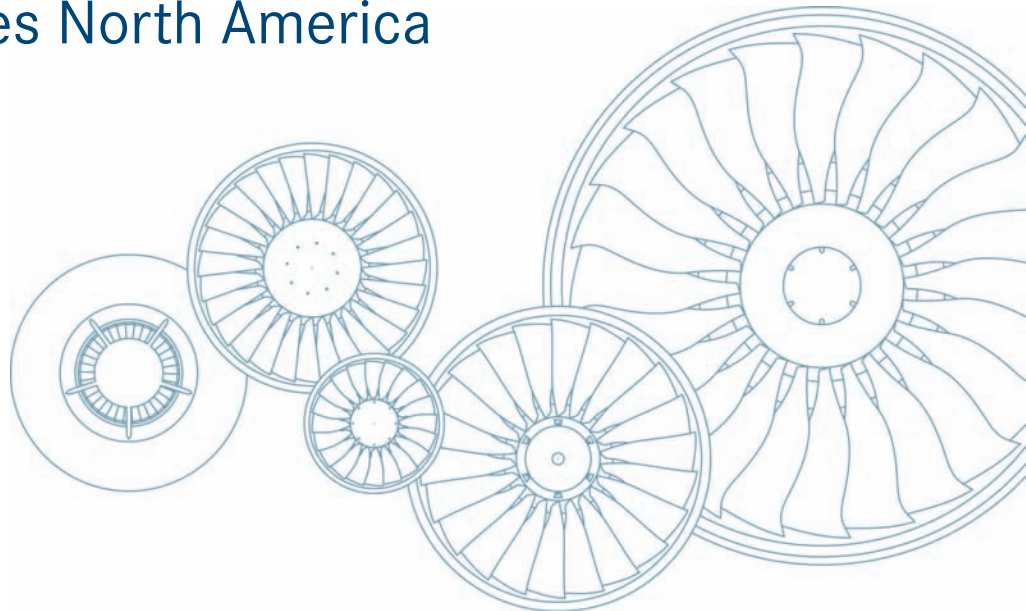




MTU Aero Engines North America



Enginese. We speak your language.

Enginese.

n. The language of partners closely tied by matters of expert engineering services for gas turbine engines and engine components.

In the aviation industry, MTU Aero Engines is known for top-notch gas turbine technology. Headquartered in Munich, Germany, MTU has been providing propulsion systems to power aircraft for decades.

MTU designs, develops, manufactures, markets and supports commercial and military aircraft and industrial gas turbines. MTU is Germany's leading independent engine manufacturer. The company has expertise in all aspects of engine manufacture and repair.

MTU has a long tradition of success in Germany, where the company has established itself as a major player in the global engine industry.

MTU Aero Engines North America (MTU AENA), a U.S. company, is a subsidiary of MTU Aero Engines. Innovation, backed by precision engineering, stands behind the company's reputation for elegant solutions tailored to each customer's individual needs.

MTU AENA provides a full range of engineering services to customers in the aerospace and power generation industries in the United States and beyond.

MTU AENA's core competencies focus on program management and engineering services (design, analytics, project and repair engineering) for gas turbines.



A global engineering partner

The proven expertise developed through years of partnership with gas turbine engine original equipment manufacturers (OEMs) makes MTU AENA the best choice for any engineering challenge.

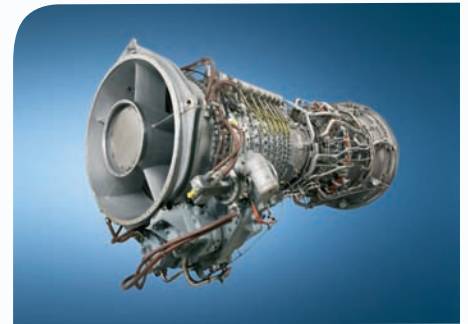
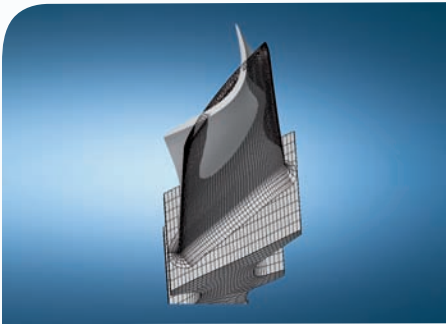
MTU AENA is part of a key market player in the aero engine industry. Most of MTU AENA's people have worked in gas turbine development programs as a partner of other OEMs.

MTU AENA's greatest strength is the unique knowledge gained through more than a decade of partnership with OEMs. Expertise in designing fuel-efficient engines drives the company's efforts to enhance customer satisfaction by ensuring that MTU AENA meets or exceeds crucial quality benchmarks.

MTU AENA's exceptional skills set the company apart from other engineering services providers. MTU AENA is experienced in meeting the needs of aero engine and land-based industrial gas turbine programs. The company's engineers often sit on the "customer-side" of the table – and they understand the need for "first time right" engineering with high quality and on-time delivery.

As a program-minded organization, MTU AENA offers particularly strong project management skills. The company not only understands the art and science of engineering, but also the reality of other challenges: the time crunches, the cost sensitivities, the export control requirements and the quality imperatives.

We speak Engine, too.



A partner in the gas turbine market

Located in Rocky Hill, Connecticut, MTU Aero Engines North America (MTU AENA) brings a wealth of engineering expertise to meet the needs of aerospace and industrial customers.

MTU AENA is an independent U.S. company, yet it operates as a subsidiary of one of the industry's global leaders. This advantageous business model gives customers the support of MTU's experience and proven expertise, along with the convenience and efficiencies of a local company.

MTU Aero Engines is known worldwide for extraordinary quality and the highest reliability standards in the development, manufacture and repair of commercial, military and industrial gas turbine engines. MTU AENA shares more than a name with its parent company. Subsidiaries share ideas and resources, too. MTU AENA collaborates with MTU using a team approach that puts world-class solutions within easy reach of its customers.

