



**TITAN 250**  
**GAS TURBINE SYSTEM.**  
**FOR POWER GENERATION APPLICATIONS.**

**Turbomach**  
*A Caterpillar Company*

# MAXIMIZE LIFE-CYCLE BENEFITS

Built on six decades of field-proven technology and experience, the *Titan™ 250* will maximize the life-cycle benefits of your application. It can operate on a wide range of gaseous and liquid fuels and delivers 22 MW (21 745 kW<sub>e</sub>) of power and 77,000 pounds of steam per hour in a highly compact package.

The *Titan 250* was designed to give customers many years of productivity with low life-cycle cost. This means a gas turbine with high availability, reliability and durability that delivers best-in-class 39% efficiency, saving on fuel and reducing emissions. No other gas turbine system gives you better power density and efficiency with lower emissions while costing you less per kilowatt-hour. The *Titan 250* provides all of these benefits and more throughout the entire life cycle of the package, adding more dollars to your bottom line.



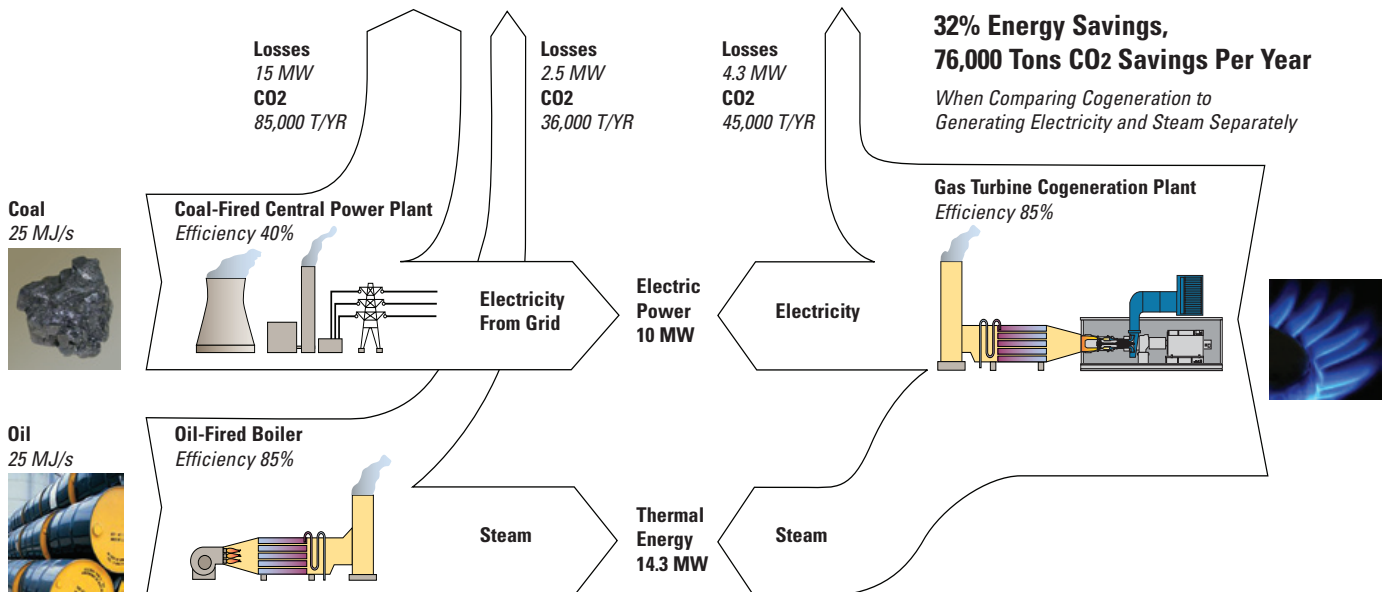
Industrial Combined Heat and Power  
Energy Star Award



University Combined Heat and Power  
Energy Star Award



Hospital Combined Heat and Power  
LEED Platinum Award



# SUSTAINABLE SOLUTIONS THAT FIT YOUR APPLICATION

Solar maintains a clear focus on providing customer satisfaction by designing products that lead their categories in critical performance and environmentally sustainable operation. *Solar*<sup>®</sup> gas turbines meet customer needs in ways that limit the impact on the environment, protect people who operate the equipment, and respect people who live nearby.

