

## Cross-country coordinated effort for steam turbine restoration & reverse engineering

CUSTOMER

Top 3 global shipping line

LOCATION

Shanghai

INDUSTRY

Shipping

KEY SERVICES

1. Inspection & Analysis

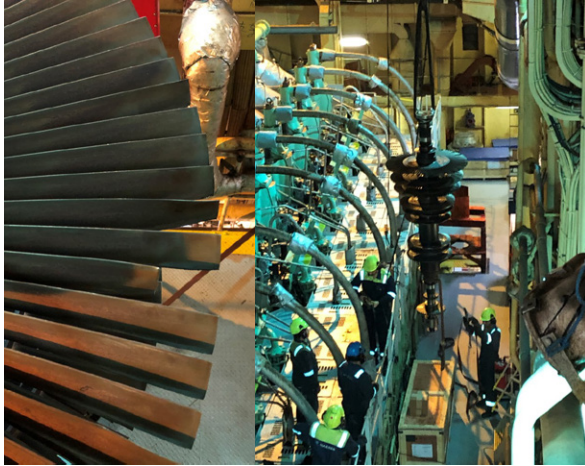
2. Maintenance

3. Reverse Engineering



## THE CHALLENGE

# Struggling for OEM's support to revive 5MW steam turbine



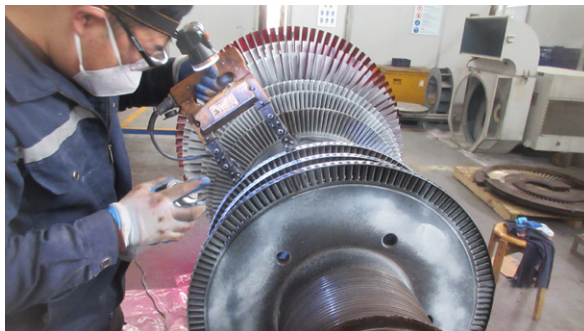
- The steam turbine installed on the 98,000 tons container vessel has been put in storage and on a standstill for more than 2 years due to alternator failure and rotor damage.
- Ship has been laid up in port of Shanghai back in Jan 2023 with a window period of 20 days to complete all repairs and commissioning work before ship sails.
- Flying in the UK OEM's technical experts wasn't financially feasible and hence the vessel operator called on Sulzer's support.
- With our breadth and depth of OEM-agnostic rotating equipment expertise along with established network of experts globally, we're ready respond to the most pressing challenges.
- Upon on-site evaluation by Sulzer's experienced technical experts, the damage was more extensive than expected by the customer's maintenance team
- Some of the key damages were:
  - Rotor had visual damage on the 3rd, 8th & 9th stages
  - The 3<sup>rd</sup> stage trailing edges have impact damage but no visual cracks
  - 8<sup>th</sup> stage has blades that were bent and cracked
  - 9<sup>th</sup> stage had various visual cracks and a complete broken blade
  - Broken bolts in the upper cover diaphragm while retaining rings can't be removed



## THE SOLUTION

# Shrewd technical evaluation pin-points targeted repair for effective restoration

- Sulzer's technical team comprising of engineers in China, Singapore and Indonesia jointly concluded that the general repair strategy would involve multiple replacements of spare parts to damaged components.
  - Reblading for stages 3, 8 & 9 with erosion shields to prevent future erosion
  - Replacement of labyrinths as the turbine is expected to operate over the long term
  - Replacement of turbine journal and thrust bearing due to heavy varnish & excessive clearance in thrust bearing
  - Rotor journals to be polished to remove light scoring
- With time of essence, our experts from the Suzhou service center concentrated on reverse engineering and replacement of more than 50 parts and components such as studs, bolts, bearings, coupling, labyrinth seals and more.
- On the other hand, more than 125 blades are to be reverse-engineered in-house aligned with OEM specifications and supplied by the Purwakarta service center, based in Indonesia.
- Additional repairs include complete replacement of turbine journal and thrust bearing, polishing of rotor journals to remove scoring by our China team.
- The damaged stages were all re-bladed, with erosion shields added to improve service life.
- Sulzer's field services team topped off the project with a successful commissioning support full stop.



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## THE BENEFIT

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# New lease of life with equipment's life extension

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- The steam turbine is expected to run well with an expected run-time of 5-15 years
- The customer was thoroughly impressed with Sulzer's cross-country coordination amid peak festivities, project management a project with such complexities and moving parts. They have had under-whelming experiences from other service providers.
- With the gained trust and confidence, the customer are quick to line-up steam turbine and generator maintenance jobs for ships that will be sailing through Asia for the months to come

## PROJECT KEY FACTS

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### STEAM TURBINE CAPACITY

# 5MW

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### REVERSE ENGINEERED & SUPPLIED PARTS

# 200+

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### EQUIPMENT LIFE EXTENSION OF

# 15 years

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## THE IMPACT

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# Helping vessel operations to be in ship-shape and achieving renewed reliability and circularity for power supply

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