MTU AENA is at the forefront of today's need for high-performance aircraft engines with low fuel consumption. MTU AENA engineers analyze engine loads and tolerances to keep fixed-wing and rotary-wing aircraft flying. In

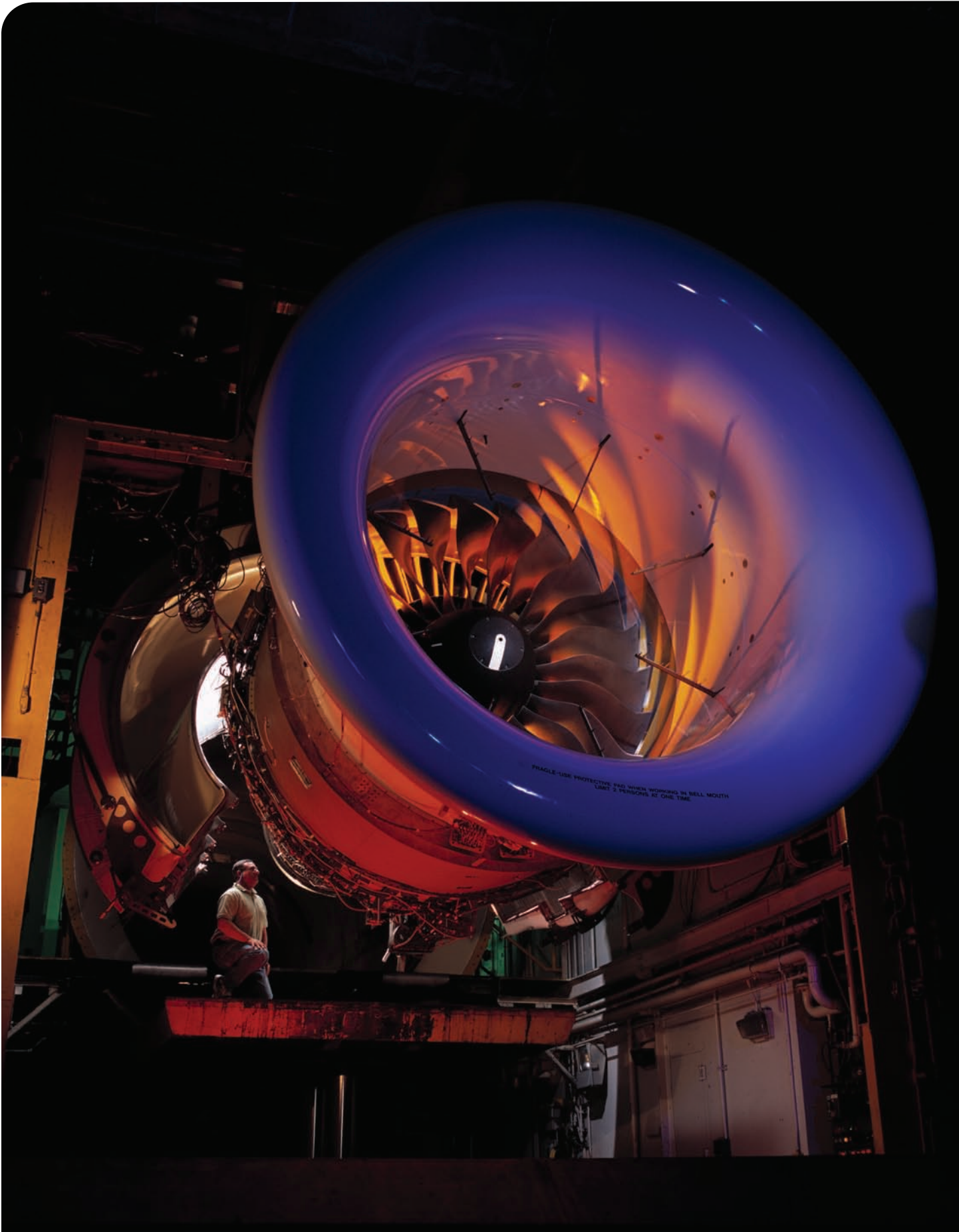
the land-based gas turbine market, MTU AENA draws on its aero engineering skills to keep engines running at peak performance. As a U.S. company, MTU AENA holds the requisite credentials to work with defense contractors on military programs.

MTU AENA's team of engineering professionals has extensive experience in everything from conceptual design, detail design and test/validation from entry-into-service through post-service support. Designers, analysts, test engineers, project engineers, repair engineers and customer support personnel are all dedicated to providing the highest levels of customer service. They work hard to understand customers' needs, to respond quickly and maintain a strong focus on turnkey, cost-effective solutions, on-time delivery, and "right the first time" quality.

MTU AENA offers its customers a broad array of knowledge and experience in every aspect of jet propulsion and gas turbine technology. Consistent with its well-earned reputation for technical innovation, performance, service, and quality, MTU AENA is positioned to play a vital role in meeting its customers' challenges.



MTU AENA's main office is in Rocky Hill, CT.



The GP7200, an MTU partnership engine, on the open-air test stand at night.

The MTU-OEM partnership



Producing maximum power

Founded in 2000 as a Pratt & Whitney partner, MTU AENA has built a strong reputation for engineering excellence. MTU has a worldwide reputation for speed, flexibility and efficiency. MTU AENA's engineers know that they have the backing of a Munich-based company that spans the globe.



MTU AENA draws on the expertise of its German parent with decades of experience in producing propulsion systems for EASA-certified aircraft. Bilateral agreements with OEMs in Europe and Asia extend the company's reach around the world. In 2010, MTU AENA earned the coveted ACE Gold Supplier status from Pratt & Whitney, a United Technologies Company. MTU AENA's engineers drive the development of the next generation low-pressure turbine (LPT) engines.



MTU AENA allocates tasks and responsibilities within a framework called a Component Integrated Product Team (CIPT). CIPTs have cradle-to-grave ownership of their assigned module or product throughout its life cycle. CIPTs support all product life cycle phases: from concept optimization to preliminary

design; detailed design; validation and certification; and delivery, service and support. The CIPT is responsible for execution of the program requirements for each assigned module or product.

CIPT members play a key role in validation and certification. MTU AENA verifies that required testing has been completed for all parts and ensures that all results concur with propulsion system requirements. MTU AENA also ensures that certification testing is completed in accordance with regulatory agency requirements. With its broad experience and knowledge of applied design and project management techniques, MTU AENA can contribute valuable expertise to a company's process improvement initiatives.

MTU AENA's dedicated CIPT members make sure product requirements can be met in terms of schedule, performance and durability. The team identifies and resolves any work shortfalls and reviews the engine validation plan test requirements. Key components of the partnership include inspection, overhaul and programs for risk mitigation. Should the need arise, the CIPT performs root cause analysis and leads field event assessments.