These products, including the *Titan 250*, provide sustainable solutions through the application of advanced technologies that enable high operating efficiency and low greenhouse gas emissions. Solar's industry-exclusive *SoLoNOx*<sup>™</sup> dry low-emissions combustion technology has been proven to lower emissions and ensure compliance with stringent exhaust emission regulations worldwide. *SoLoNOx* technology cuts NOx emissions up to 90% and CO emissions are reduced as much as 30% over conventional combustion systems.



Municipal Power  
Energy Star Award

Solar gas turbines incorporating *SoLoNOx* combustion systems, have logged more than 86 million operating hours, saving 2.1 million tons of NOx emissions, improving air quality for millions of people around the world. And many of our gas turbines have helped our customers win Energy Star, LEED and other awards recognizing efficiency and sustainability.

The *Titan 250* gas turbine generator set can be applied in a variety of applications, including combined heat and power, peaking power/load management, district heating and cooling, and base load power. It will meet your requirements in a wide variety of industries and facilities, including hospitals, universities, rural electric cooperatives, municipal utilities, food processing, pulp and paper mills, manufacturing facilities, mining and refineries.

For combined heat and power applications, the *Titan 250* generator set can be coupled with heat recovery equipment to optimize your application by capturing otherwise wasted thermal energy from the exhaust to produce steam for space, water or process heating, maximizing energy efficiency and increasing sustainability.

Because the *Titan 250* is extremely reliable and efficient, utilities can benefit by using it to provide power to isolated communities, commercial centers and industries. Utilities will also benefit their communities by using the *Titan 250* in peaking applications to reduce the incremental cost of additional generation.

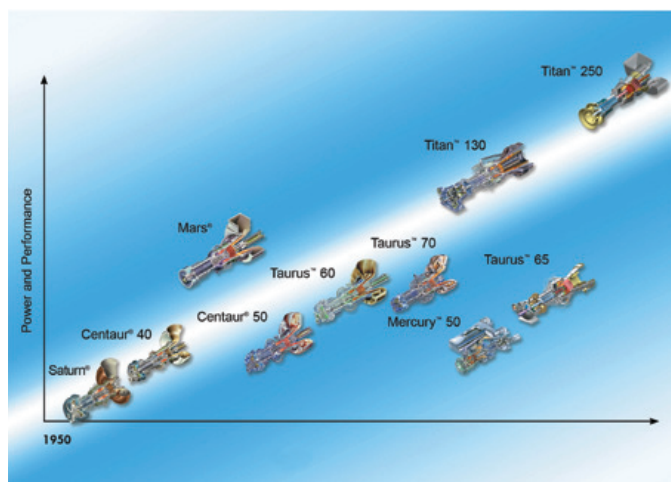


# LEVERAGING PROVEN TECHNOLOGY

The *Titan 250* is a familiar machine, yet still a gas turbine like no other – taking the best from Solar’s proven products. Each advancement builds on experience gained from our latest and most proven designs, while adding thoroughly tested technologies in critical areas of compressor aerodynamics, combustion, advanced materials, cooling performance and package design.

Configured for power generation, the *Titan 250* comes fully integrated and self-contained with lube oil, fuel and *Turbotronic™* control systems on board.

