



Empowering tomorrow's industry today.

A comprehensive package of integrated services combining testing, inspection and certification with innovative business solutions.

www.tuv.com

 **TÜVRheinland**[®]
Precisely Right.



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The single source provider for achieving your goals across all stages of the value chain and project- and asset lifecycle.

At TÜV Rheinland, we help you meet different challenges. Regardless of whether we work for you in the energy, infrastructure or industrial components sectors, we understand the different environments and needs of each business. That's why we provide a great variety of customized as well as standard services to meet individual requirements.

Ensuring efficient management of your assets and projects is our mission – we are globally available, lending a local hand for helping you to achieve your business goals.

Our expertise and comprehensive service portfolio offers much more than inspections and tests. We add value by minimizing risks and helping you to grow your business. With over 140 years of industrial expertise, we utilize our in-depth knowledge to offer you exactly the right solution for your specific requirements.

The core values of integrity and excellence, customer orientation, performance and agility guide us in our mission to deliver first-class services on a constant high quality level to clients around the world.



Image: TÜV Rheinland ©

Our experts offer you in-depth industry knowledge – specific tailored solutions with a proven track record.

Established in 1872, we combine tradition with German precision and innovation. Our reputation for accuracy and trust precede us around the world. TÜV Rheinland was founded at a time when people first started grappling with the safety of pressure vessels, and the first industrial codes were created. Since then, we have grown to become an international provider of technical services.

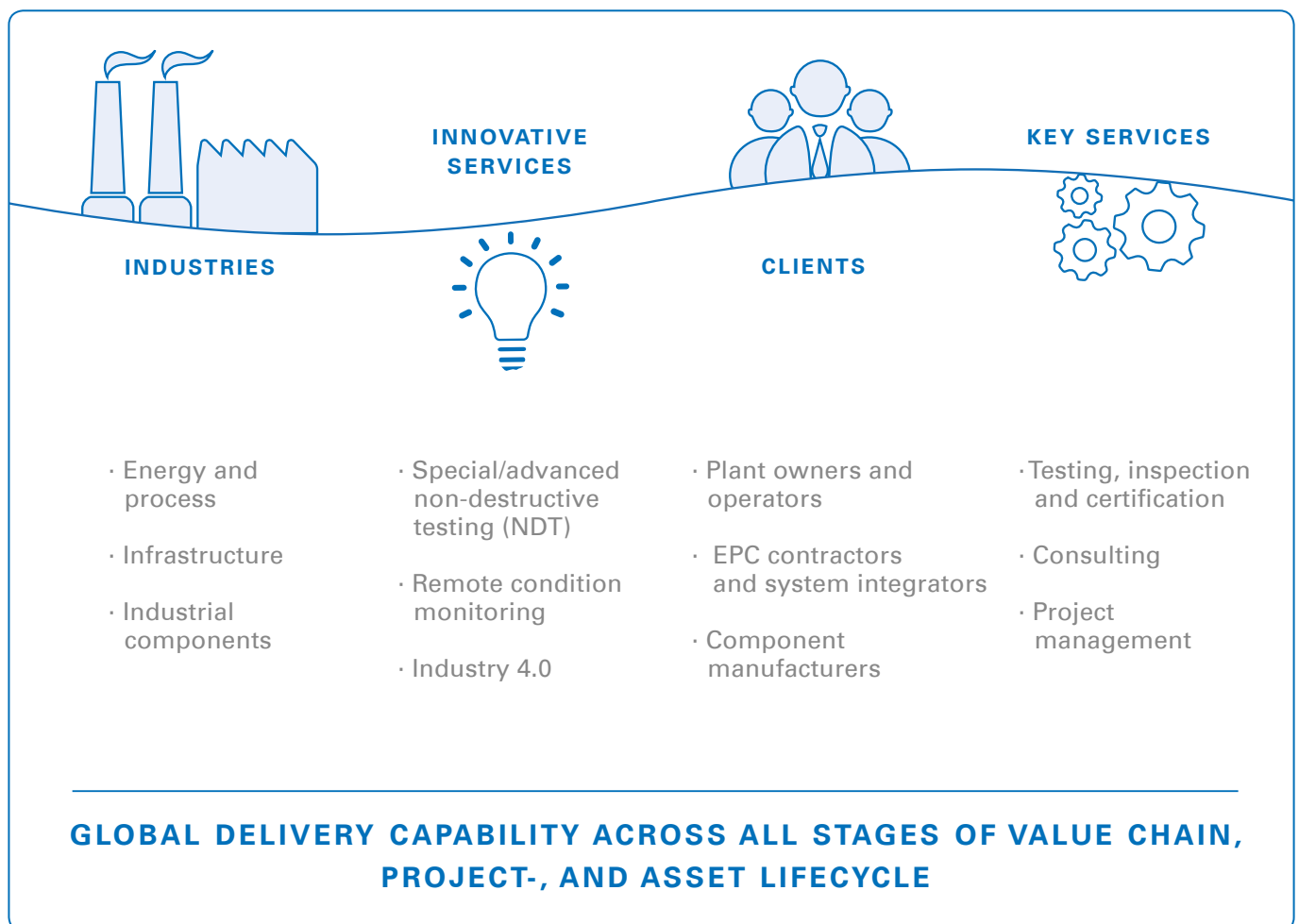
We ensure that industrial plants, buildings, infrastructure and related materials, including installations and machinery meet all performance, safety and quality requirements – whether regulatory, voluntary or customer based.