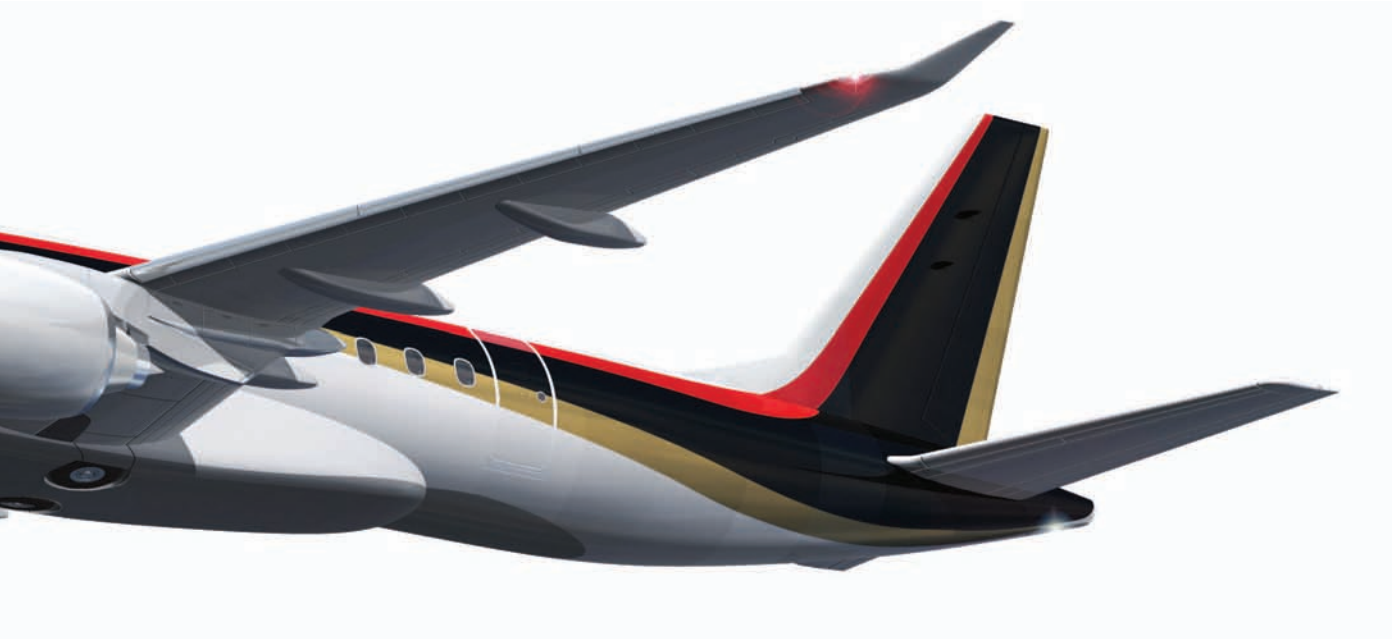
The next generation of PurePower®

With the Geared Turbofan™ (GTF), MTU and Pratt & Whitney are building the propulsion system of the future. The unique feature of the GTF is a reduction gear-box between the fan and the low-pressure turbine. On conventional engines, the two components are rigidly interconnected through a common shaft. When they are decoupled by a gearbox, the large-diameter fan can run slower and the turbine much faster, permitting both components to operate at their best. In this manner, they greatly improve the efficiency of the GTF engine and reduce the noise it generates.

Pratt & Whitney's PurePower® PW1000G engine family is not just a concept or a promise for the future—it is reality. MTU AENA's partnership with Pratt & Whitney has created a more efficient engine to power medium- and short-haul aircraft.

MTU AENA also partners with OEMs and engine consortiums to develop components and modules used in V2500, PW2000, PW4000, PW6000 and GP7000 engines. From the beginning, MTU AENA's parent company in Munich has dedicated its know-how and resources to the project. Although the U.S. office is small enough to assure personal attention to customers, MTU AENA's OEM partners can rely on real-time support from a global parent company with decades of experience in producing propulsion systems. The PurePower® PW1000G engine family with GTF technology delivers game-changing reductions in fuel burn, environmental emissions, engine noise and operating costs.

MTU AENA collaborates on a wide range of projects through partnerships that utilize its design, analytics, repair and project management skills. MTU AENA plays a vital role in cost savings, weight reduction and performance improvement initiatives.



The Mitsubishi Regional Jet (MRJ) is one of the platforms for Pratt & Whitney's PurePower® PW1000G Geared Turbofan engine.

Delivering results through strong project management



Customer partnerships

MTU AENA's Component Integrated Product Teams have developed the skills to take your project from design concept through after-market services. MTU AENA has developed processes for a wide range of design, analytics and project management activities with the company's OEM partners. MTU AENA takes the experience and skills learned through the company's partnerships and applies them to providing engineering services for other customers.