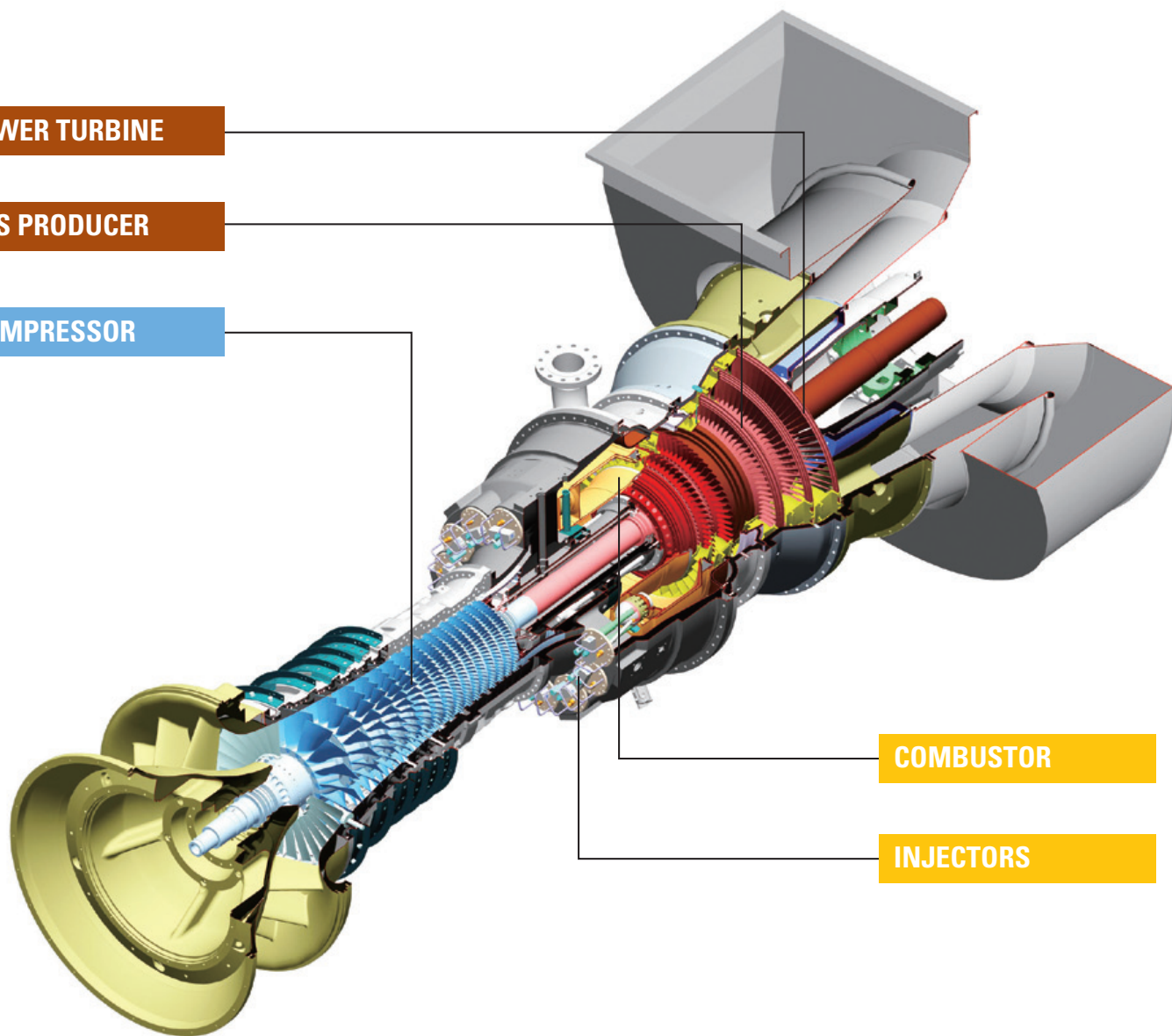
Modular inlet, exhaust and ancillary systems can be adjusted to suit your application in enclosed or unenclosed packages.



