

Rising to the challenge - Cross-country extensive restoration for steam turbine & generator

CUSTOMER

Energy major

LOCATION

Vietnam

INDUSTRY

Thermal power generation

KEY SERVICES

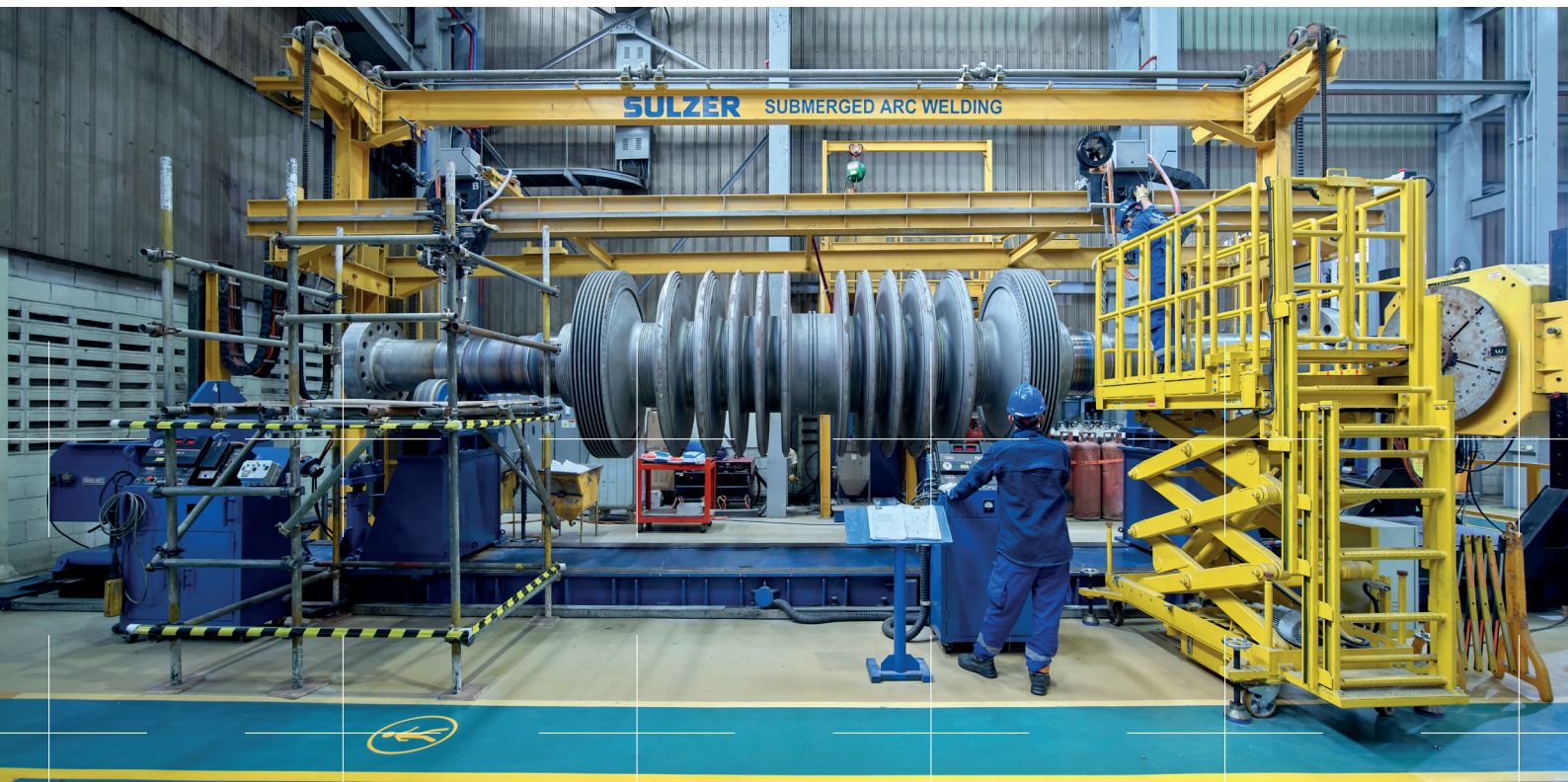
1. Rotor repair

2. Submerged Arc Welding

3. Reverse Engineering

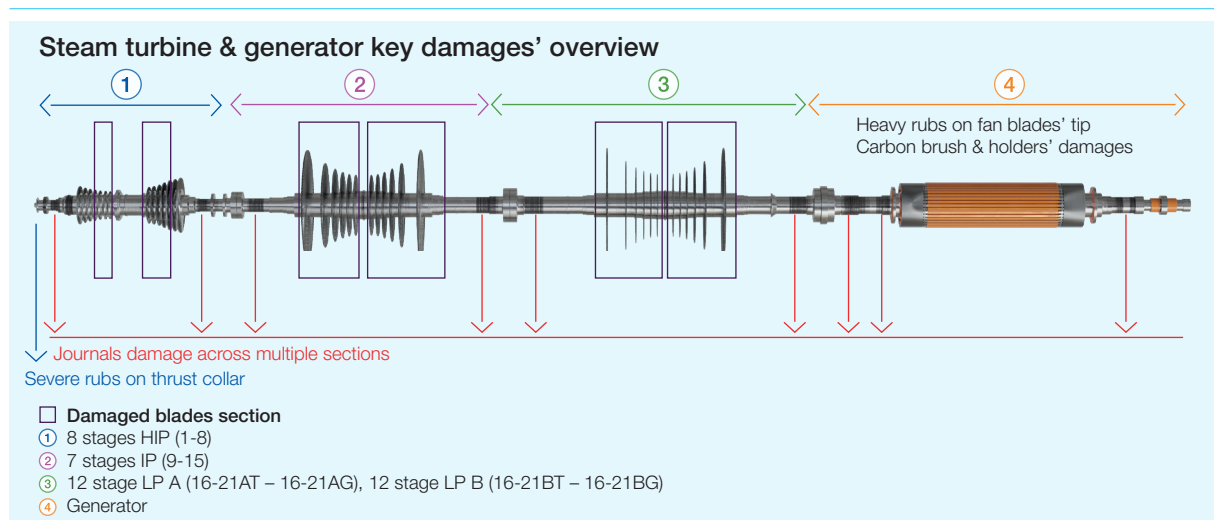
4. Parts production

5. Commissioning

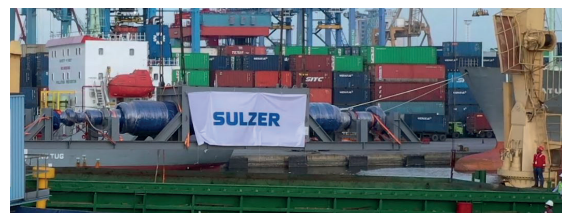


THE CHALLENGE

Failed turbine & generator sends costs skyrocketing and place stress on the grid



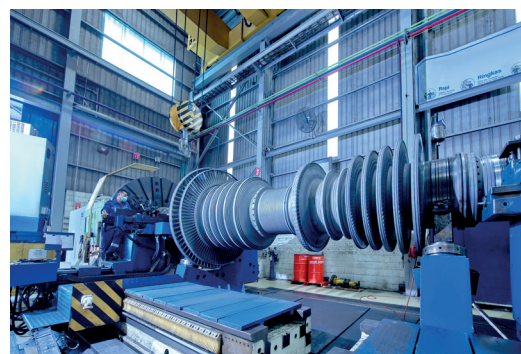
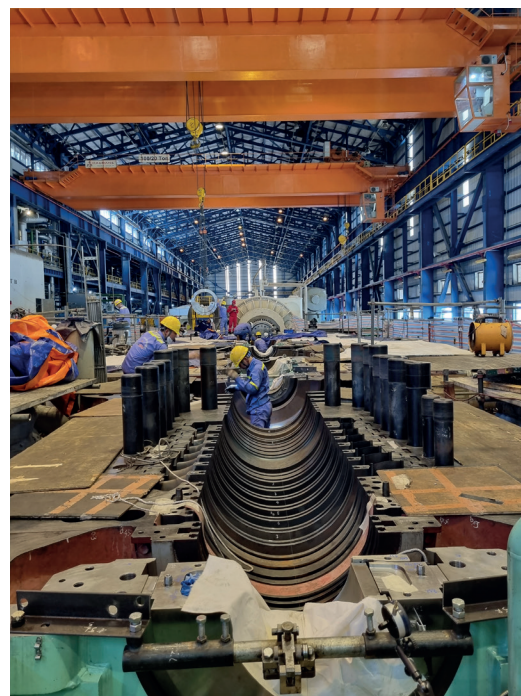
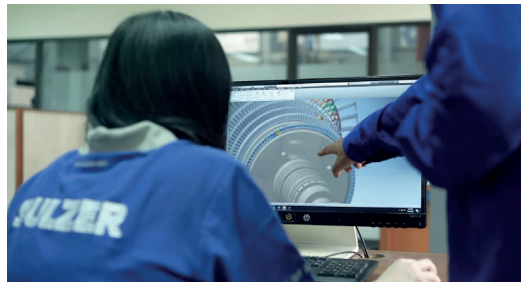
- Unit-1 steam turbine generator of a 1200 MW thermal power plant suffered an unexpected outage – with spectacular consequences
- The unit consists of an HIP, LPA, and an LPB turbine train that drives the generator.
- Most of the rotating steam path parts in the unit were damaged. The unit also suffered a loss of oil lubrication, that caused the unexpected outage.
- On further examination, damages were identified in the shaft area, specifically on the journals and seals. In addition, 31 of the 39 rows of turbine blades required extensive repair and replacement.
- The OEM reviewed the damage and advised that the energy supplier would need to replace all four of the turbine's rotors – an extremely expensive undertaking, in addition to completing extensive repairs on the shaft sections of all the rotors.
- Repairs and replacement lead time would take a year
- Once Sulzer's experts assessed the unit, we were able to deliver good news: Instead of replacing the turbine's rotors, the energy supplier could reduce costs and wastage by repairing the turbine generator – extending its lifecycle and saving the customer millions in the process.