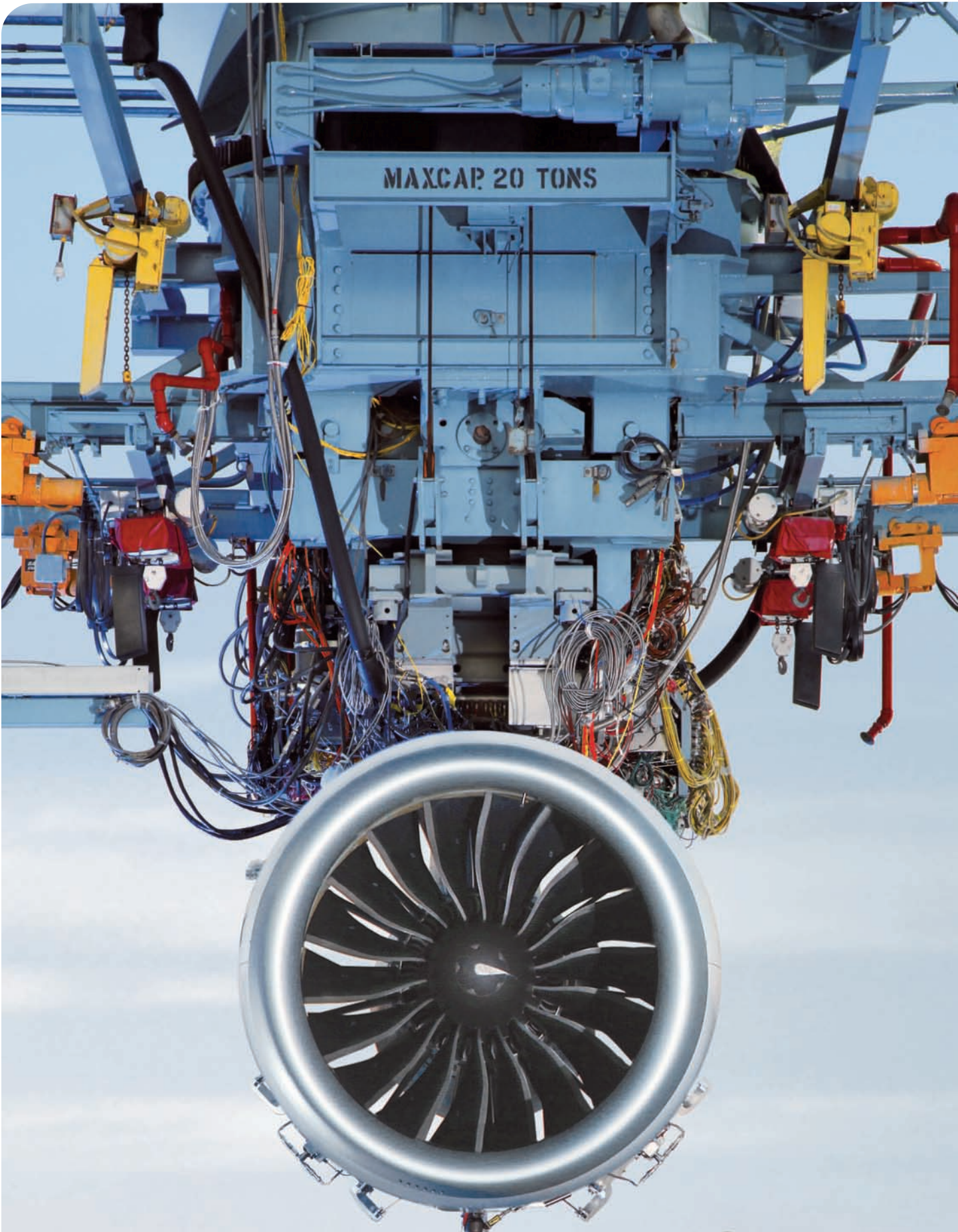
professionals will perform root cause analysis for service problems, handle industrial management tasks or fill gaps in your project teams. MTU AENA's logistics specialists forecast parts demand and make supply chain projections, working on site at the customer to ensure the accuracy of all communications. Project engineers at MTU AENA are well trained in tools such as Microsoft Project and Earned Value Management System (EVMS). Using these tools and their experience, they work to deliver projects to completion on time and within budget.



MTU AENA participates in key partnerships with customers engaged in aerospace and industrial gas turbine applications. MTU AENA's parent company pioneered the high-efficiency engine propulsion systems that are synonymous with excellence in aviation worldwide. MTU AENA has ready access to a German workforce with more than 75 years of experience in gas turbine engine design. The company's project engineering and management

The same thrust that drives an aero engine can generate electricity for a power plant. Beyond the aerospace market, MTU AENA is providing engineering services in the industrial gas turbine (IGT) industry. MTU AENA is expert in providing high-tech engineering for aircraft, where light, reliable, weight-optimized design is the goal. MTU AENA is now translating the same skills into technologies that use gas turbines for other applications.





The Pratt & Whitney PurePower® PW1000G is a high-bypass geared turbofan engine.

Firm roots in Germany



A strong presence worldwide



MTU in Germany

MTU Aero Engines is a company with a long tradition, its roots dating back to 1934. It operates three locations in Germany:

MTU Aero Engines Munich

The Munich-Allach site, the oldest and largest of the company's locations, is home to MTU Aero Engines' headquarters as well as to MTU Maintenance and MTU Aero Solutions. It is from here that the company's affiliates and most of MTU's research and development activities are controlled.

At its Munich location, MTU assembles military and commercial engines and manufactures components for shipment to the big engine OEMs. Moreover, spare parts are manufactured and innovative repair and maintenance techniques developed for use at the company's affiliates.

MTU Maintenance Hannover Langenhagen

The Langenhagen facility is the centerpiece of the MTU Maintenance group. It is responsible for the maintenance of medium- and large-size commercial engines, including the General Electric CF6-50, CF6-80C2 and GE90, Pratt & Whitney PW2000, International Aero Engines V2500 and CFMI CFM56-7B. Comprehensive service offerings, such as engine leasing, 24-hour AOG service, training and Total Engine Care, complement the company's portfolio. The location is MTU's center of excellence for high-tech repairs and is busy developing novel repair techniques.

MTU Maintenance Berlin-Brandenburg Ludwigsfelde

Ludwigsfelde-based MTU Maintenance Berlin-Brandenburg specializes in the maintenance of Pratt & Whitney Canada engines and industrial gas turbines. It provides service support for PT6A, PW200, PW300 and PW500 and General Electric CF34 family engines. It is MTU's center of excellence for the maintenance of industrial gas turbines, with a special focus on the GE LM series of gas turbines. The location operates the only production test facility for the TP400-D6.



MTU's Munich location is home to the company's headquarters.



MTU Maintenance Hannover also provides support for the V2500 engine that powers the A320 family of aircraft.



MTU Maintenance Berlin-Brandenburg is MTU's center of excellence for industrial gas turbines.



Pratt & Whitney Canada engines, such as the PW305 shown here, are maintained by the CSC in Ludwigsfelde.



- MTU Maintenance Berlin-Brandenburg
- Pratt & Whitney Canada Customer Service Centre Europe

MTU Maintenance Hannover

MTU Aero Engines Polska

- MTU Aero Engines
- EUROJET Turbo
- Turbo-Union
- MTU Turbomeca Rolls-Royce ITP
- MTU Turbomeca Rolls-Royce

Middle East Propulsion Company

MTU Maintenance Zhuhai

MTU Maintenance Service Center Ayutthaya

Airfoil Services



MTU Maintenance Canada provides service support for CF6 family engines and accessories.



MTU Aero Engines Polska develops, manufactures and repairs engine parts.



Ceramic Coating Center in France specializes in ceramic coatings.