**POWER TURBINE**

**GAS PRODUCER**

**COMPRESSOR**



**COMBUSTOR**

**INJECTORS**

# ENGINEERED FOR EXCELLENCE

*Titan 250* gas turbines deliver best-in-class performance while saving on fuel and reducing emissions. Above all, the *Titan 250* is engineered for durability, reliability and availability. Using smart diagnostics, remote monitoring and onsite maintenance capabilities, the *Titan 250* takes advantage of advanced features to keep your operation online and producing for many years to come.

Look at the technologies behind the *Titan 250* and you'll recognize key contributions from our most widely accepted products:

## COMPRESSOR SECTION TECHNOLOGY



A 16-stage compressor produces a 24:1 pressure ratio. Coated components provide corrosion resistant surfaces for durability. The four-piece, split-case design allows for easy field maintenance. Variable guide vanes and stators permit smooth, reliable starting and stopping.

## COMBUSTION SECTION TECHNOLOGY



The 14 dry, lean-premixed *SoLoNOx* injectors deliver less fuel than conventional designs resulting in lower emissions. The combustion liner is an Augmented Backside Cooled (ABC) configuration providing maximum cooling ensuring long-term durability.

## HOT SECTION TECHNOLOGY



The two-stage gas producer features internally air-cooled first and second stage nozzle vanes as well as internally cooled first stage rotor blades. The design provides cylindrical blade tips and a rub-tolerant coating for improved tip control increasing efficiency.



The power turbine is a three-stage configuration utilizing shrouded blades to maximize efficiency and flatten the power curve.

And the *Titan 250* gas turbine was designed with the same rigorous approach that has always served our customers well – extending these proven technologies to new products and advancing the state of the art.

The latest proven engineering methods give the *Titan 250* its performance edge. Tools like computational fluid dynamics (CFD) and computer-aided thermal and mechanical analysis ensure achievement of design and performance objectives. A comprehensive reliability analysis gives you refinements in design and processes that further enhance availability:

- Adding redundancy
- Improving controls and optimizing shutdown logic
- Enhancing component reliability and durability
- Minimizing service events and their duration
- Expanding machine health monitoring and predictive maintenance

This design methodology ensures that customers receive robust equipment ready for long, reliable service across the entire life cycle of their project.



# HIGHER AVAILABILITY

Tougher projects and challenging markets demand maximum equipment availability. The *Titan 250* promises more productive hours with less repair and fewer and shorter planned service intervals. It continues a design tradition of modular components for the ultimate in operational flexibility and service simplicity.

## MONITORING AND DIAGNOSTICS: CORNERSTONES OF PRODUCTIVITY

*Titan 250* packages provide remote monitoring and predictive diagnostics enabled by Solar's *InSight System™*, the industry's most advanced equipment health management system. This system provides a clear vision, focus and understanding of your equipment and is designed to save you time and money.

With *InSight System*, problems once found only by a technician's visit can be detected online from anywhere – even half a world away – so you can avoid unscheduled downtime.

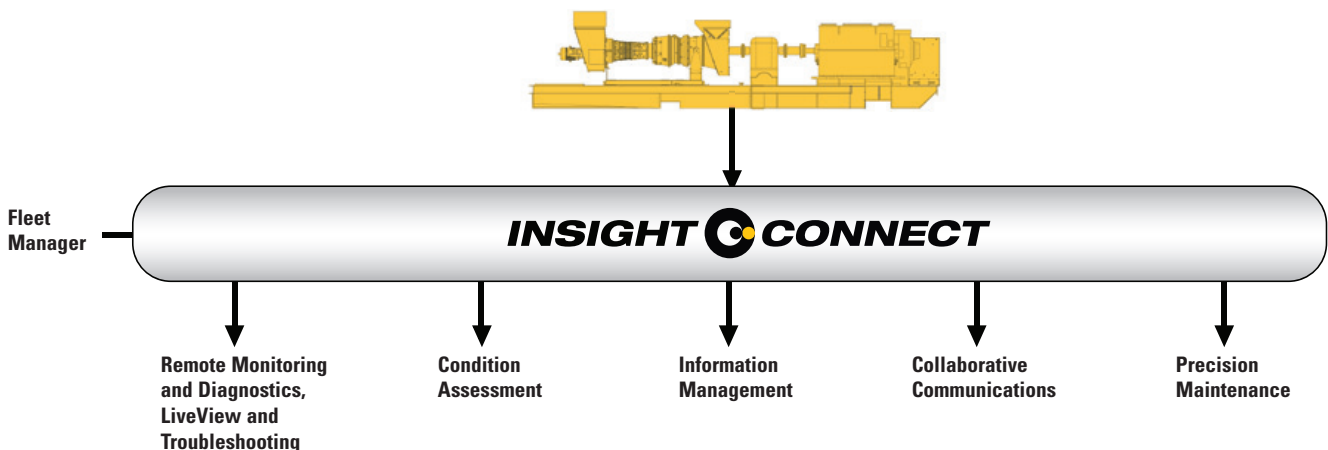
Capabilities include:

