This compact and efficient “once through” design enables the preheating, evaporation and superheating circuits to occur in one unit, unlike other boiler systems which require separate steam drums, water and blow-down systems.

The spent steam falls through a Condenser where cooling water cools the steam back into water, this feedwater is then returned to the Steam Generator and once more turned into steam.

The spent exhaust gas, now much reduced in temperature passes through a silencer before discharge to the atmosphere via the main stack. Burning gas as a fuel source results in negligible levels of emission.

The Steam Turbine Generator
Manufactured by MAN Turbomaschinen AG, the steam turbine generator comprises of two combined assemblies operating at high and low pressures. Superheated steam produced in the “Once Through Steam Generator” (OTSG) is piped at high velocity to the turbines and strikes rows of blades causing the shaft to rotate (4818 rpm). This drive shaft is connected via a gearbox to the electrical generator adding a further 23MW to the overall power station output.

The Once Through Steam Generator
Manufactured by Innovative Steam Technologies the Once Through Steam Generator (Boiler) consists of rows of tubing arranged horizontally within the boiler outer casing. Pure water pumped down through these tubes is heated by the hot exhaust gas ducted from the Gas Turbine, the heat transfer is increased by “finning” attached to the tubes. The resulting superheated steam is piped to the Steam Turbine at low and high pressures.

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or email pam.cryer@manxutilities.im
Each gas turbine can produce 32MW and the steam turbine 23MW giving a gross output of 87MW. The station consumes 3MW of power.

The cooling water is circulated through the pressure sufficiently for the feedwater to be returned to the steam generator and once more be turned into steam.

The spent steam falls through a generator tubes and converts it into superheated steam. The steam is then piped to the steam turbine.

The now cooler exhaust gases then pass to the compressor and then the low pressure turbine that drives and electrical generator.

The power station utilises 'Combined Cycle Gas Turbine' technology based on aero-derivative GAS TURBINES. Air is drawn into the turbine compressor and compressed to 22 bar. The air then passes to the combustion chamber where it mixes with the natural gas or oil fuel and the mixture is ignited. The resulting hot combustion gas rotates firstly the high pressure turbine that drives the compressor and then the low pressure turbine that drives and electrical generator.

The now cooler exhaust gases then pass to the ONCE-THROUGH-STEAM-GENERATOR. The energy in the exhaust gas from the gas turbine is not wasted, but heats up water inside the steam generator tubes and converts it into superheated steam. The steam is then piped to the STEAM TURBO-GENERATOR SET, which produces further electrical power.

The spent steam falls through a CONDENSER where cooling water cools the steam back into water. This condensate is extracted from the condenser and pumped to the feed-pumps, which raise the pressure sufficiently for the feedwater to be returned to the steam generator and once more be turned into steam.

The cooling water is circulated through AIR-COoled-ExchangerS, which dissipate the energy from the condensed steam to the atmosphere.

Each gas turbine can produce 32MW and the steam turbine 23MW giving a gross output of 87MW. The station consumes 3MW of power for its own needs and hence the station net output is 84MW.

### Operating Parameters

<table>
<thead>
<tr>
<th>GAS TURBINE</th>
<th>Natural Gas/Light Oil</th>
<th>9754 kJ/kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel</td>
<td>Output</td>
<td>32 MW</td>
</tr>
<tr>
<td>Heat Rate</td>
<td>Power Turbine Speed</td>
<td>6100 rpm</td>
</tr>
<tr>
<td>RPM</td>
<td>Pressure ratio</td>
<td>57.1%</td>
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<tr>
<td>Air flow rate</td>
<td>Compressor Outlet Temp</td>
<td>66.4 bar</td>
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<tr>
<td>Turbine Inlet Temp</td>
<td>Exhaust Specific Heat</td>
<td>1.1526 kJ/Kg</td>
</tr>
<tr>
<td>Steam Inlet Temp</td>
<td>Generator Efficiency</td>
<td>98.24%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>STEAM TURBINE</th>
<th>Generator Output</th>
<th>25 MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP Stop Valve Pressure</td>
<td>56.8 bar</td>
<td></td>
</tr>
<tr>
<td>HP Stop Valve Temp</td>
<td>584 ºC</td>
<td></td>
</tr>
<tr>
<td>LP Stop Valve Pressure</td>
<td>5.8 bar</td>
<td></td>
</tr>
<tr>
<td>LP Stop Valve Temp</td>
<td>286 ºC</td>
<td></td>
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</tbody>
</table>

### Key to Annotations

1. Air inlet
2. Gas turbine
3. Gearbox
4. Generator
5. "Once through" steam generator (OTSG)
6. Ignition knife module
7. Load cell
8. Steam turbine
9. Gearbox
10. Generator
11. Condenser
12. Vacuum system
13. Lub oil module
14. Close circuit systems
15. Condenser heat exchanger (ACHE)
16. Cooling water pumps
17. GT enclosure vent exhaust duct and anti-icing
18. Air inlet
19. Silencers
20. Condensate storage tank
21. Steam vents
22. OTSG exhaust ducts
23. Condenser back feed
24. Radiators
25. Transformers
26. Water treatment plant room
27. CCGT equipment room
28. Control room
29. RIV break tank
30. Raw water/firewater tank
31. Distillate oil storage tanks
32. Firewater storage tanks
33. RW break tank
34. 415V substation
35. 33kV switch house