PERFORMANCE FOR A LIFETIME
GAS TURBINE RECONDITIONING
Services for thermal power plants

Alstom is dedicated to keeping thermal power plants competitive. Thanks to our OEM expertise and involvement in around 25% of the world’s power production capacity, Alstom operates from a position of proven expertise. With 15,000 power industry professionals spread across 200 world-wide locations, we support our customers with extensive service solutions for daily operations and maintenance while helping to enhance life cycle management.

In a changing competitive and regulatory environment, flexibility and expertise are key. Building on our global fleet and project execution experience, we partner with owners of Alstom and other OEM equipment to help maximise performance and lifetime profitability while keeping safety, reliability and environmental compatibility top priorities.

Alstom is a global organisation that cultivates cutting-edge expertise at the product/technology level while maintaining a strong local presence to meet site-specific needs and efficiently deliver tailored solutions in both established and emerging markets. Whether you require support in the areas of skills or systems, we have the technology, solutions and presence to meet your needs.
In today’s tough markets, plant owners need inventive and reliable reconditioning solutions to optimise and enhance their return on assets.

Reconditioning to reduce life cycle costs

In a dynamic market and regulatory context, utilities, independent power producers and merchant power generators are all looking to maximise their return on investment by optimising plant life cycle economics through reconditioning.

At Alstom, we combine OEM insights and fleet experience to establish a unique perspective that allows us to offer the most efficient reconditioning solutions.

Whatever suits your business needs best, we recondition or further upgrade components and incorporate the latest technological advantages to maximise the performance of reconditioned parts.

With over 100 years of turbine design and manufacturing and more than 30 years of reconditioning experience, Alstom provides high-quality reconditioning solutions to reduce life cycle costs, while at the same time keeping your risk at a minimum.

Parts reconditioned by Alstom will fit perfectly – so there are no unexpected surprises during reassembly. Alstom delivers full sets with seamless fallout replacement and assembly material. In operation, reconditioned parts will perform indistinguishably alongside new parts.

The decision to recondition is best taken based on customer-specific and condition-based criteria. That is why we offer on-site inspection, metallurgical analysis and lifetime evaluation. Reconditioning with Alstom is a powerful step towards enhancing your total life cycle management.
We use an array of assessment tools to define the reconditioning scope and to monitor the process steps. From the incoming inspection where we check the component version serial number and component condition, throughout the complete reconditioning cycle, we ensure full traceability of every step.

Surface contamination and old coatings need to be removed, before detail inspections and subsequent repairs can take place. Besides classic mechanical and chemical methods of cleaning, we also employ advanced thermo-chemical cleaning techniques like fluor ion cleaning to remove oxides from the finest tip of a crack in preparation for crack brazing.

Increasingly advanced materials and technologies are being employed in the quest for higher power output and efficiency. This adds complexity to the repair job.

Alstom’s substantial investment in people and technology means we can efficiently handle manual and automated repair processes including welding, brazing, machining and laser-based processes.

Our innovative reconditioning services and portfolio of upgrades cater to the needs and concerns of all plant owners who want to increase availability, reliability and performance.

Extending the operating life of the hot gas path components and boosting performance is our speciality.

Building on over 100 years of turbine manufacturing, operations and maintenance experience, we know how to design, build and recondition in a manner that will achieve the best return on investment from any engine.

Our reconditioning service covers the full range of noble parts for Alstom and other OEM equipment:

- Turbine components: vanes, blades and heat shield segments
- Compressor components: blades and vanes
- Structural parts: vane carriers, liners and hot gas casings
- Combustor components: lances, burners, swirlers, etc.
Superior coatings play an important role in allowing higher operating temperatures and optimising total life cycle costs. For better protection against corrosion, oxidation and heat damage, Alstom has a full range of advanced coatings.

With our wide range of assessment methods and thorough documentation, we are able to present firm evidence that the reconditioned parts are according to specifications.

