

Revitalizing a 99-year-old hydropower turbine in record time

CUSTOMER

Independent power producer (IPP)

LOCATION

West Java, Indonesia

INDUSTRY

Hydropower

KEY SERVICES

1. Submerged arc welding shaft repair

2. Turbine tip welding

3. 3D scanning

4. Reverse engineering



THE CHALLENGE

An urgent repair to overcome an energy shortage



After almost a century of reliable operation, the support bolts installed on one of the turbine shafts at a hydropower plant in West Java finally failed, causing uncontrolled running. This resulted in complete turbine failure and an energy shortage, so the IPP approached several independent service providers (ISPs) for a solution, but no suitable proposal was forthcoming.

- The turbine shaft had split completely in two and the casing had been smashed to pieces
- Additional damage had been caused to the turbine tips, runner casings and the bearing pedestal
- The IPP urgently required a repair from a specialist in legacy equipment
- The lead time for sourcing new parts from the OEM was 12 months
- Local communities were suffering an energy shortage, with increased stress being placed on the wider grid to cover the shortfall

THE SOLUTION

Turnkey turbine restoration with world-class welding expertise

With securing a prompt, high quality repair paramount, the operator approached Sulzer Indonesia, which has a track record of revitalizing legacy equipment backed by century-old turbo engineering heritage and expertise.

Sulzer experts inspected the damaged equipment thoroughly, checking dimensions and scanning it to identify the best approach. The thorough assessment concluded with a viable proposal which impressed the customer as no other vendor could promise a restoration for such an old equipment and most recommended for a completely new replacement. The team recommended a cost-effective restoration project, with all work to be delivered within 5 months.

- To avoid a long lead time for a replacement shaft of the correct size, Sulzer used SAW to apply an upgraded, high-strength low-alloy steel weld material to build up the diameter of a smaller, locally sourced shaft in the coupling area - a technology transferred from Sulzer's Houston Service Center
- The turbine blade tips were welded with corrosion resistant material, supported by laser scans and reverse engineering techniques to ensure the right dimensions
- Sulzer reverse engineered the elbow casing, using metal stitching to connect the pieces back together
- The shaft and rotor were reassembled and underwent low speed balancing and demagnetization in-house
- Damaged runner casings and bearing pedestals were also fully repaired and a new sleeve manufactured, ensuring a turnkey approach, further supported by precision machining, inspections, non-destructive testing (NDT)



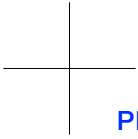
Bringing power back to the community as fast as possible



Sulzer's world-class welding capabilities and wider engineering expertise ensured the multiple, complex rotating equipment assemblies could be fixed. Experience working with legacy equipment from any brand ensured familiarity with the application and the ability to service equipment which is almost a century old. The turbine was quickly returned to operation, alleviating the local energy shortage and resuming supply of renewable electricity.

- The cost-effective project was delivered in less than 50% of the expected OEM lead time for new components
- Incorporating material upgrades into the design of the turbine delivered a long-lasting solution that will maximize power generation equipment uptime
- The turbine is now expected to operate reliably for at least another 30 years
- A turnkey approach supported by innovative welding services ensured the fastest possible repair
- Local communities regained access to renewable energy, while the IPP could resume power supply to the wider grid





PROJECT KEY FACTS

HYDROPOWER TURBINE AGE

99 years

REDUCED LEAD TIME COMPARED TO
BUYING NEW EQUIPMENT

50%

ESTIMATED TURBINE LIFE EXTENSION

30 years

THE IMPACT

Turning the seemingly impossible to reality. Restoring century-old legacy equipment where no other ISP/OEM could do it.