THE RIGHT SOLUTION FOR YOU

We provide solutions for clients across a diverse range of industries around the world. Gaining entry to emerging markets requires up-to-date information and technology. Profit from our in-depth market knowledge and our interest in cutting edge technologies and benefit from our industrial expertise! Our experts work in different committees and organizations, developing new standards and taking part in research work. We offer a global presence with locations in more than 60 countries. Take advantage of our international network for your global projects and learn about local regulations, market access for your products and international expansion for your business.

Services for the entire lifecycle of your project – when quality matters.

We offer a comprehensive package of integrated services combining traditional testing, inspection and certification with innovative business solutions based on the complete project and asset lifecycle.





Save time and effort –
access a range of
services and up-to-date
information from one
source

Innovative one-stop-solutions for your industry's challenges.

We enable our clients to achieve more success. Safety, quality, efficiency and compliance are the results of our work. Precisely right. Two words that perfectly encapsulate our commitment to service: whatever we do, we do it precisely and we do it right for the benefit of our clients.

Made up of technicians, engineers, scientists, economists, geologists and project managers, our employees are our strength. They possess a high level of technical skill combined with far-reaching practical experience resulting from successfully completed projects and satisfied clients. Our service teams provide a wide range of expertise, which makes us exceptional.

This strength is our advantage ensuring our capacity to precisely find the right solution for each of our clients.

Whether you are involved in planning, manufacturing, construction or operations, we enable you to meet the challenges of your industries now and in the future.



Image: TÜV Rheinland ©



OIL, GAS AND CHEMICAL

Oil and gas will remain essential energy sources in the coming decades. New and improved exploration technologies provide access to new reserves. Nevertheless, challenges are increasing. Not only are new reserves harder to reach, but projects are also becoming increasingly complex. Old assets operating beyond design life pose financial and safety risks. In an industry of large investments, intense competition, new technologies and tight project schedules it is very valuable to have assistance that meets increased legal, commercial and environmental requirements.

We ensure the integrity and regulatory compliance of your assets along their lifecycle. Take advantage of our long-term experience for the oil, gas and chemical sectors, our high quality standards and professional objectivity.



POWER GENERATION – CONVENTIONAL AND RENEWABLE ENERGY

Looking at changing energy markets, we can see that it is getting increasingly important for conventional power plants to optimize operation by maximizing safety, reliability and availability. Inefficiency and unplanned downtime should be minimized. We support you with testing, inspection, certification or consulting services along the whole lifecycle of your industrial plants. Whether in fossil, combined cycle, biomass, hydro or nuclear power plants, we have the expertise and accreditations to support you in solving your technical issues, ensuring safety and meeting regulatory compliance.