Thanks to Alstom’s cutting-edge reconditioning technologies, many parts that would otherwise be replaced can now be reconditioned.
Alstom’s global technology

Technology leadership is the key to reconditioning that enhances performance and extends component lifetimes and inspection intervals.

Reconditioning with Alstom is not just about getting your unit back online. We seek every opportunity to reduce emissions and boost performance by taking advantage of modern design insights to propose modifications that deliver added value. With this we bridge the technology gap between the time you bought the turbine and our current capabilities.

Expertise in reconditioning and latest design evolutions

Alstom’s reconditioning network has a strong link to the turbine development centre, which gives us first-hand knowledge of emerging technologies and the latest design improvements. Our experienced reconditioning and repair engineers have access to full-sized gas turbine test rigs and are supported by Alstom’s coating and material research laboratories.

Thanks to our investment in cutting-edge technologies:
- Lifetime of components can be enhanced with new repair technologies
- New techniques and automation technologies are reducing scrap rates
- Improvements can be made to whole sets of components cost-effectively
Putting quality first

A modern, traceable quality assurance system is integral to Alstom’s reconditioning process. From the incoming controls, to the final checks, every step of the reconditioning process is carefully monitored and documented.

Quality assurance for reconditioned parts is particularly important, because a correct form-fit is essential to avoid any unexpected surprises during reassembly. Furthermore, for reconditioning to be an attractive alternative, the reliability of reconditioned parts has to match that of new parts.

High standardisation
Standard reconditioning processes are developed, tested and audited in one of our technology centres before being implemented and certified for each reconditioning workshop in our network. Close communication between workshops and our technology centres ensures the continuous growth of our practical knowledge and experience.

A mindset and a system
Quality control at Alstom is not a department: it is the mind-set of all our highly trained employees whose skills are continuously honed to global standards. All our reconditioning workshops are ISO 9001:2000 certified. Furthermore, our Reconditioning Diagnostics and Statistics platform (R-DAS) enables us to have full traceability for each component and manufacturing and quality assurance step.
Our global reconditioning network, product lines, field service and sales organisations collaborate closely to ensure for you the very best support. Our global organisations derive insights and added value by systematically managing the knowledge accumulated within our global fleet. At the local level, we cooperate closely with you to determine solutions that suit your exact needs.

**Global competence, local presence**
This combination of global reach and local partnership means everything happens faster when it needs to:

- We can conduct on-site assessments rapidly or arrange the full-service approach where Alstom is responsible for all the logistics and work from disassembly to reassembly and everything in between.
- Besides shorter lead times, our customer proximity is the basis for better condition-based or customer-specific reconditioning strategies.
- The identical procedures, equipment and training levels throughout our global network allow us to balance loading in our workshops and ensure timely delivery to our customers.

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**Reconditioning workshops around the world**

<table>
<thead>
<tr>
<th>Location</th>
<th>Type</th>
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<tbody>
<tr>
<td>Switzerland, Birr</td>
<td>Blading, combustor parts</td>
</tr>
<tr>
<td>Croatia, Karlovac</td>
<td>Structural parts</td>
</tr>
<tr>
<td>UAE, Dubai</td>
<td>Blading, combustor parts</td>
</tr>
<tr>
<td>USA, Richmond</td>
<td>Blading, combustor parts</td>
</tr>
<tr>
<td>USA, Jupiter</td>
<td>Blading, combustor parts</td>
</tr>
<tr>
<td>USA, Danville</td>
<td>Structural parts</td>
</tr>
<tr>
<td>Vietnam, Phu My</td>
<td>Blading, combustor parts</td>
</tr>
<tr>
<td>KSA, Rabigh</td>
<td>Structural parts</td>
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On average, we process well above 50,000 components per year in our global reconditioning network.
Reconditioning unlimited

Power Systems Mfg., LLC (PSM), an Alstom company, provides a wide range of technologically advanced aftermarket gas turbine capital components, reconditioning, field services, monitoring and Long-Term Agreements (LTAs).