- Advanced diagnostics
- Condition monitoring
- Remote troubleshooting
- E-mail alert notifications
- Predictive recommendations
- Equipment operation summary reports



Features delivered by *InSight System* rely on a dedicated connectivity solution, *InSight Connect™*, allowing reliable access to critical operational information. This secured web connection provides a standardized method for the acquisition and transmission of information while minimizing the impact to an existing customer network.

*InSight System* monitors your operation 24 hours a day. If trouble is detected at any time it helps you determine the prognosis, forecast the outcome, and decide whether to repair now or wait for the next scheduled service. With built-in predictive capability, some events that previously would have shut the package down now trigger fall-back to a safe operating mode and alert service personnel of the machine's status. The system also gathers and analyzes information – performance maps, historical displays, reports on availability and life-cycle cost – to help you make operational decisions that maximize your investment.



# DESIGNED FOR PRODUCTIVITY

The *Titan 250* gas turbine system has been designed to give customers many years of productivity with the highest life-cycle value at the lowest life-cycle cost. This means equipment with the highest availability, reliability and durability, and machines that are easy to maintain and service.

Our complete approach to machinery management includes digital monitoring and control systems that help further minimize emissions, support predictive maintenance, increase availability, enable unattended operation, and reduce life-cycle costs.

All regularly serviced components are placed near the sides of the package for ease of access and fast service. With our lateral and axial engine repair and maintenance system, you have the option of doing in situ condition-based repair, modular component exchange, or a complete exchange of major engine components.

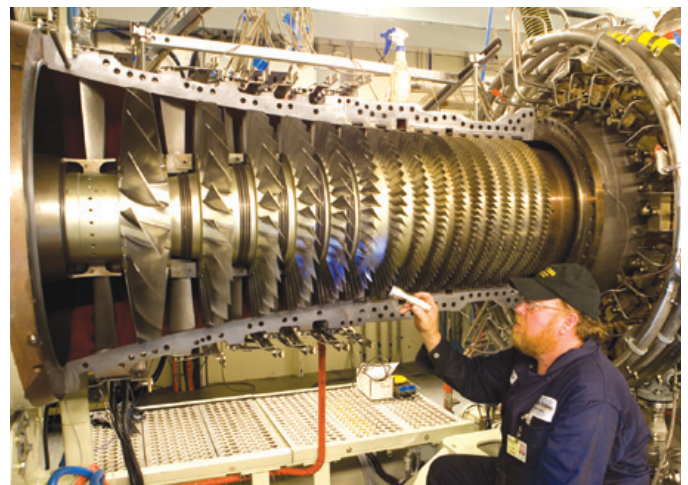
The rail-mounted service system supports the turbine from below and allows easy access to inspect, repair or replace hot section components, bearings, blades and seals. Technicians can also remove and replace the gas producer independently of the power turbine, avoiding realignment of the power turbine and driven equipment. The rails can also be used to roll the entire turbine out for factory overhaul or exchange, minimizing downtime.