MTU's international locations

MTU is a global player that cooperates with the world's biggest engine manufacturers and has set up affiliates in all important regions and markets.

MTU Aero Engines North America Rocky Hill, CT U.S.

In Rocky Hill, Connecticut, a team of engineers provides program management and engineering services for OEM partners and customers in the gas turbine industry.

MTU Maintenance Zhuhai Zhuhai, PR China

Germany's leading engine manufacturer has a presence also in China. MTU Maintenance Zhuhai, a 50-50 joint venture of MTU Aero Engines and China Southern Airlines, specializes in the maintenance and repair of V2500-A5 (IAE) and CFM56-3, -5B, -7B (CFMI) engines.

MTU Aero Engines Polska Rzeszów, Poland

Located in Rzeszów in the Polish aviation valley MTU Aero Engines Polska develops and manufactures low-pressure turbine components and turbine airfoils, assembles modules and repairs engine parts.

MTU Maintenance Canada Richmond, BC, Canada

MTU Maintenance Canada, a wholly-owned MTU affiliate, has its home near Vancouver. The company provides overhaul services for CF6-50 and CFM56-3 engines and is MTU's center of excellence for accessories.

Vericor Power Systems Alpharetta, GA U.S.

The wholly-owned MTU affiliate Vericor Power Systems designs, develops and manufactures gas turbines for marine propulsion, mechanical drive and electrical power generation applications. As the OEM for the TF and ASE series of gas turbines Vericor serves customers worldwide, including the navies of various countries.

Airfoil Services Kota Damansara, Malaysia

MTU operates Airfoil Services Sdn. Bhd. (ASSB) in the vicinity of Kuala Lumpur in equal partnership with Lufthansa Technik. The shop repairs airfoils of CF6-50, CF6-80, CF34, V2500 and CFM56 family engines.

Ceramic Coating Center Châtelleraut, France

Ceramic Coating Center (CCC) is a 50-50 joint venture of MTU Aero Engines and Snecma Services (SAFRAN group) specializing in high-tech coatings.

MTU Maintenance Dallas Grapevine, TX U.S.

With MTU Maintenance Dallas, MTU has expanded its portfolio to also include on-wing services. The location provides maintenance services for the CF34, CFM56, V2500, CF6, GE90, JT8D, PW2000, PW4000, RB211 and other engines.

MTU Maintenance Service Center Ayutthaya

MTU Maintenance Service Center Ayutthaya in Thailand specializes in the maintenance of industrial gas turbines. It provides service support mainly for regional LM6000 customers.

Representative offices

MTU has established representative offices around the globe, notably in the U.S., China, Thailand and South Korea.

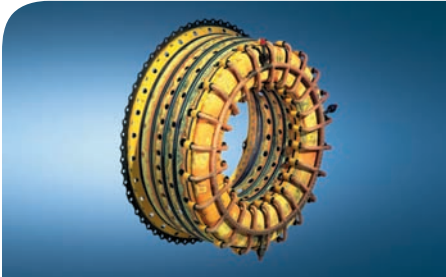
International participations

- International Aero Engines (IAE)
- Eurojet Turbo
- Europrop International (EPI)
- Turbo-Union
- MTU Turbomeca Rolls-Royce (MTR)/MTU Turbomeca Rolls-Royce ITP (MTRI)
- Middle East Propulsion Company (MEPC)



MTU Maintenance Zhuhai is the market leader in China.

Top-notch technology



Mastery of design disciplines

MTU AENA's team designs, models, and innovates—whether designing a single part, complex system or managing an entire project. The company is driven by its customers' requirements. MTU AENA executes conceptual, preliminary and detail design engineering, with mastery in the disciplines of modeling, drafting and checking. MTU AENA utilizes standard work processes, in combination with its own continuous improvement tools, to support all phases of a project and bring about a value-added finished product. MTU AENA employs the most advanced techniques for 3D modeling, dimensioning and tolerancing for parts and assemblies.

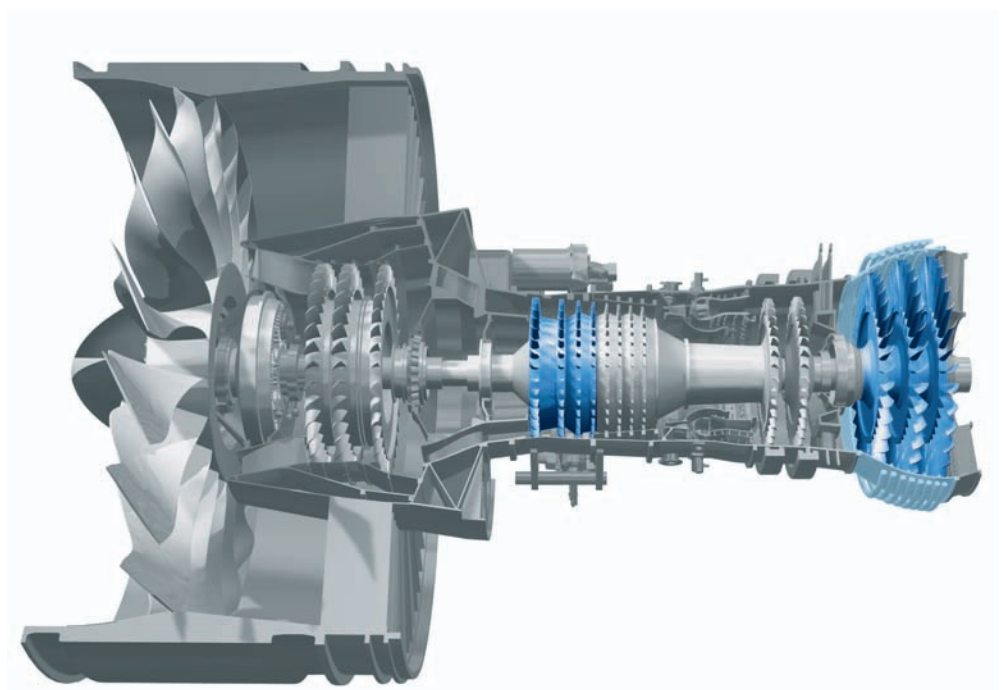
High-tech tools have revolutionized the ability to visualize components for aero and industrial gas turbine design, reverse engineer, overhaul and repair, and aftermarket services. MTU AENA visualizes individual parts and assemblies to optimize designs or recreate engine components, using the following software packages:

- Unigraphics
- Pro/Engineer
- Geomagic

The next generation of optical measuring is white light scanning, which provides higher resolution and better tolerances than laser scanning, with comparable tolerances to traditional CMM. For legacy turbine engines still in service, white light scanning provides an optimal way to recreate models and drawings that may no longer exist or be supported. It also provides a resource for capturing “as made” manufactured parts. This data can then be compared to the original CAD model and any non-conformances identified. MTU AENA techniques for data analysis include:

- White light scanning
- Rapid prototyping
- Tolerance expansion
- Laser scan or CMM

Inspection is a key component of the design process. MTU AENA provides custom services tailored to the needs of aerospace or industrial gas turbine manufacturers. MTU AENA's design professionals are experienced in design interface management as well as ANSI & ISO GD&T standards. MTU AENA's design teams provide the highest quality design services, on time and at a competitive cost.