The reconditioning portfolio for the 50 Hz and 60 Hz markets includes blades and vanes, liners and transition pieces, fuel nozzles, rotors and other capital parts. PSM performs repairs on components manufactured by Alstom and PSM as well as other OEM’s including Siemens, Mitsubishi and GE. PSM also adds design modifications and upgrade features to keep your other OEM parts running longer.

The reconditioning workshop located in Jupiter, FL, USA, is fully integrated with the other Alstom reconditioning workshops. This network is supported by the Engineering Product Center expertise in Jupiter and Mannheim, Germany, for the non-Alstom products.

Our PSM offering portfolio
As a full service provider, the PSM team supports a wide range of power equipment including gas and steam turbines, generators and auxiliary equipment.

PSM is fully integrated into the Alstom organisation and works to the same high standards completing workscope in a timely, safe and high-quality manner worldwide.

- An entire range of re-engineered and fully compatible compressor, combustion and hot gas path components for the GE 7FA and Siemens-Westinghouse 501F engines designed to improve life cycle costs.
- Performance upgrade packages for the 7FA and 501F engines that increase efficiency, power output and inspection intervals.
- An ultra-low emissions LEC-III® combustion system for GE’s B and E class engines. Additionally hot gas path replacement components are available for the 6B, 7E and 9E.
- LTAs that are structured to meet the specific needs of each individual plant and account for changing market conditions. Our flexible agreements incorporate state-of-the-art PSM parts, reconditioning, field services, “24/7” plant monitoring and engineering support to optimise maintenance budgets and lower costs over the life of the agreement.
Alstom’s service contracts are tailored to meet all your operational, maintenance and support requirements. Whether you prefer a Long Term Agreement (LTA) or an Operation & Maintenance (O&M) contract with Alstom’s comprehensive, yet flexible agreements, you can be sure of a win-win situation.

Partnerships for performance

Long-term agreements are based on framework contracts that define prices and conditions in advance. Besides offering preferential conditions for high-quality parts and services, the LTA reduces administrative efforts and simplifies planning. The scope of services and equipment covered, as well as the contract duration and risk sharing, can be adapted perfectly to your needs.

**LTAs** offer many immediate advantages:
- Fixed preferential prices for parts and services
- Flexible scope to suit operative strategy
- Extendable scope to include almost any aspect of plant operations

Alstom’s operation and maintenance contracts let plant owners devise completely new management strategies by outsourcing risks and responsibilities. Take advantage of performance and availability guarantees through tailored agreements that perfectly suit your required service and equipment scope.

Alstom’s **O&M contracts** are fee-based agreements that:
- Mitigate risks
- Leverage Alstom’s extensive experience in plant asset management
- Can be adapted to suit your business strategy
Alstom

Alstom is a global leader in the world of power generation, power transmission and rail infrastructure and sets the benchmark for innovative and environmentally friendly technologies.

Alstom builds the fastest train and the highest capacity automated metro in the world, provides turnkey integrated power plant solutions and associated services for a wide variety of energy sources, including hydro, nuclear, gas, coal, wind, solar thermal, geothermal and ocean energies. Alstom offers a wide range of solutions for power transmission, with a focus on smart grids.

Power generation

Alstom Power offers solutions which allow their customers to generate reliable, competitive and eco-friendly power.

Alstom has the industry’s most comprehensive portfolio of thermal technologies – coal, gas, oil and nuclear – and holds leading positions in turnkey power plants, power generation services and air quality control systems. It is also a pioneer in carbon capture technologies.

Alstom offers the most comprehensive range of renewable power generation solutions today: hydro power, wind power, geothermal, biomass and solar. With ocean energies, we are developing solutions for tomorrow. Alstom is one of the world leaders in hydro power, the largest source of renewable energy on the planet.