THE SOLUTION

COVID-19 disruption: No match for Sulzer's expertise and flexibility

- Shipping the damaged equipment for repairs would always be complex, however, tight COVID restrictions and supply chain constraints made the challenge even greater.
- The energy supplier needed a partner who could work fast – and avoid the supply chain issues that threatened to slow down repairs and drive up losses even further.
- Knowing our expertise and track record in overhaul projects of this scale, and our ability to work to tight timelines, the energy supplier chose Sulzer to help them restore and fix the unit
- We stepped up to the challenge, coordinating a major logistical operation that would transport 218 tons of equipment more than 4,000km over land and sea.
- After thoroughly assessing the situation, we established that repairs were required for most of the rotating steam path parts and shaft sections of all rotors using the weld repair method.
- Submerged Arc Welding was utilised to effectively restore the damaged areas due to its high deposition rate, compatibility with such large equipment, and its ability to fulfill high technical repair requirements.
- Weld repair on rotors is not as easy as weld repair on common workpieces. It requires high-quality material, highly skilled welders, qualified processes, and of course extensive experience.
- Sulzer's Indonesia service center is the only workshop in APAC which has such extensive experience in large rotor welding. Not many OEMs or other ISPs boast such a track record.



The complete repair and overhaul of the unit also included these key scope:

- Turbine rotors (HIP, LPA, LPB): Repaired and welding of all journals, thrust collar weld build-up and reblading of 4002 new blades across 31 rows.
- Turbine stators: Supplied new interstage packing seals, replaced seal strips, and repaired the diaphragms.
- Generator rotor: Repaired the welding on all journals, replaced the insulation, and conducted high-speed balancing to improve performance.
- Generator stator: Refurbished journal bearings, supplied new bearings assembly for the exciter, and repaired the generator stator and aux while onsite.
- Generator: Rotor retaining ring removal, inspection & stress analysis by qualified metallurgical specialist.
- Supply of quality re-insulation materials, rotor field coils, rewinding and more
- More than 3600 parts such as generator seals, seal strips, bearings, etc were reverse engineered in-house.
- This meant that we could avoid any supply chain issues and get work moving without delay.
- This flexibility accelerated the repair timeline and allowed us to get the energy supplier's unit up and running again faster.
- Using Sulzer's engineered parts also allows the energy supplier to turn to Sulzer for any future repairs or rapid replacement requirements, opening up significant savings for the future.



THE CUSTOMER BENEFIT

A good-as-new unit to secure the plant's production reliability

PROJECT KEY FACTS

PARTS REVERSE-ENGINEERED & SUPPLIED

3,600+

REPAIR VS CAPEX REPLACEMENT COST SAVINGS

45%

EQUIPMENT CAPACITY

600MW

ROWS OF NEW BLADES INSTALLED

31

EQUIPMENT SHIPPED

218 tons

LAND AND SEA SHIPMENT DISTANCE

4,000km+

- Despite the extensive repairs and replacements required, the repairs were completed and the hard work of our engineers got the unit back up and running.
- Most of the steam paths were reconditioned, the seals and mating parts were replaced, and the unit went through a robust restoration process.
- These improvements gave the steam turbine generator a new lease of life. We can even say that it has been 'reset', having a new lifetime of up to 20 years.
- By opting for a repair instead of a new unit replacement, the customer achieved substantial cost savings of 40%.
- Turnkey expertise from metallurgy, manufacturing to technology and supply chain allowed us to give the energy supplier exactly what they needed: a fast, reliable, high-quality repair.
- With their good-as-new unit, the energy supplier is poised to fulfill its mission of delivering energy security for the grid and community.

THE IMPACT

Turnkey expertise for complex large power machine repair solution alleviated immense pressure off the operator, to salvage and resolve a seemingly impossible mission for renewed reliability.

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