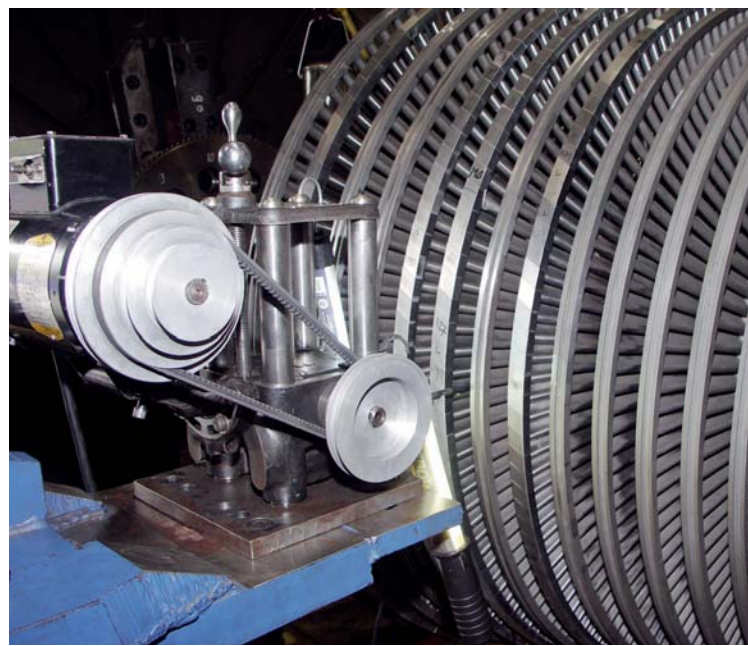




Welding process on the journal of the LP rotor.



Re-blading works on the HP rotor.

160 MW Steam Turbine Repair Project

Towards the end of 2007, Sulzer Hickham Indonesia was awarded a contract to recondition a 160 MW steam turbine generator set on an emergency basis from a state-owned electrical company located in Medan, North Sumatera. A lube oil failure had caused catastrophic damage to the journals, seals and blades.

The unplanned shutdown of the unit had caused a significant shortage of power in the region because two gas turbines were being repaired and overhauled at the same time. This serious condition meant that the customer needed to have the recondition completed on very tight schedule as well as expediting the repair and overhaul of the two gas turbine units.

The power plant has a total of 4 x 65 MW steam turbines and two gas-fired combined cycle trains in a 4 x 2 configuration, comprised of 4 x 130 MW gas turbines and 2 x 160 MW steam turbines, producing total of about 1100

MW at full capacity. Each 160 MW steam turbine unit consists of one unit high-pressure (HP) turbine, one unit low-pressure (LP) turbine driving one generator unit. The HP turbine rotor is of a barrel type rotor with 27 stages of rotor blades. The LP turbine rotor has a symmetrical double-flow design with 8 stages of rotor blades on each side. Both turbine rotors are connected in series directly driving the generator rotor.

The unit was reported as having lubrication failure during operation resulting in unit shutdown and causing significant damage to all of the rotors. Sulzer Hickham Indonesia was called in to help conduct a site inspection to examine the failure consequences, and the repair possibilities.

During the site inspection, serious damage was found on the last seven stages of rotating blades of the HP rotor, being 19th to 27th stages. The blades exhibited heavy damage as a result of radial rubbing, other damages on HP rotor including the seal strips.

Serious damage was also exhibited on the LP and generator rotor with severe rubbings and cracks on the LP rotor journal and generator coupling flange.

On the stationary components, it was found that the stator blades on 26th to 27th stage of HP unit were in a severely damaged condition, requiring blade replacement and total replacement of all seal strips.

For further and more comprehensive inspection, the rotors and stationary components with the exception of the HP turbine stationary components were then shipped to the workshop. The repairs of HP turbine stationary components, such as replacement of stator blades and seal strips to include final machining was to be performed on site since the construction would not permit the removal of the HP casing to the workshop within the required timeframe.

The workshop as-received run-out inspection on the LP rotor indicated

that the failure had also caused the turbine rotor to bow very badly.

Based on the complete inspection, Sulzer Hickham Indonesia made a

The replacement of the stator blade and stationary seal strips of the HP turbine and final machining were carried out on-site. For field in-situ machining,

The LP rotor was straightened and the journals brought back to original dimension and specification by SAW repair process. Due to the LP rotor size - it weighed almost 50 tons - it was necessary to manufacture some fixtures to set it up in vertical position for the stress relief process.



Re-winding works on the generator rotor.

proposal for repairs with the main scope being: blade replacement on seven last stage blade rows of the HP turbine rotor and blade replacement on the two last stage stator blades of HP turbine, straightening and weld

Sulzer Hickham Indonesia designed a portable line boring machine specifically for this application.

The design, fabrication and testing of the machine was completed in four

Using experience, good preparation and anticipation once again Sulzer Hickham Indonesia has succeeded in providing a fast turnaround solution demonstrating our commitment to customer satisfaction with all repairs being completed within the tight time-frame.

The steam turbine rotors have been delivered to site for installation and commissioning while the two gas turbines have been operated at full capacity to fulfill the demand for electricity in the region.



In-situ field machining of HP turbine stationary components.

repair of the LP rotor, total seal strip replacement and repairs on the generator rotor coupling flange and complete rewinding.

weeks. The machine was then delivered to the site and the HP turbine stationary components were successfully machined to target size.

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