

Turbines shift into turbo-gear

Siemens AG





A turbine operating at a velocity of around 12,000 revolutions per minute exerts an enormous centrifugal force on the blades. The blades only make up one part of the roughly 3,000 components of a steam turbine – but they are also one of the most important for its correct functioning.

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New tool technology by Unimerco saved Siemens two weeks' production time in its industrial steam turbine service centre. Cycle time was cut to a tenth and the lifetime of the tools increased tenfold.

If a power station anywhere in the world shuts down, hundreds of thousands of people lose their heating. That may not matter in the summer or in warmer countries, but it also means that individuals and towns are deprived of electricity.

So steam turbines have to be serviced as quickly as possible. But often this does not take place in situ, especially when a major overhaul is involved and the steam turbine, weighing around 80 tonnes, has to be disassembled and then transported to Nuremberg, Germany, where Siemens has concentrated its expertise in the field of industrial steam turbines.

Long-term investment

Industrial steam turbines represent millions in terms of investment and frequently operate for up to 30 years. Turbines of all sizes are complex units that often operate in extremely hostile environments using steam pressure.

Malfunctions usually occur “unexpectedly” and it is only after the turbines have been removed that it becomes evident how extensive the repair

work is. Only then can new tools be procured for the machines, for machining the blades, for

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*Holger Meyer, Team Leader,
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example, and the part of the rotor on which they are mounted. The procurement and manufacture of replacement parts is therefore always undertaken in considerable haste. This was why it was a major step forward for Siemens when it came into contact with Unimerco, the international tool manufacturer. Unimerco was in a position to supply at short notice some of the tools that assist

in manufacturing the blade root that anchors the turbine blades in the rotor. Unimerco had previously supplied a cutter for the turbine blades and as a result was testing a cutter for machining root grooves in the turbine rotor. After exhaustive testing it became clear to Siemens that the tool demonstrated considerable qualities in terms of intervention time and cycle time.

Oh, Christmas tree, Oh, Christmas tree!

It would perhaps be an exaggeration to refer to it as a gift, but even so the tool constitutes an essential part of the overhaul process and, owing to its Christmas tree shape, is known as the fir tree cutter.

Holger Meyer, team leader for mechanical engineering, reports that on the one hand Unimerco was able to deliver the tool within two weeks, whereas all other suppliers would have needed up to 15 weeks, and on the other, the tool was essentially more effective and completed the overhaul process up to ten times faster than comparable rival tools.

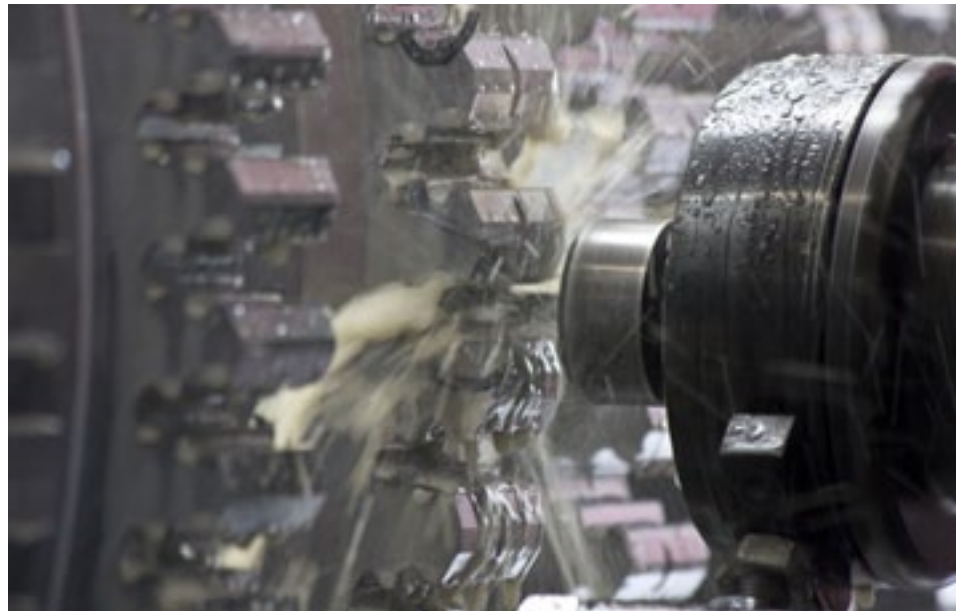
“All in all we are saving about two weeks’ work per rotor,” says Holger Meyer, for whom this additional capacity has exceeded all expectations. The Nuremberg firm works a triple shift system and also partly at weekends in order to deal with the mountain of contracts that build up over the summer when power stations usually carry out turbine maintenance.

This is because at this time of year the capacity required for heating and electricity generation is lower. As capacity has reached its limit, each and every improvement in the operating procedure is not only welcome but absolutely essential. A reduction of two working weeks in the milling of the root form does not necessarily mean that a turbine can be finished two weeks earlier, because the root grooves only constitute one part of the process. However, it does free up capacity.

Tenfold gain

Furthermore, the tools are not only faster at manufacturing root grooves; they also last considerably longer than the tools Siemens had been using up to this point. Other tools managed to machine 17 grooves and then had to be replaced.

In contrast, the Unimerco tool manages ten times as much machining. “It could certainly accomplish much more, but we prefer to stop it so as to be absolutely sure that we are adhering accura-



Machining workpieces for power generation requires great precision. The fir tree cutter from Unimerco has saved several manufacturers of turbine blades hundreds of machining hours because of its unique cutting geometries and nano-composite coating.

tely to our tolerance specifications to within a few micrometers,” says Holger Meyer. Siemens saw an improvement of 30% following introduction of the new tool. This can truly be described as clear progress.

One of the reasons for the huge time saving is the high level of precision of the tool throughout its entire lifetime.

“Previously, we had to replace the tool every 17 machining procedures, and with each replacement it was essential to check measurements to guarantee the required precision,” explains Holger Meyer. Additional checking of measurements is no longer required with the Unimerco tool despite the fact that it allows ten times more machining.

Avoiding having to replace tools clearly also saves time which otherwise has to be spent checking measurements on newly installed tools to guarantee adherence to the required tolerances – not an inconsiderable amount of time, since each turbine body consists of almost one thousand turbine blades. “According to our estimates, we could make significant annual savings using the Unimerco tools for this type of turbine,” says Holger Meyer. ■

Facts:

Siemens Power Generation is one of the world’s leading suppliers of components and systems to companies in the energy and electricity industry. With roughly 40,500 employees, PG had sales of over EUR 12 billion and received new orders for approximately EUR 18 billion in fiscal 2007.

Modern turbomachinery equipment and power plant technology must deliver low costs, high flexibility, absolute safety, and excellent compatibility with the environment and the climate. With its global network, Siemens has a presence in nearly all regions of the world, and roughly one-fifth of installed power plant capacity worldwide is from Siemens Power Generation.



Holger Meyer, team leader for mechanical engineering at Siemens, assessing the results. Due to excessively long delivery times for tools, Siemens was forced to make some changes. In Unimerco it has found a partner ideally placed to meet the challenge.



UNIMERCO Inc.

UNIMERCO Inc. manufactures, distributes and services tools for machining, primarily for the metal, automotive, aerospace, fluid power and woodworking industries. The tooling concept comprises standard and customized tools, RE-NEW™ tool maintenance, coating and optimization guidance. The American company was established in 1995. Today, the company has product development, production, sales and administration in Saline, Michigan, as well as a sales office in Charlotte, North Carolina. The company is part of UNIMERCO GROUP with companies in Europe, the Americas and Asia.



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