MTU AENA provides engineering services to customers in the industrial gas turbine industry.

Best-in-class analytic solutions

Engineering analyses

MTU AENA performs structural, thermal and secondary air system analyses using finite element analysis and proprietary analytical tools. To perform analyses, MTU AENA can execute a customer's standard work or use its own processes, always delivering the most accurate results in the most efficient manner.

With best-in-class analysis solutions, MTU AENA helps ensure that safety, reliability and durability requirements are met, and that regulatory certification requirements are accurately submitted.

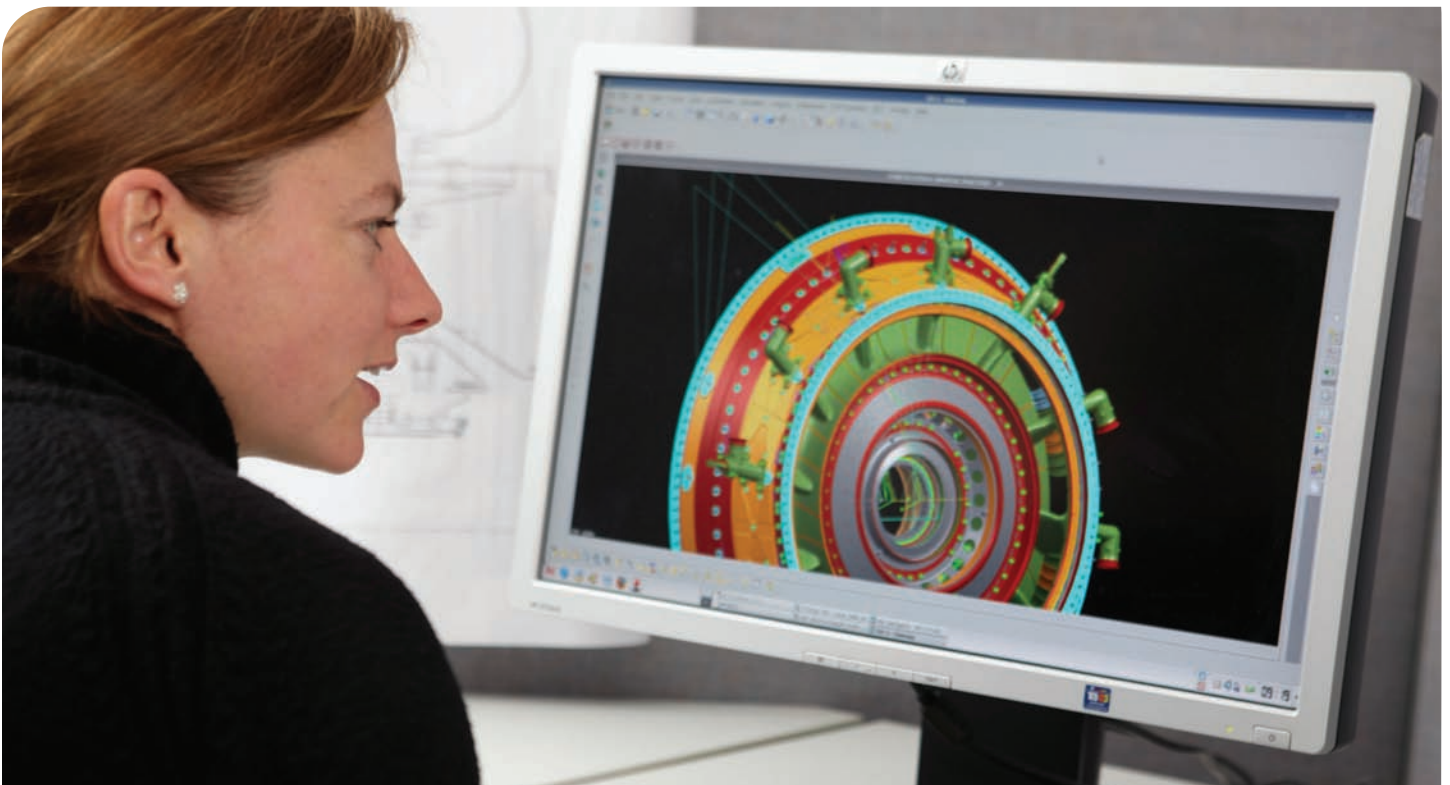
MTU AENA specializes in complex structural analysis for a high safety-critical industry. MTU AENA provides top-notch technology to the company's customers, starting with conceptual, preliminary and detail design analysis through the full product life cycle, including post-certification support, such as analyses of repairs of engines in service. MTU AENA develops and validates new tools and technologies.

