

CASE STUDY: IMPROVED WEAR PROTECTION ON LARGE VENTILATION FANS IN UNDERGROUND MINING

An underground hard-rock mining operation was experiencing rapid and recurring wear on large ventilation fan impellers, resulting in frequent removals, high maintenance costs, and elevated safety risks. Elastotec, working alongside Carters Engineering, implemented a flexible ceramic wear protection solution that dramatically extended impeller service life and significantly reduced maintenance intervention.



LOCATION: Orange N.S.W.

YEAR: 2022

APPLIC.: Ventilation Fans

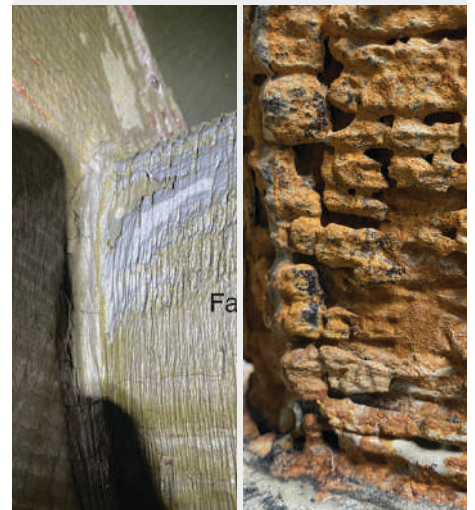
SOLUTION: Light Duty Ceramic Tiles

ISSUES ON SITE:

The underground hard-rock mine was experiencing excessive abrasion on ventilation fan impellers operating in harsh underground conditions. Key challenges included:

- ⓔ Fan impellers exceeding 3 metres in diameter and weighing approximately 4 tonnes.
- ⓔ Excessive wear caused by high-speed operation in moist air with high stone-dust concentration, forming an abrasive paste.
- ⓔ Leading-edge erosion of fan blades, resulting in frequent repairs.
- ⓔ Previous hard-facing solutions delivering only 3-month's service life.

- ⓔ Significant downtime, high labour costs, and increased OH&S risk due to regular impeller removal.



THE SOLUTION

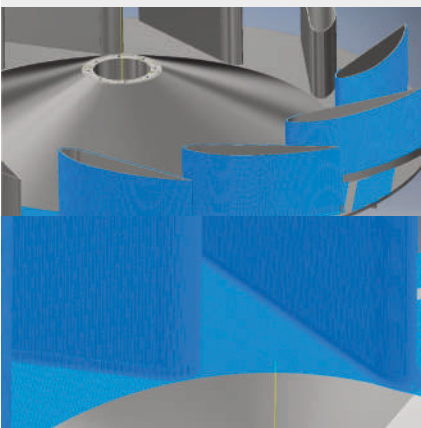
Carters Engineering, responsible for fan maintenance, engaged Elastotec to develop a more durable wear protection solution capable of withstanding extreme centrifugal forces generated at fan speeds of up to 1200 rpm.

Elastotec proposed the application of flexible, light-duty ceramic tiles bonded to the leading edges of the impeller vanes using the same high-strength epoxy system employed in Elastotec's Direct Bond Ceramic Lagging solutions.

Key elements of the solution included:

- Ⓢ Flexible ceramic tiles capable of conforming to complex curved impeller profiles
- Ⓢ High-strength epoxy adhesive with bond strengths exceeding 25 MPa
- Ⓢ Independent engineering analysis by Conveyor Dynamics confirming a safety factor greater than 10:1 under centrifugal loading
- Ⓢ CAD-designed ceramic tile layout reviewed with site maintenance personnel prior to full installation

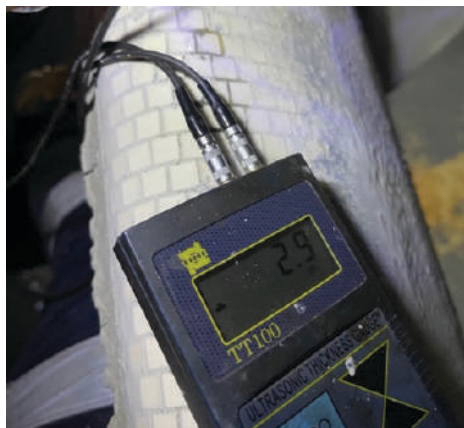
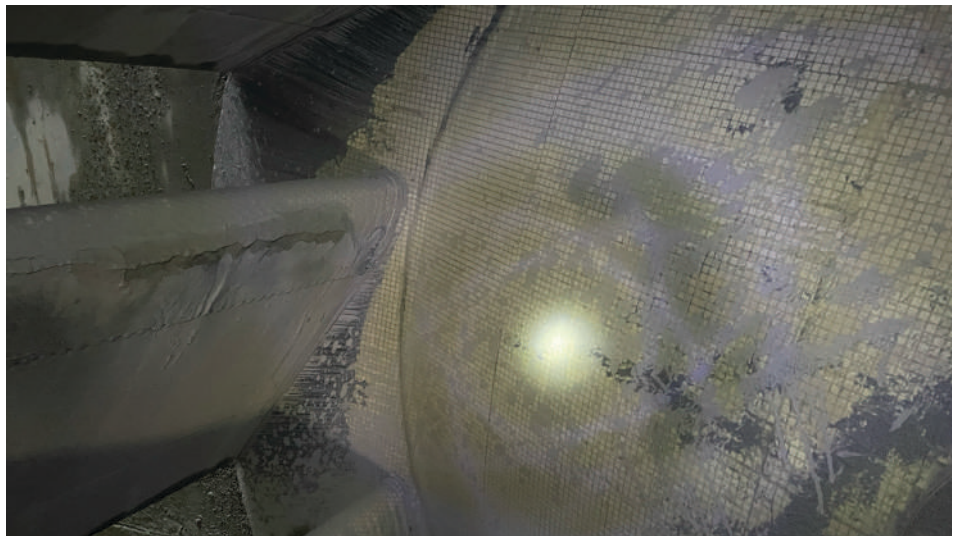
A full impeller was lined with ceramic tiles and returned to service, with performance monitored during planned maintenance shutdowns.



THE RESULTS

During scheduled three-month maintenance inspections, tile thickness measurements showed minimal wear from the original 3 mm ceramic thickness. The ceramic protection performed consistently under high-speed, abrasive conditions.

The improved wear protection extended the operational service life of the fan impellers to more than 12 months. During scheduled mechanical servicing, minor maintenance such as replacing isolated tiles and re-grouting was completed without full impeller refurbishment.



>400% increase in impeller service life (from 3 months to over 12 months)

75% reduction in OH&S risk by eliminating frequent impeller removal

Significant reduction in maintenance downtime and labour costs