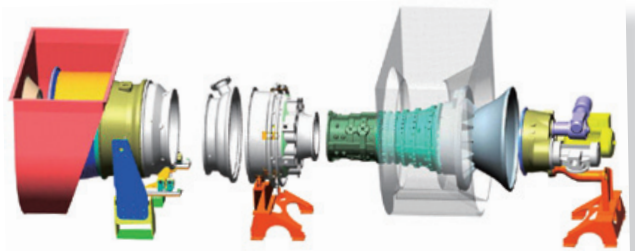
Lateral Rail System



Easy Access to Major Components

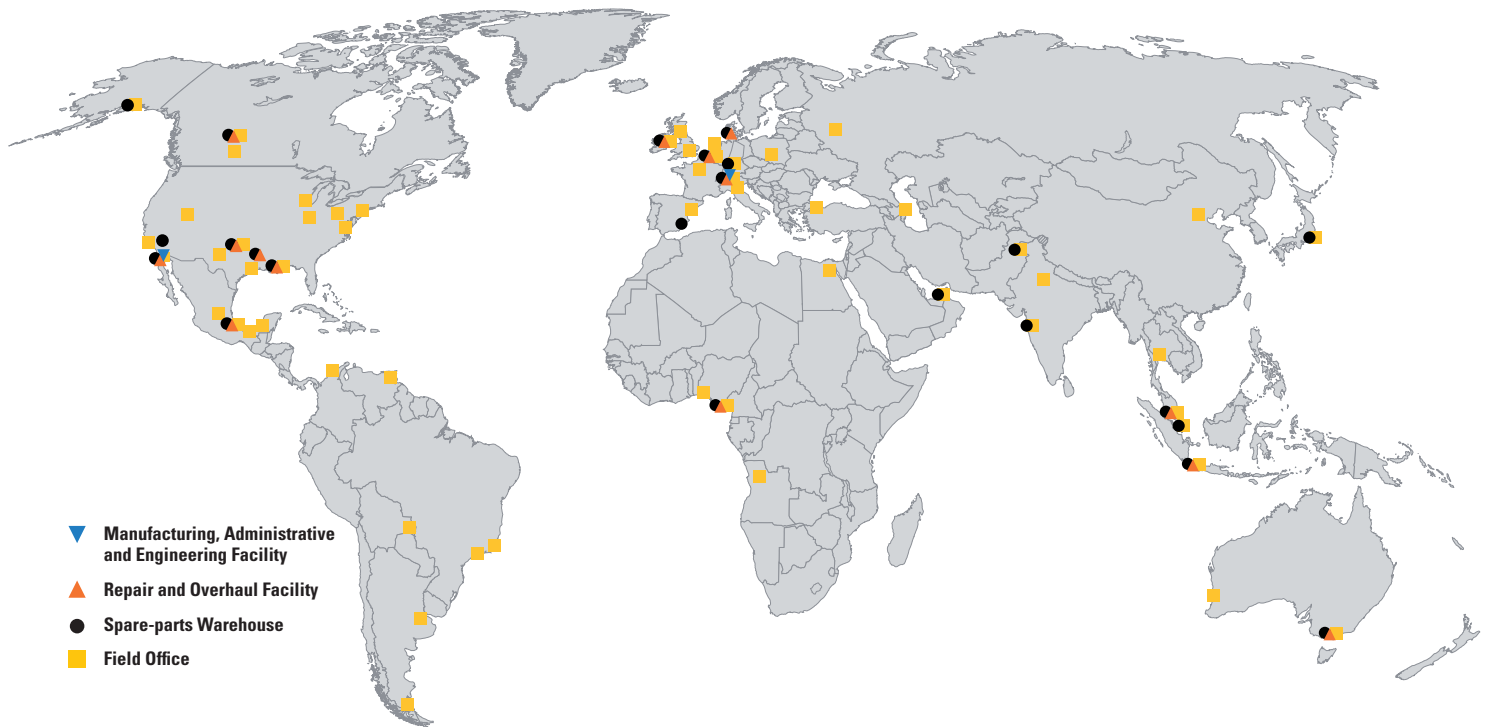


Onsite Inspection Capability



Axial Rail System

# CONTACT US AND PUT THE TITAN 250 TO WORK



**FOR FURTHER INFORMATION,  
PLEASE VISIT  
[WWW.TURBOMACH.COM](http://WWW.TURBOMACH.COM)  
OR CONTACT US AT:**

## **TURBOMACH Switzerland**

Via Campagna 15  
6595 Riazzino  
Tel: +41 91 851 15 11  
Fax: +41 91 851 15 55  
[contact@turbomach.com](mailto:contact@turbomach.com)

## **SOLAR TURBINES USA**

Solar Turbines Incorporated  
San Diego, California  
Tel: +1 (619) 544 5352  
[powergen@solarturbines.com](mailto:powergen@solarturbines.com)

## **OR OUR NEAREST FIELD OFFICE.**

**Brazil**  
Sao Paulo  
Tel: +55 11 2109 2015 or  
Tel: +34 93 586 41 62  
[contact\\_lam@turbomach.com](mailto:contact_lam@turbomach.com)

**Colombia**  
Cartagena de Indias  
Tel: +57 5 664 72 16 or  
Tel: +34 93 586 41 62  
[contact\\_lam@turbomach.com](mailto:contact_lam@turbomach.com)

**Egypt**  
Cairo  
Tel: +20 10 00 36 76 76  
[contact\\_africa@turbomach.com](mailto:contact_africa@turbomach.com)

**France**  
91280 St-Pierre-Du-Perray  
Tel: +33 1 6989 00 00  
[contact\\_fr@turbomach.com](mailto:contact_fr@turbomach.com)

**Germany**  
64347 Griesheim  
Tel: +49 6155 8749-0  
