



Fast reaction to findings prolonged turbine major overhaul by only four weeks

The scope of the operating hour-based major overhaul had to be broadened on very short notice when findings requiring extensive repairs were discovered in the turbine. Thanks to rapidly including the unexpected work into the plan, the overhaul was ultimately prolonged by only four weeks.

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Umeå Energi, based in eastern Sweden, is an energy and communications company that provides a sustainable grid for electricity and broadband. Among others, the company operates two combined heat and power plants (CHP) at the Dåva site just outside the city of Umeå. Dåva 2 was built to meet the increased need for district heating in Umeå. It is fired with biofuels from the logging industry, and peat. It creates 105 MW of power, 75 MW of which is used for heating.

2

In 2019 the company was looking for a qualified supplier to perform a regular operating hour-based overhaul on the plant's Siemens SST 600 turbine. Fortum eNext met the requirements of the public procurement and offered the best total price for the work. In the summer of 2020, the unit was to be dismantled and inspected, its parts cleaned and repaired where necessary, and, finally, reassembled.

Opening the machine often uncovers something surprising

Without any hiccups, a turbine major overhaul normally takes around one month. But it is very common that opening the machine uncovers something surprising – as was the case with this turbine. As the dismantling work progressed, findings requiring extensive repairs were discovered in the rotor, stator, and control valves.

Fortum eNext reacted fast to the findings and provided descriptions of the damage along with recommendations on how to repair the damage in the most cost- and time-efficient way. The overhaul was first extended by six weeks, but in the end the solution prolonged the overhaul by only four weeks.



Overhaul proceeds after change of scope

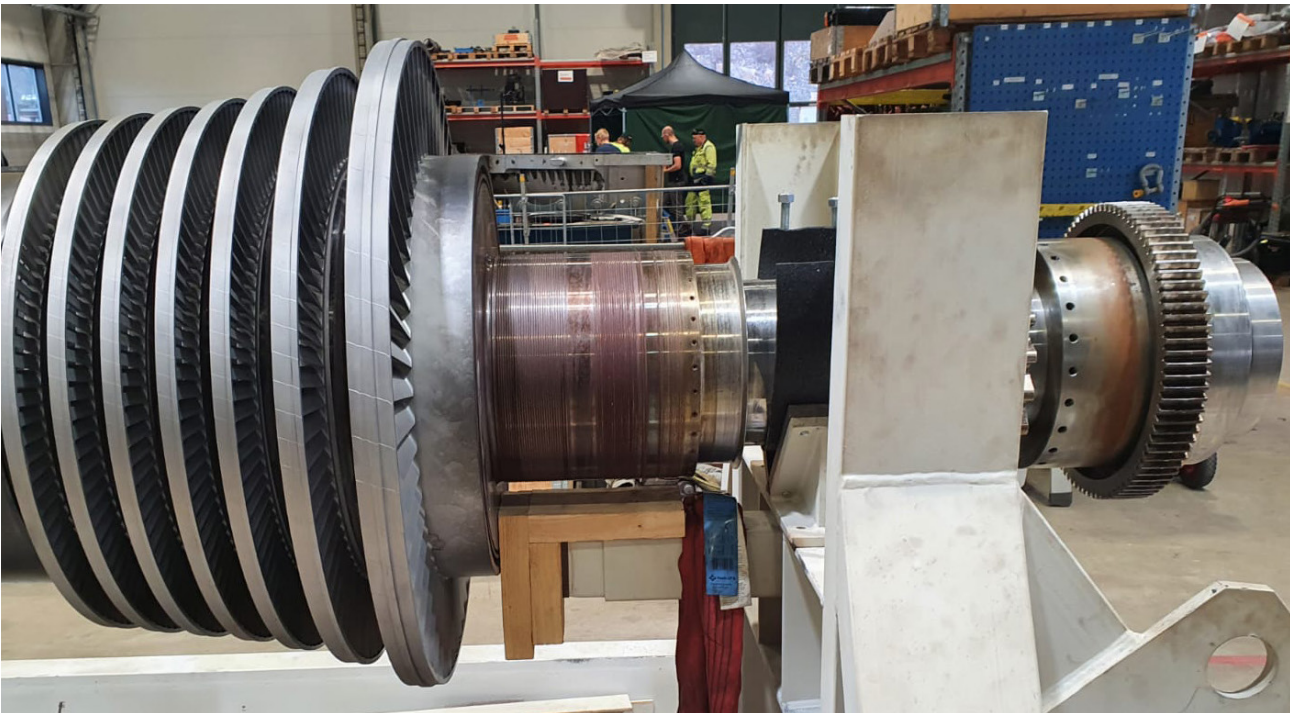
Sealing strips from front gland, balance piston, and intermediate sealing were damaged and therefore replaced, and the rotor was high-speed balanced on short notice at a subcontractor's premises. In the stator parts, intermediate sealing labyrinths and a sealing strip in the inner casing were damaged and replaced with new ones. Cracks in nozzle segment welds and erosion damages were repaired by welding and manual scraping. Damages in the control valve required the manufacturing of new parts for the stuffing box. Additionally, Fortum eNext's Engineering Department designed new oversized seats that were manufactured, delivered, and installed.

