

Realignment of modified blade carrier.



Assembly overview exhaust end.

Win-Win Situation for Customer and Sulzer

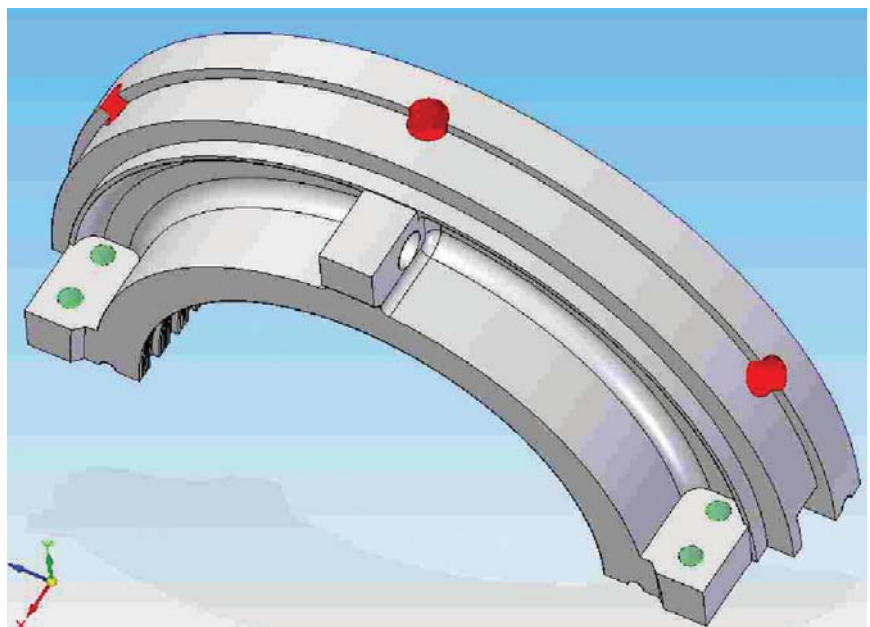
One of our local customers, working in the air separation market, producing mainly N₂ and O₂, requested us to do a complete overhaul of their main air intake compressor, including all steam turbine drivers. As most of the refineries, air separation and utility plants are closely connected to each other it is of great importance to maintain timely and quality products to their customers and keep their shutdown periods to a minimum.

During the inspection of several steam turbines and compressors at the plant much damage was found. The original planning did not allow for sufficient time to perform all repairs as the customer had to fulfill their contractual obligations with their customers. Sulzer Repco offered several different alternatives to shorten the extra plant downtime. Various scenarios were looked at and in the end the technically best and fastest solution was performed, which resulted in limited customer downtime.

Sulzer Repco was awarded an order for a turnaround on an air separating plant. The work consisted of inspections of the air compressor unit, the oxygen unit and the driver from the pre-pressurizing oxygen unit.

unit a full inspection was planned and scheduled.

For the air compressor, major components were available with the customer in stock and during inspection



Blade carrier before modification.

The air compressor unit consisted of a steam turbine and a centrifugal compressor of about 6 MW. On this

works it became clear that rotor, labyrinths and bearings had to be replaced.

The steam turbine had suffered in the last few years, due to a lower steam inlet temperature with the same level of vacuum pressure. This was clearly visible on the rotor (last 2 stages) and the eccentric radial pins that connect the blade carriers in the outer casing. Severe erosion was found on the last two stages of blades.

Working together with Sulzer Elbar, Sulzer Repco was able to propose a

All the welding on the both rows of blades was done by Sulzer Elbar working double shifts to reduce downtime and in order to improve the life cycle of the blades.

After restoring shape and model, a chromium carbide overlay coating was applied to the blades to improve erosion resistance. The blade carriers were positioned according to the "old" eccentric radial pin fixation through

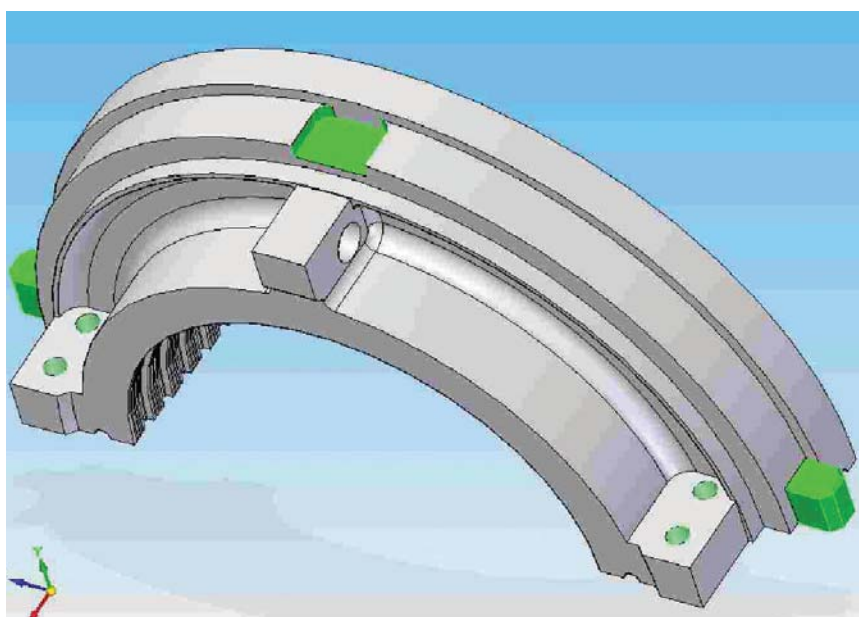
the pinholes and accordingly installation of oversized pins. Due to the risk involved in this kind of repair method, the large machinery equipment needed and the knowledge that the customer is not able to change their steam condition (in order to avoid future damage), Sulzer Repco proposed an alternative.

- Blocking old pin holes (insert pin and weld)
- Match axial positioning faces.
- Fabricate a separate adjustable hanging horizontal support.
- Fabricate all parts and machining of casings and carriers.

Using this method Sulzer Repco was able to perform fast and low risk machining on the casings and carriers and construct simple small parts for the hanging support.

The repairs were completed in six weeks and the plant was successfully back in production.

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Blade carrier after modification. (a)

suitable and relatively fast repair for these last two stages. This consisted of: removal of blades, inspection of blades and rotor grooves, refurbishment of damaged parts by welding, refurbishment of shape and mode of blade, blade and damping wire installation and high speed balancing, including spin test.

As an alternative, the client asked the OEM for repair of the blades and/or new delivery. Due to plant down time the customer decided to award Sulzer Repco the order to carry out the proposed repairs. The OEM's proposal was late, expensive and the lead time was triple that offered by Sulzer Repco.

casing and carrier outer ring. Due to wet steam and internal leakages, the pins and the carriers suffered erosion,



Blade carrier after modification. (b)

which caused leakage on the outer casing.

The most obvious repair method would have been re-machining of