Project planning and construction of renewable energy systems entails management of risks, which can jeopardize performance or reliability during operation. Only

comprehensive quality assurance, from site assessment and type approval to final inspection and monitoring during operation, can reliably minimize such risks. We offer extensive experience in the renewable energy sector, whether with wind power, solar thermal or photovoltaic, helping you at every phase of your project.



BUILDINGS AND INFRASTRUCTURE

With our high level of expertise in the real estate and construction industry, we support you from planning or technical due diligence to operational maintenance. We ensure the safety, quality and durability of your structural or civil engineering projects around the world. Our experts consult on energy-saving designs, test your construction materials and support with gaining compliance to applicable technical regulations for electrical and building safety. Furthermore, we assist you with the operation and maintenance of essential infrastructure, be it recurring bridge inspections, assessment of road conditions and railways or the renovation of pipes and sewers. Other areas of activity include safety related systems such as lifting equipment and amusement park ride testing or explosion protection.



INDUSTRIAL COMPONENTS

Whatever equipment or components you manufacture, our experts provide support during product design and at every stage of your supply chain across the globe. We check and certify the safety, performance and quality of your industrial products and materials. Our worldwide network of experts and inspectors is familiar with country-specific regulations and can help you receive product approvals and certification for your target market.

OPERATING IN A GLOBALIZED AND INTERCONNECTED WORLD THAT IS CHANGING AT AN INCREASING PACE, WE RECOGNIZE THE IMPORTANCE OF IMPROVING OUR SOLUTIONS AND OUR WAY OF WORKING. WE ARE FOCUSED ON PREPARING OURSELVES – AND YOU – FOR THE FUTURE. THE MAIN AIMS OF OUR INNOVATION PORTFOLIO ARE: REMOTE INSPECTION, INCLUDING SPECIALIZED NDT TECHNOLOGIES AS WELL AS DIGITALIZATION AND INDUSTRY 4.0.

Increase asset productivity while meeting safety and environmental requirements.

Maximize asset value, profitability and returns while safeguarding personnel, equipment and environment through best-in-class Asset Integrity Management (AIM).

An effective Asset Integrity Management (AIM) program incorporates all stages of the asset's lifecycle from design, through construction and commissioning, to operations, maintenance and modifications, and decommissioning. It integrates all aspects and disciplines that directly and indirectly impact on asset integrity or performance.

The purpose of Asset Integrity Management is to help maintain an asset in fit-for-service condition while extending its remaining lifetime in a reliable, safe and cost-effective way.

CLIENT BENEFITS

- Improve plant integrity, safety and reliability
- Increase plant and equipment availability
- Cut cost by eliminating ineffective inspection / extending inspection intervals where appropriate
- Receive expert advice from renowned international AIM company

Moreover, AIM enables organizations to assert – with confidence and based on documented evidence – that their assets are safe and reliable at any specific point in time.

We have a large team of specialists and engineering support in all areas of Asset Integrity Management, including process safety, risk analysis, mechanical integrity, inspection and maintenance optimization to help you be confident in your assets.

OUR APPROACH

No two projects are the same! That is why our AIM model provides a flexible approach to establish full value-adding service packages tailored specifically to our customer needs and individual project requirements.

Our competitive advantage lies in our ability to combine selected value-adding inspection planning, inspection execution, risk and safety, and AIM consulting services according to individual asset or plant integrity management requirements. This represents our AIM concept.



Image: TÜV Rheinland ©

The main five levels of our AIM services – profit from our extensive know-how.

We have diverse expertise and practical knowledge across all service levels and will support you with customized solutions for your specific AIM needs.

1. MANAGEMENT SYSTEM AND SOFTWARE CONSULTING

Establishing a system of policies, standards, procedures and resources to maintain integrity over the entire asset lifecycle.

2. DATA ANALYSIS AND TECHNICAL CONSULTING

Conducting relevant integrity, risk, reliability, process safety and other safety and security assessments to understand integrity vulnerability, ensure assets are designed and operated to achieve performance targets and minimize risk.

3. DATA COLLECTION

Inspecting, testing and monitoring the condition of structures and equipment during operation to maintain design intent throughout the asset lifecycle.