"Downtime is very expensive for the customer, so we were pleased to be able to react quickly to the findings as well as to plan and execute the needed repairs. It required agility, first-rate project management, and the commitment of our excellent partner network. This turbine overhaul could have been prolonged by many more weeks – but this time it wasn't," says Senior Product Manager **Teemu Heinonen** from Fortum eNext.

3

Cracks in nozzle segment welds and erosion damages were repaired by welding and manual scraping





Thorough fact finding and preparing for the unexpected

Fortum's approach to overhauls requiring the machine to be opened is to carefully prepare for all possible findings and immediate repairs. A carefully executed fact finding programme makes it possible to determine the actual condition of critical components, which in turn helps in planning the activities with precision.

"Thorough fact finding is standard procedure for us. It provides comprehensive knowledge about the turbine's actual condition as well as its risk levels and the actions required to reduce those risks. This enables us to give the customer a cost-efficient recommendation for spot-on maintenance services," Teemu Heinonen says.

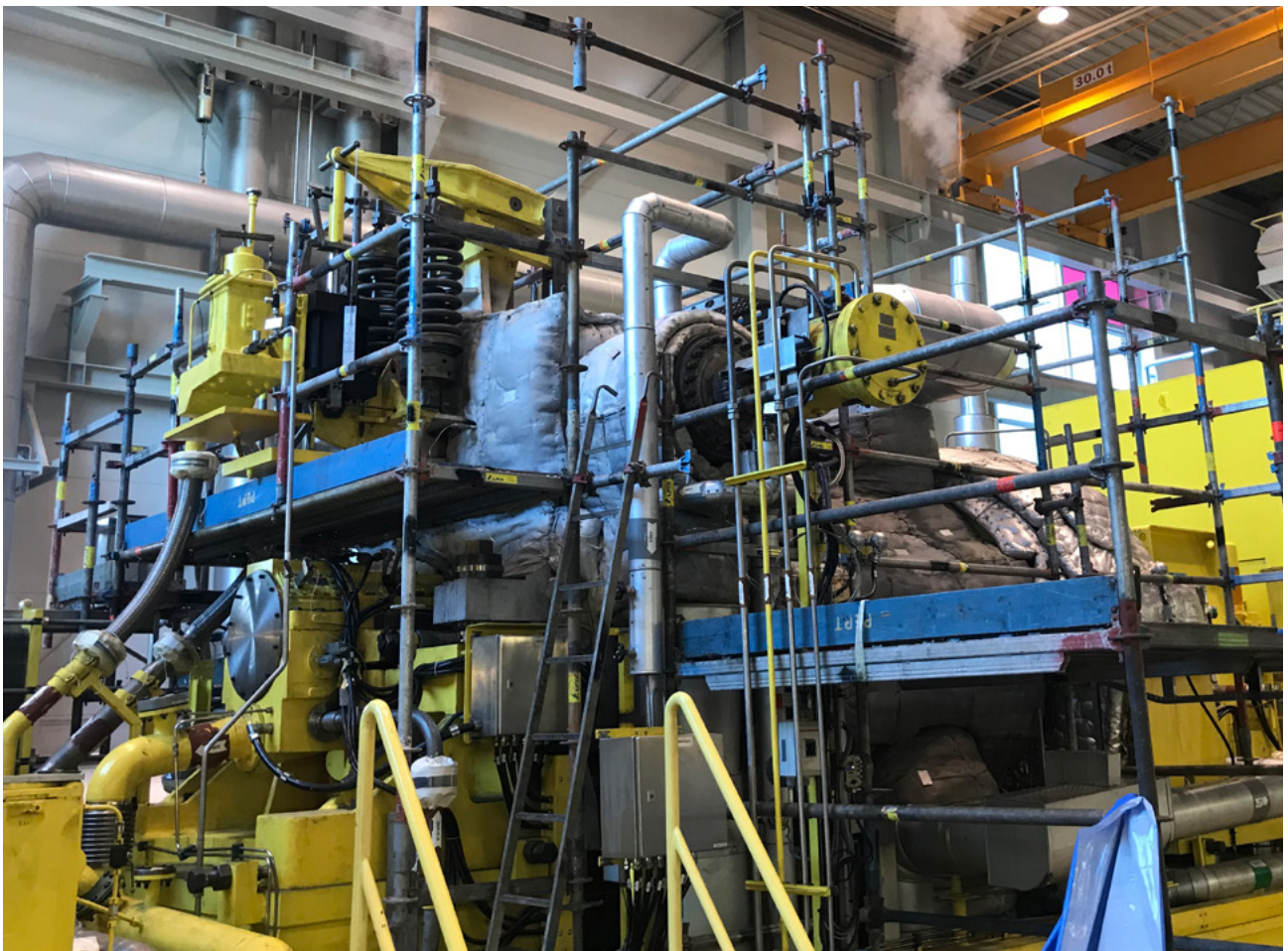
The major overhauls are always designed according to customer's needs and timetable. In practice, this means that the rotor is given priority when it comes to repairs, reverse engineering, and manufacturing of spare parts. This is possible because most of the works are done at Fortum eNext's own workshop in Naantali, Finland, which is designed for full-scope turbine maintenance services.

“We always try to see the situation from the customer’s point of view. Our aim is to offer the best technical and most economical solution for each case, tailoring the service and delivery as much as required,” says Teemu Heinonen.

