation is produced by two evaporators of flash type Serk Como [700 m<sup>3</sup> (184.920 gallons) per day] and one reverse osmosis [400 m<sup>3</sup> (106.000 gallons) per day]. The average consumption of potable water is about 250 liter (66 gallons) per person per day. The air condition plant consists of four large units of 1060 KW each, using environmentally friendly refrigerant type 410A.

## COMMONLY ASKED QUESTIONS

Q.What is the total power output of the Celebrity Constellation?

A.71 MW or equivalent to the power output of 900 medium size family cars.

Q.What is the Marine gas oil consumption?

A.At the service speed of 23.65 knots consumption is 240 mt per day, equal to 63.401 gallons.

Q.What is the diesel consumption?

A.At the full load the consumption is 45,6 mt per day, equal to 12.046 gallons

If the required speed is above 20 knots, ship runs with two Diesel Turbine engines but if it is below 20 knots we run with one Diesel Turbine and one Diesel engine.

Q.What is the diameter of the propeller?

A.Each of the 4 blade propellers are of a fixed pitch type and are 5.75m (18.8 ft.) in diameter and weigh 17.5 tons.

Q.At what speed do the gas turbines run?

A.The gas turbine is comprised of two shafts. The gas generator shaft with the high pressure turbine runs with a maximum speed of 10,100 rpm and the power turbine shaft which is connected with the generator runs with a constant speed of 3600 rpm.

Q.What is the range when all fuel tanks are full?

A.At service speed the Celebrity Constellation carries enough fuel for 14 days of continuous sailing, but more economical at the slower speeds.

Q.How many personnel are there in the Technical Department?

A.Engineers, Electronic, and Electrical Officers number 17. There are 35 additional technicians from mechanics and plumbers to air condition mechanics.

Q.How many Engineers actually run the propulsion plant?

A.The installation was designed and certified by the Classification Society to be unmanned. However, one Second Engineer is always on duty in the engine control room, assisted by three technical staff on rotating shifts of 4 hours on and 8 hours off.

Q.When the vessel arrives in port does everything stop?

A.Most definitely not. This is the time when maintenance and checks can be performed. There is always one Diesel engine running in port to keep lights, air conditioning, and galley's functioning.



Q.How do the stabilizers work?

A.The Simplex Complex fin stabilizers are controlled by a gyroscope which uses the effect of centrifugal inertia to maintain its position under any conditions. It controls a hydraulic pump that alters the angle of the fin which is shaped much like an airplane wing. The action of the water over the wing either provides "lift" or "dive" to counter the effects of bad weather.

Q.Are computers used in the machinery spaces?

A.Of course, very extensively. There is a very sophisticated alarm and monitoring system which alerts the duty engineer to any function which is outside of the established parameters.

Q.Why do engineer Officers wear gold stripes with purple?

A.Engineers wear these colors in recognition of their British colleagues on board the Titanic. When it sank, all engineers went down with the ship.

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