Repair and Service of Turbomachinery

TON BÜCHNER SULZER TURBOMACHINERY SERVICES



In November 2000, Hickham Industries Inc., a subsidiary of Sulzer Turbomachinery Services (Fig. 1[■]), received a call from one of the largest producers of electricity in the USA. It concerned a failure in the power unit of a hot gas expander serving one of their plants in Oklahoma. The machine had to be brought to the Hickham repair facility in La Porte (Texas), where the repair was undertaken on an around-the-clock basis. Five weeks later, the expander was returned to Oklahoma, where it has been operating without any problems ever since and, in fact, is running better than before. According to the customer, the The rotors of turbomachinery are subject to the most severe conditions, e.g. high temperatures. Sulzer Turbomachinery Services can repair rotors and the other components of turbomachinery even in the most difficult cases, which is undoubtedly more cost-effective for customers than replacing them anew.

1 Hickham Industries and also the other companies of Sulzer Turbomachinery Services repair the turbomachinery of various manufacturers. The picture shows the rotor of a hot gas expander for which the repair work was completed on an emergency basis at the end of November 2000.

machine, originally designed for a rating of 20 MW, is now generating in excess of 21 MW.

MACHINES FROM DIFFERENT MANUFACTURERS

Contracts such as the one received from Oklahoma are typical for Hickham Industries and also for the other companies that are integrated under the name of Sulzer Turbomachinery Services (see box). Sulzer Turbomachinery Services specializes in the repair of gas turbines, steam turbines, various types of compressors, hot gas expanders, different types of pumps and other rotating equipment of different original manufacturers. The time that has to be expended for the repair, i.e. during which the machine cannot be operated – whether in cases of emergency or for scheduled repairs – is very critical for customers. Nevertheless, fast repair work is always in demand especially with emergency contracts, because the failure of these machines cannot be bridged automatically and therefore causes unexpected production outfall.

An example: Sulzer Repco received a contract in mid-2000 for the repair of a bullgear compressor which had had run for a too long period and therefore had quit a lot of damage. The OEM had quoted a repair time of twelve weeks, which was too long for the customer. Sulzer Repco was able to complete the work within a period of seven weeks. For this, extensive repair work was carried out in the Sulzer Repco workshop near Rotterdam. The compressor was provided with new bearings, which were reversed engineered according to the original design. Furthermore, a number of parts were provided with a special coating to protect them against possible friction (Fig. 2[®]).

QUICKNESS THANKS TO GEOGRAPHICAL PRESENCE

The time taken for repair work can be reduced further through the geographical nearness to the customer. PT Hickham Indonesia is the only repair facility in Indonesia and only one of two in SE Asia that can handle large turbomachinery. The geographical presence was therefore one of the reasons why PT Hickham Indonesia was successful in gaining a contract for a second time in 2000 for work on one of the 132-MW rotors weighing 55 tons which operate on the Indonesian island of Sumatra (Fig. 3[•]). The first contract was completed at the beginning of 1999.

In accordance with the contract, the repair work had to be completed and the rotor returned to Sumatra within 28 days. A further reason why PT Hickham Indonesia could win this contract is its special repair know-how. Some parts of the rotor shaft are especially subject to wear, because they are used to dampen transient vibrations when the turbine is starting up or shutting down. The conventional method of repair is to grind the affected parts undersize and manufacture new friction damper

SULZER TURBOMACHINERY SERVICES

Sulzer Turbomachinery Services consists of four companies: Hickham Industries Inc.,

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elbar

with its headquarters in the USA, PT Hickham Indonesia, as well as Elbar B.V. and Sulzer Repco B.V., both of which have their headquarters in the Netherlands. Elbar joined Sulzer Turbomachinery Services following its acquisition by Sulzer in November 2000. All four companies offer comprehensive repair and maintenance services for the most diverse rotating equipment. Hickham Industries, PT Hickham

Indonesia and Sulzer Repco specialize more in the repair of rotors, Elbar more in the repair of components, particularly for gas turbines. Hickham Industries and Elbar have ultramodern coating facilities.

2[■] Fast repairs are one of the major requirements of customers. The bullgear compressor from which these inlet guide vanes stem (left prior to, right after repair with new coating) were repaired by Sulzer Repco within a period of seven weeks in mid-2000, five weeks faster than the offer made by the original manufacturer.





3[•] Comprehensive repair know-how facilitates high-class quality repairs. At PT Hickham Indonesia, for example, parts of the rotor shaft are treated with a special coating process, which makes them more resistant to wear.

sleeves called damping cones. This process, however, has its limitations. PT Hickham Indonesia has developed a solution with which these areas are provided with a special HVOF coating. This process creates a very wear-resistant surface and can be repeated as frequently as required.

GUARANTEE AS FOR ORIGINAL SPARES

Customers not only want quickness, but also high-class quality repairs. The companies of Sulzer Turbomachinery Services offer the same guarantee for repaired components as the original manufacturer of the machines gives for its spares. These STS companies also possess extensive repair know-how for all types of rotors and their components, a fact that is appreciated by the customers, as the following example of the subsidiary company Elbar shows.

In 1999, Elbar was requested by several customers to develop a method that would enable the combustor of a specific type of gas turbine to be repaired and prolong its life cycle (Fig. 4[■]). This component is produced as a welded assembly of a carbon steel support ring, austenitic stainless steel burners and body made of nickel-base alloy. The vibration during the combustion process may also cause fatigue failures in the most robust materials, and can normally be repaired. For this, the base material properties and dimensional integrity have to be restored. With the repair method developed by Elbar, the inner walls of the combustor are provided with a zirconium

coating which serves as a thermal heat barrier, before the components are reassembled again. Results show that this repair method doubles the lifetime of the components.

The services, such as those offered by Sulzer Turbomachinery Services, are finding increasingly greater interest by the operators of gas turbines and other turbomachinery, because they are looking more and more for quick, costeffective and also high-class quality repairs. Ω

4 Elbar – a specialist for the repair of gas turbine components – has developed a unique method for the repair of combustor assemblies.



FOR MORE DETAILS

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