

## DEMAG MANNESMANN VK32 Incident



### A giant chemical industrial plant suffered from failing

**Compressor , gas expander.** The application of this integral geared 4 stage compressor is to supply process air (36.000m<sup>3</sup>/h 1,4 MPa). The driver is a 4,2 Mw electromotor and a fourth stage nitrogen expander turbine.

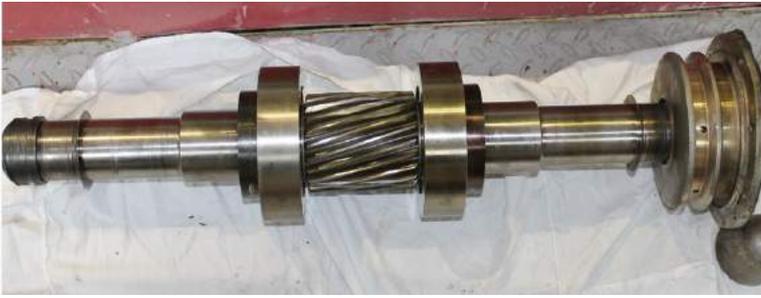
An incident caused an important impeller rub with big consequences as result.

The production stopped immediately, and a first inspection of local technical staff resulted in a determination of completely destroyed impellers and related parts. The damage was enormous, rotor stage 3 & 4 inclusive impellers were completely destroyed. All air labyrinth seals were leaking. Both carbon seals and stuffing boxes were

abraded by friction. Bearings were damaged, some were completely lost.

The complete compressor was dismantled from base plate and transported to the workshop of Energetic NV in order to start a more detailed inspection.





This resulted in a plan of action where some parts were repaired and others were replaced by parts engineered and delivered by Energetic nv.

Besides the inspection of all the internal parts, the top and bottom casing were also

Geometric inspected to check possible deformation. This type of inspection sometimes results in a frequency analysis study to determine and solve abnormal upcoming vibrations by enforcement of the welded casings.

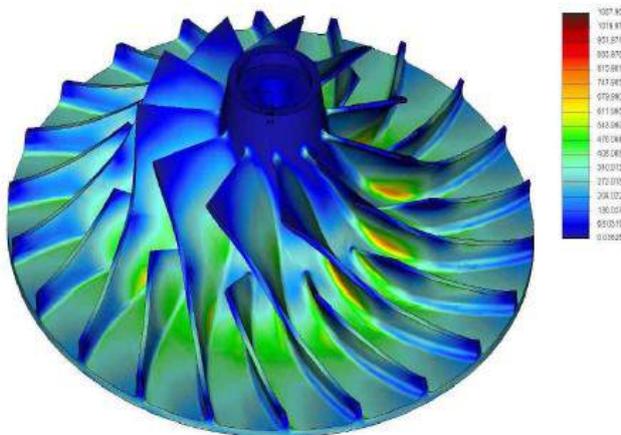
The existing impellers were not useable as model for reproduction, Therefore a complete thermodynamic calculation was executed, inclusive CAD remodeling by using Siemens NX, to meet minimum the required performance.

The manufacturing was quality guided by following the API standards, inclusive spin and over speed tests