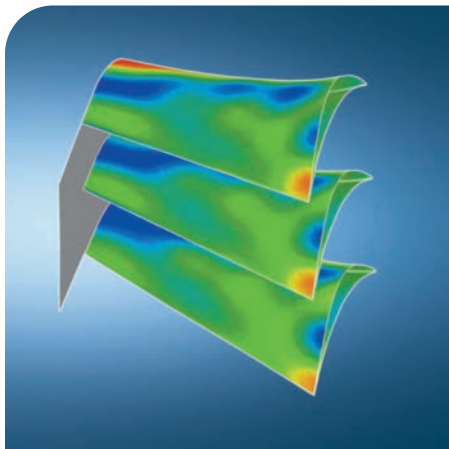
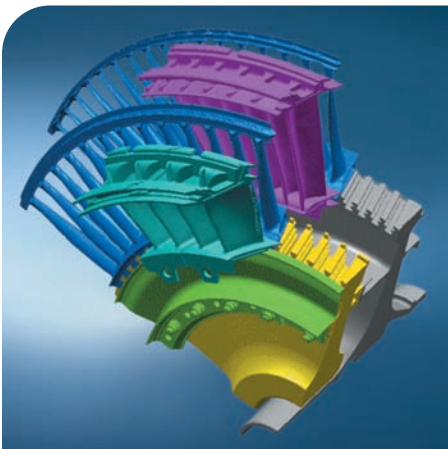
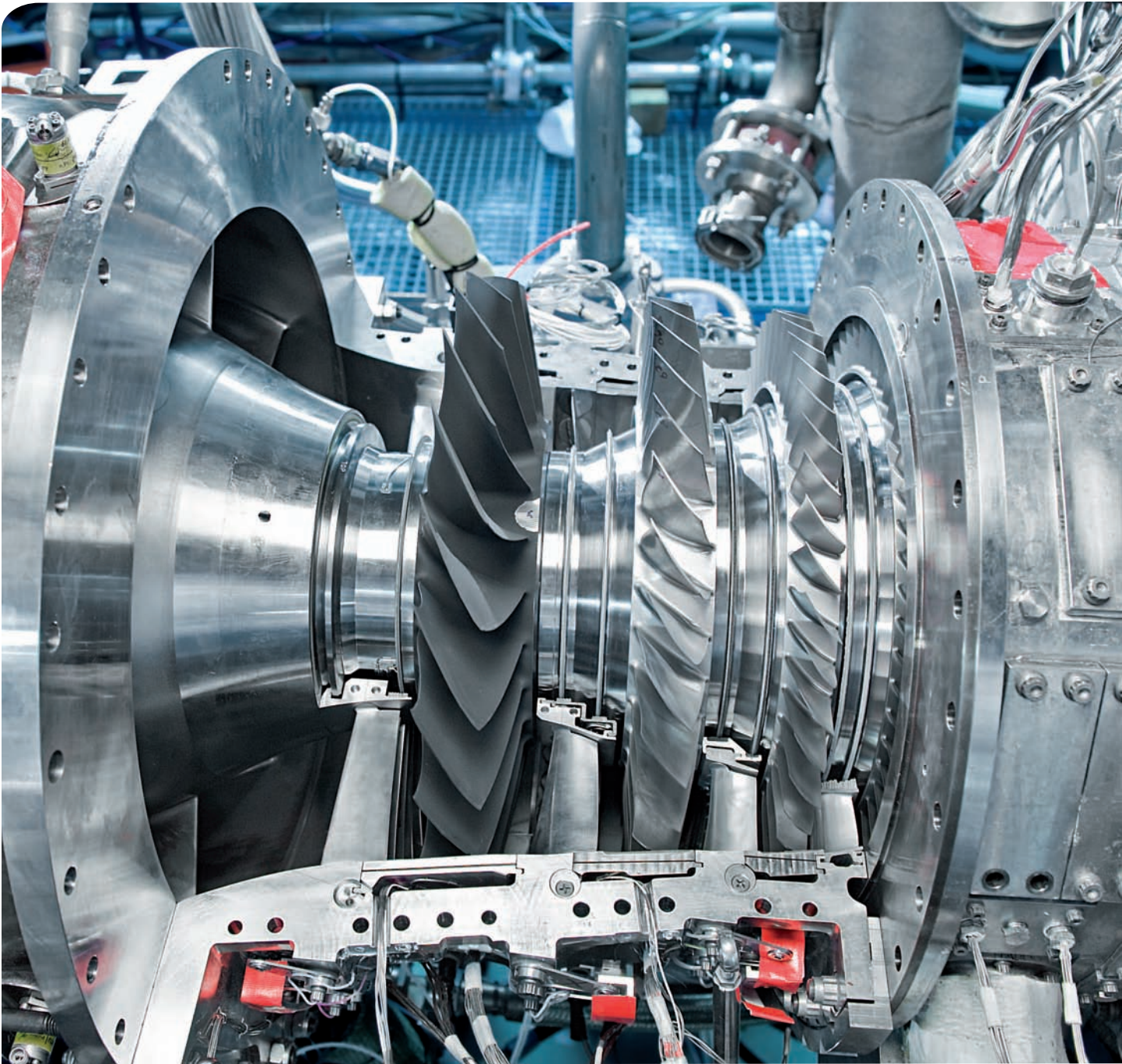
MTU AENA's core capabilities include the following analyses:

- Static steady-state
- Transient mission
- Cyclic lifing (LCF, TMF, HCF)
- Fracture mechanics
- Modal and vibration
- Burst and buckling
- Nonlinear creep

These analyses are performed using tools such as ANSYS®, Abaqus®, Marc®, Patran®, HyperMesh®, NASGRO® and DARWIN®, among other commercial and proprietary tools. MTU AENA focuses on the metrics, schedule and budget with exceptional customer satisfaction and on-time delivery.

By applying the extra effort necessary to provide what has been requested, when it is expected, without sacrificing accuracy on even the most complex assignments, MTU AENA enhances the speed and precision of analytics projects.





MRO engineering from inlet to exhaust



A leader in MROe

Along with its German parent company, MTU AENA is a leader in maintenance repair and overhaul engineering (MROe) services. When partnering with MTU AENA, expect cost-effective engineering solutions with timely dependable support and the flexibility to meet all requirements.

MTU's cutting-edge technologies and innovations extend operating time and prolong the serviceability of your components. MTU AENA's industry experts provide invaluable know-how to keep parts in service longer, generating more revenue. Specializing in the fast identification of MROe solutions allows MTU AENA to reduce engine downtime.

