

Technical Paper

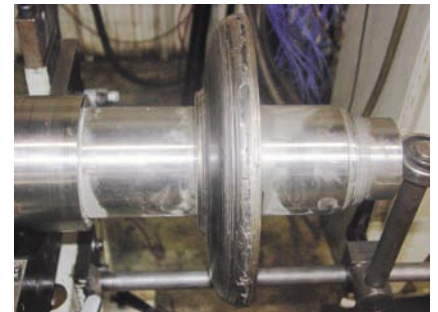
A Sulzer Hickham USA Speciality - Reducing Nitric Acid Plant Downtimes

In early August 2006 a chemical plant in the Midwest experienced an unplanned shutdown due to a power failure, which resulted in a lube oil loss to the nitric acid plant compressor train. The lube oil failure caused catastrophic damage to the tail gas expander. Among other critical components, the stator was almost completely destroyed and there was no spare stator readily available. A new replacement stator was months away, so after talking with another Sulzer Hickham USA customer, Sulzer Hickham USA was called on for help. Rather than being without an expander for months, we were able to rebuild the machine to a “better than original” condition with available inventory parts and ship to the customer in only two and a half weeks!

The Sulzer Hickham USA Expander Advantage

Sulzer Hickham USA has some of the most experienced personnel in the world for repairing expanders of this design, including personnel with vast experience in operating nitric acid plants. Approximately 80 machines of this design were manufactured between 1962 and 1999 and many are still operating throughout the world. From 1990 up to the present, our

company has repaired 55 complete machines, in addition to many spare rotors. Of these, several were complete, replacement or spare machines that were performance-matched to suit the plant design. In fact, this same customer has now asked Sulzer Hickham USA for a quote to provide a complete “drop-in” spare machine.



Close-up of rotor thrust collar.



Rotor from wrecked expander.

Sulzer Hickham USA also has the ability to repair these unique machines quicker than anyone else in the industry, partly because of a significant inventory of expander parts. In this particular case, the inventory made all the difference, for it included a complete stator, wheels and blades for this size machine.

A unique machine

These nitric acid expanders are unique in design due to the large thermal variations that the machine is exposed to. Unlike the average steam turbine and centrifugal compressor, small deviations from tolerance during the repair procedures cannot be allowed, for the design is very unforgiving. Sulzer Hickham USA has developed standardized repair procedures to assure a well performing machine in the field. Over the years we have also initiated several design improvements proven to increase reliability and provide lower vibration on these machines.

Outcome

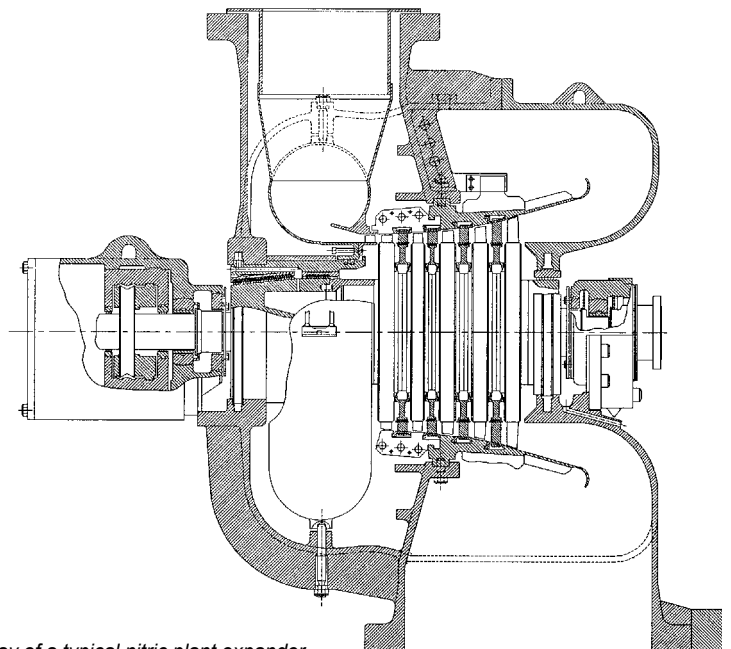
The machine was installed and aligned to Sulzer Hickham USA specifications. Upon startup, the customer



Installed Sulzer Hickham USA inventory stator

proudly stated that the vibrations and air leakage from the HP seal were lower than they had ever experienced, even when the machine was new.

*John East
Sulzer Hickham USA*



Cutaway of a typical nitric plant expander.