EES

Ensurge Energy Solutions

CASE STUDY

# EFFICIENCY IMPROVEMENT AND STEAM PATH DESIGN MODIFICATION

Ensurge Energy Solutions was approached by one of its customers to assist in efficiency improvement and Steam path design modification to suit their new process operating conditions.

Initial Turbine design & proposed new operating conditions

| Parameters | Initially Designed | Proposed Design |
|---|---|---|
| Inlet Pressure (Kg/cm²g) | 65.0 | 65.0 |
| Inlet Temperature (°C) | 505.0 | 500.0 |
| Inlet Flow (TPH) | 22.0 | 22.0 |
| Bleed Pressure (Kg/cm²g) | 7.0 | NA |
| Bleed Flow (TPH) | 3.0 | NA |
| Back Pressure (Kg/cm²g) | 3.5 | 2.2 |
| Exhaust Flow (TPH) | 19.0 | 22.0 |
| Power (KW) | 2500 | 2700 |
| Speed Ratio (Input / Output) | 7562/1500 | 7562/1500 |

Due to modification in the distillery plant, steam required at 3.5 Kg/cm2 g to distillery process was now reduced to 2.2 Kg/cm2 g.

Customer wanted to reap the benefit of lower process exhaust pressure as a result steam path component were designed and manufactured through reverse engineering process (Moving blade and Fixed blade) to suit new operating conditions thereby optimising the efficiency.

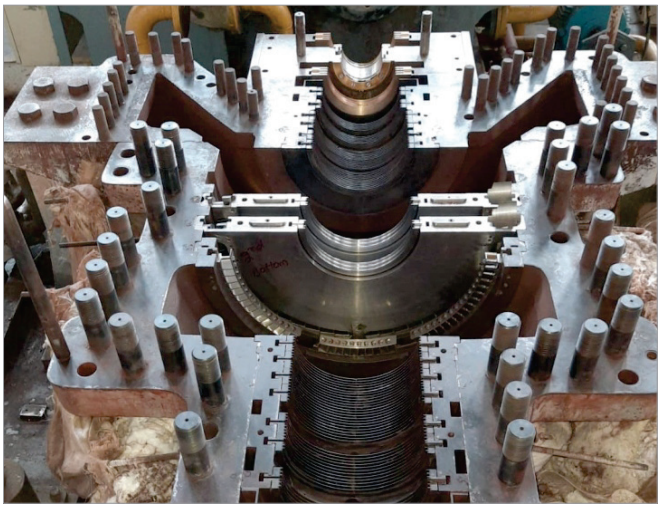
The major challenge for us was high volumetric flow at the back end of Turbine due to low exhaust pressure and higher mass flow rate which resulted in selection of higher blade heights. The rotor disc was carefully analysed with higher blade heightfor safety and strength of rotor disc and blade roots.

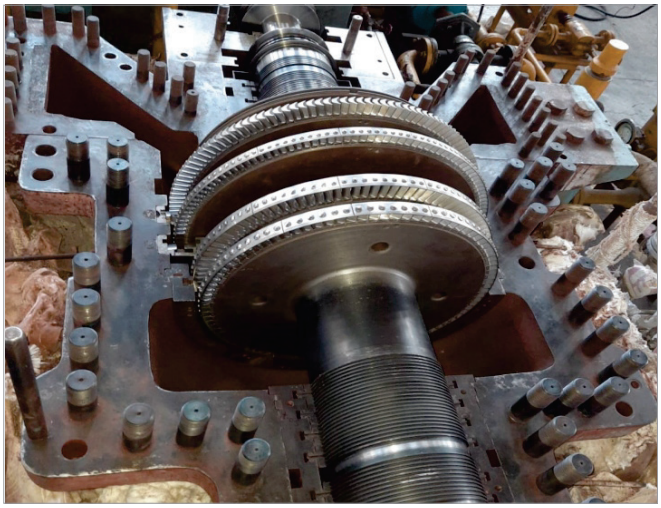
Diaphragms were designed through a detailed layout plan to provide sufficient area for proper steam flow with reduced losses.

Turbine rotor along with Steam top casing and Nozzle chest were received at our works. Existing blades on the rotor and nozzles in 1st stage nozzle chest were removed carefully through machining process without any damage to the main equipment.

1st Stage nozzles in the Nozzle chest, two rows of Curtis moving blades, one row of guide blade, 2nd and 3rd stage moving blades, 2nd and 3rd stage diaphragm assembly were replaced. Rotor was dynamically balanced as per ISO 1940 grade G2.5 after fitment of new blades.

Ensurge's vast experience in steam path design combined with strong supply chain network helped the customer to successfully run their distillery unit at a much improved Specific steam consumption.





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