Industry-leading expertise allows MTU AENA to provide the coordination necessary to implement custom solutions to return parts

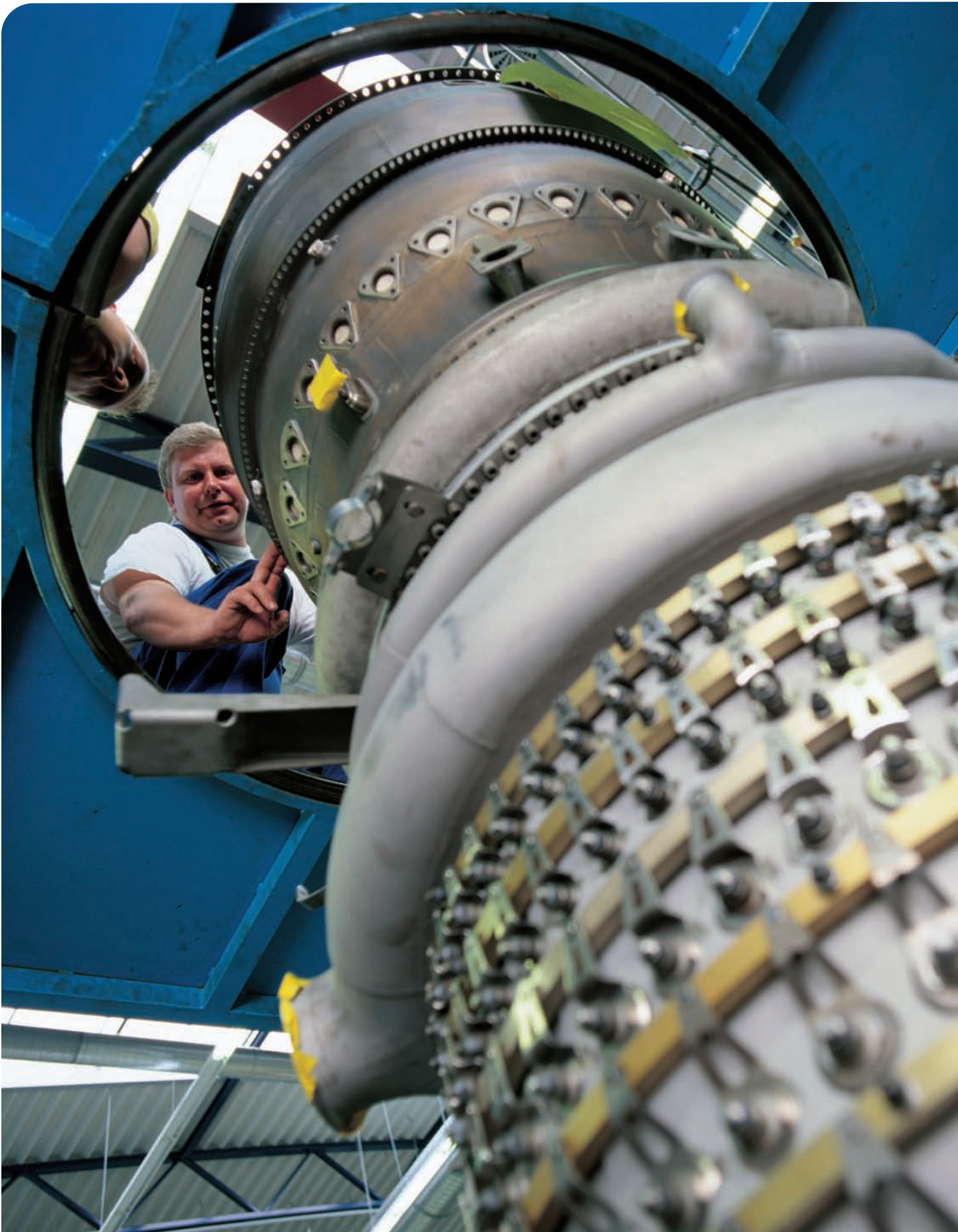
to service, while the company's on-site representatives efficiently meet FAA regulatory needs.

Core capabilities

- Custom MROe evaluations and solutions
- On-site regulatory approvals
- Substantiation and analysis generation
- Project Management
- Hardware review and disposition

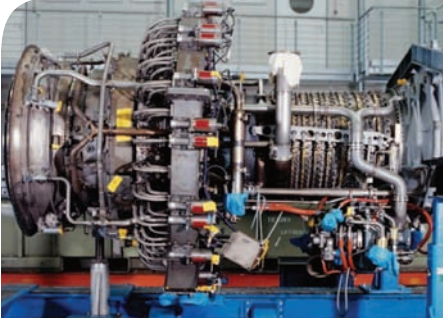
These MROe core competencies are rooted in extensive experience spanning a full range of commercial, military and industrial applications. MTU AENA's engineering team offers expert support and industry-leading quality with a strong focus on the individualized needs of customers.





MTU AENA's expertise extends from repair development for aero engines to industrial gas turbines.

The way forward



As MTU AENA looks toward the future, the goal is to expand the company's capabilities while training and growing its young workforce. MTU AENA pursues continuous improvement and has earned AS9001 and ISO9001 certifications. The company's goal is to become a top-tier provider of engineering services in the gas turbine industry.

MTU has identified an integrated approach to addressing the challenges of the aviation industry. MTU AENA is committed to designing gas turbines that are cleaner and quieter than ever before. The company is diversifying as it expands its customer base and moves into new industrial markets through partnerships with Siemens and other OEMs.

In the aerospace business, the company's innovative strategy is being successfully put into practice in Pratt & Whitney's Geared Turbofan™ engine. The fuel-thrifty GTF developed by Pratt & Whitney in partnership with MTU will debut on the A320NEO, the Mitsubishi regional jet, the Irkut MS-21 and the Bombardier CSeries family of aircraft, among others. The company's streamlined processes are setting the standard for work with aerospace and industrial OEMs.

Progress and people

Company-wide career development activities help employees chart a path toward success. Training is a critical component of growth in a company that values education and promotes employees from within its ranks. The flat hierarchy provides easy access to all management levels. MTU AENA promotes a healthy work-life balance with company events, team-building and recreational activities.

MTU AENA works hard to assure the health and wellness of all employees with health, life and disability insurance and a 401(k) retirement plan. In addition to a generous benefits package, including tuition reimbursement and professional development, the company offers flexible hours, employee recognition, support for military personnel, performance pay and the opportunity to work abroad, among many other advantages.

MTU's focus is data-driven. The company believes the most important quality benchmark is responsiveness to its customers. Customers know MTU AENA will invest the necessary time to provide the highest-quality service and support.

Communication pays extraordinary dividends. MTU AENA endeavors to understand the requirements up front. Clarity means understanding expectations. MTU AENA strives for excellence and continuous improvement in everything it does.

We speak your language: [Enginese](#).



MTU is a partner on the Pratt & Whitney PurePower® PW1100G Geared Turbofan™ engine which will propel the Airbus A320NEO (new engine option).



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