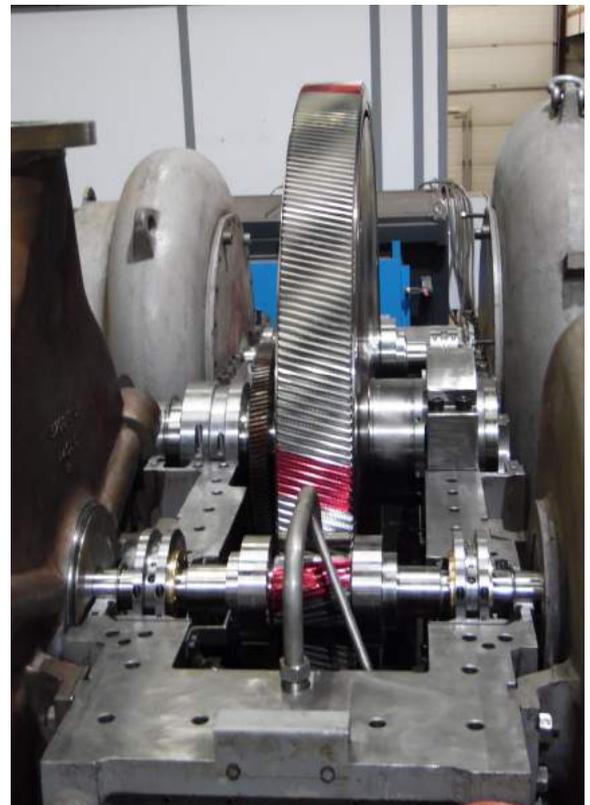
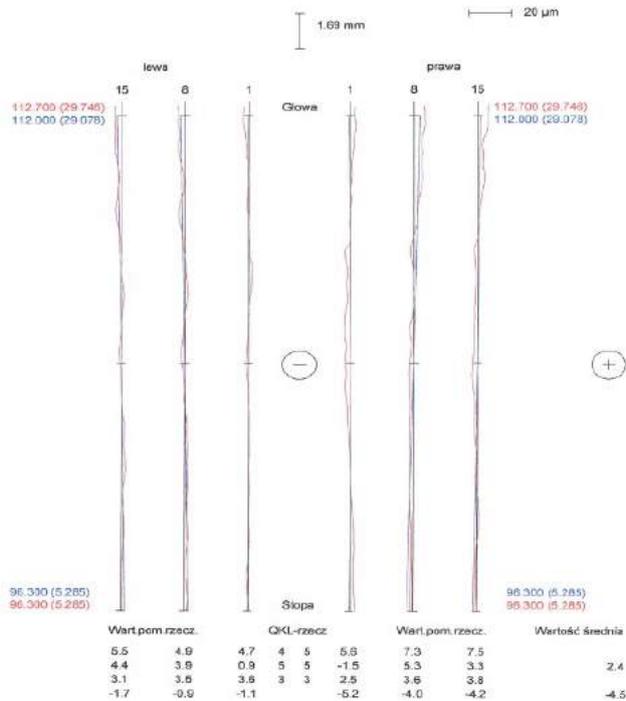
The complete repair and manufacturing process was in line with our ISO 9001 certification.

All activities were planned and transparent for the customer to follow.

Design, and material upgrades were discussed upfront for approval, nevertheless the responsibility of the outcome and performance was ours.



It was clear from the beginning that the Pinion stage 3 & 4 needed to be reproduced. The pinion stage 1 & 2 and the bull gear where part of an geometric inspection , which resulted also in a new manufacturing pinion and bull gear re-grinding. In fact the two new pinions where modeled towards the grinding result of the bull gear. The aim was to transfer load with minimum of noise and vibrations



The bearings from bull gear, radial and axial /radial where re-babbited. The existing tilting pad bearings where replaced by a special design which allows the pad to tilt in multiple directions, with a better guidance during shaft rotation under load and specially during start up. The new pinions where degaussed and the electrical run out was checked, after completing the burnish activity on the probe surface .

The primer inlet I.G.V's where complete maintained , the gas expander inlet guide vanes where renewed by engineering and modeling because of deformation caused by the impeller rub.