[kontakt\\_de@turbomach.com](mailto:kontakt_de@turbomach.com)

**India**  
Mumbai 400 076  
Tel: +91 22 4042 54 25  
[contact\\_in@turbomach.com](mailto:contact_in@turbomach.com)

**Italy**  
43122 Parma  
Tel: +39 0521 275 811  
[contact\\_it@turbomach.com](mailto:contact_it@turbomach.com)

**Netherlands**  
2171 AL Sassenheim  
Tel: +31 71 408 09 19  
[contact\\_nl@turbomach.com](mailto:contact_nl@turbomach.com)

**Pakistan**  
54000 Lahore  
Tel: +92 42 35 87 7760  
[contact\\_pk@turbomach.com](mailto:contact_pk@turbomach.com)

**Russia**  
114400 Moscow  
Tel: +7 495 755 8153  
[contact\\_ru@turbomach.com](mailto:contact_ru@turbomach.com)

**Singapore**  
Singapore 627973  
Tel: +65 6828 7000  
[contact\\_asia@turbomach.com](mailto:contact_asia@turbomach.com)

**Spain**  
08290 Cerdanyola - Barcelona  
Tel: +34 93 586 41 62  
[contact\\_es@turbomach.com](mailto:contact_es@turbomach.com)

**Thailand**  
Bangkok 10250  
Tel: +66 2 366 0712-5  
[contact\\_asia@turbomach.com](mailto:contact_asia@turbomach.com)

**Turkey**  
34330 Istanbul  
Tel: +90 212 284 6001  
[contact\\_tr@turbomach.com](mailto:contact_tr@turbomach.com)

**United Arab Emirates**  
Dubai  
P.O. BOX 17779  
Jazfa, United Arab Emirates  
Tel: +971 48168300  
[contact\\_middleeast@turbomach.com](mailto:contact_middleeast@turbomach.com)