“The project collaboration on site has been a highlight for us at Umeå Energi. It was mainly due to the open and straightforward dialogue with Fortum that made it much easier to keep the downtime to a minimum.” says **John Josefson**, Operations Technician at Umeå Energi

“During the work, we were able to quickly handle the findings that required action. Fortum’s team on site handled their job extremely professionally.”

John Josefson, Operations Technician at Umeå Energi



Customer

Umeå Energi, Umeå, Sweden –
energy and communications company

Site

Dåva CHP in Umeå, Sweden, producing
electricity and heat for the surrounding
community

- Plant type: Combined heat and power (CHP) production
- Fuel: Biomass
- Commissioned: 2010
- Fuel power: 105 MW (75 MW heat, 30 MW electricity)
- Boiler: Fluidized-bed boiler
- Turbine-generator: Siemens SST 600

Customer needs and challenges

- » **Initially**
Conducting regular time-based maintenance for the turbine
- » **Ad hoc**
Findings requiring extensive repairs threatened to prolong the overhaul and thereby also downtime

Solution by Fortum eNext

- » **Initially agreed scope**
Turbine overhaul based on operating hours, including disassembly of the unit, inspections, cleaning the parts and repair if needed, and final assembly
- » **During the overhaul**
Fast reaction and prompt diagnosis of the discovered damages and clear recommendations on actions to be taken
Repairs and manufacturing of spare parts conducted without delay at own dedicated turbine workshop and with the help of extensive subcontractor network

Customer benefits

- » The overhaul was extended by only four weeks
- » A detailed fact finding programme performed as standard procedure helps in planning the activities with precision
- » The major overhauls are always designed according to the customer's needs and timetable in a cost-conscious way



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