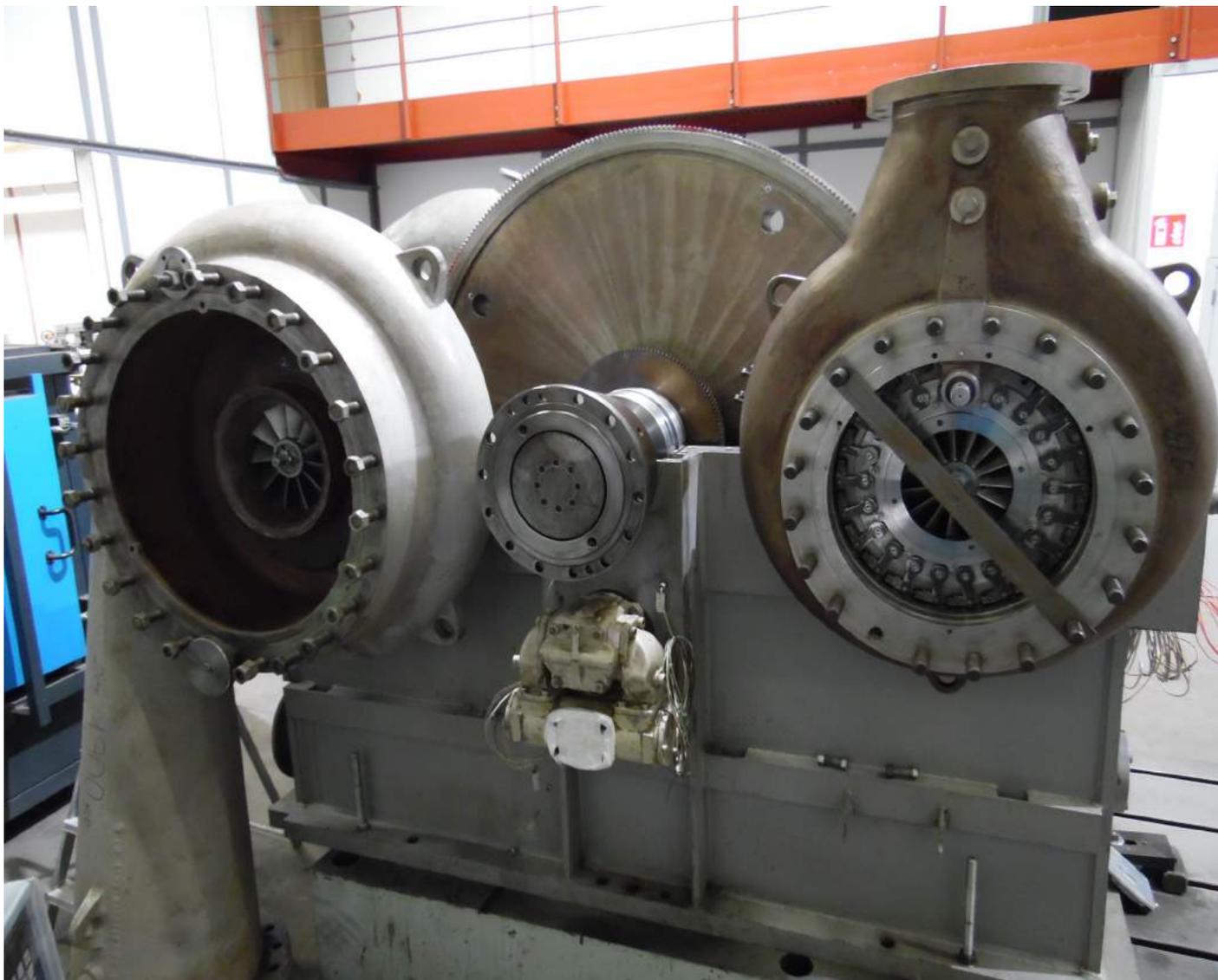
After a positive factory acceptance test the

Demag VK 32-3 EX was prepared for transport. Due to custom reasons , the assembly was complete in the workshop and the compressor inner parts ,protected for transport.

Field personnel from Energetic N.V. re-installed and commissioned the compressor gas expander succesfully. In case of interest in our Compressor service do not hesitate to contact:

[info@energeticmachinery.com](mailto:info@energeticmachinery.com)





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