4. INDEPENDENT REVIEW AND VERIFICATION

Independent examination of all or selected elements of the AIM system, policies and processes as well as their implementation to determine adequacy.

5. AIM TRAINING

Various training modules targeting engineers and supervisors working in operations, inspection, maintenance and reliability, process engineering, safety engineering and loss prevention, HSE/EHS and facilities management.

Asset Integrity	Management System & Software Consulting	AIM system and strategy development and implementation		
		AIM software selection & implementation support	Data management	Auditing and certification
		Inspection planning and RBI consulting		Maintenance optimization and RCM
	Data Analysis & Technical Consulting	Integrity assessment	Risk, process safety & security assessment	Independent verification
		Inspection of plants and components		Condition monitoring
	Data Collection (Testing, Inspection)	Materials testing and Non-destructive testing (NDT)		
	AIM Training and Independent Reviews			



Risk and Safety Management for high hazard sectors.

Achieve safe and reliable operation and avoid loss with a complete solution for successful risk and safety management. Our expertise is particularly suited to organizations operating in the high hazard industries and other sectors where the impact of loss is high.

Our services help clients to manage health, safety, security, environmental (HSSE) and business risk to achieve safe and reliable operation and avoid loss, comply with complex legislation and corporate standards, protect business reputation as well as ultimately protect and enhance enterprise value.

Controlling risk requires understanding engineered and technological systems, management systems and organizational, cultural and behavioral factors. TÜV Rheinland provides consulting, learning and resourcing services across all of these enablers.

Identifying, analyzing, evaluating and reducing the risks associated with facilities, operations and equipment to acceptable levels:

- ALARP assessment
- Asset Integrity Management
- Bowtie analysis
- Business risk assessment
- Fire protection
- Functional safety
- Hazard identification
- Human factors engineering
- Physical effects consequence modeling
- Qualitative / deterministic risk assessment
- Quantitative / probabilistic risk assessment
- Reliability, availability and maintainability modeling
- Technical safety studies

Identifying, developing and implementing effective policies and procedures to maintain control of risks and minimize loss:

- Business continuity management
- Emergency planning and crisis management
- Environmental management
- HSSE / safety case
- HSSE management systems
- Independent safety review
- Process safety management
- Security risk management
- Safety culture assessment
- Workplace safety systems

Accelerating cultural and behavioral improvement, and ensuring a solid foundation for building sustainable improvements in risk control:

- Behavioral safety programs
- Competency management

- Human factors
- Safety leadership training

Delivering online and classroom training and postgraduate education to help develop competent risk and safety management professionals:

- MSc in risk and safety management
- UK degree apprenticeship in risk and safety management
- TÜV Rheinland Risktec professional qualification in risk and safety management
- Training courses from single modules to multi-year programs for corporate clients
- Game-based learning
- Computer-based training
- Delivery via face-to-face, distance or blended learning
- Accredited by professional engineering institutions and industry bodies

WE WORK ACROSS ALL STAGES OF THE PRODUCT, ASSET AND LOGISTICS LIFECYCLES:

We have a substantial track record of working with leading international and national operating companies, design engineering companies, manufacturers and suppliers, insurers and service providers, as well as industry associations and regulators. Our consultants have extensive international experience and our

multi-industry expertise facilitates the sharing of good practice.

We also have considerable experience of a broad range of regulatory, cultural and working environments, from prescriptive to goal-setting legislation, from compliance to learning organizations, and from harsh to mild environments. We have a proven track record to meet the challenges each industry faces; whether new build or

extending the life of assets, frontier or brownfield developments, application of novel or traditional technologies, organizational and cultural change, or changing regulatory regimes.

Whatever your risk and safety management needs, in working with us you can be assured of responsive, high quality technical support delivered by experienced consultants, tailored to meet specific circumstances.

Ensuring & demonstrating safe PRODUCTS throughout lifecycle



Ensuring & demonstrating safe LOGISTICS



Ensuring & demonstrating safe PROJECTS throughout lifecycle

Market Access Services – exporting industrial components abroad.

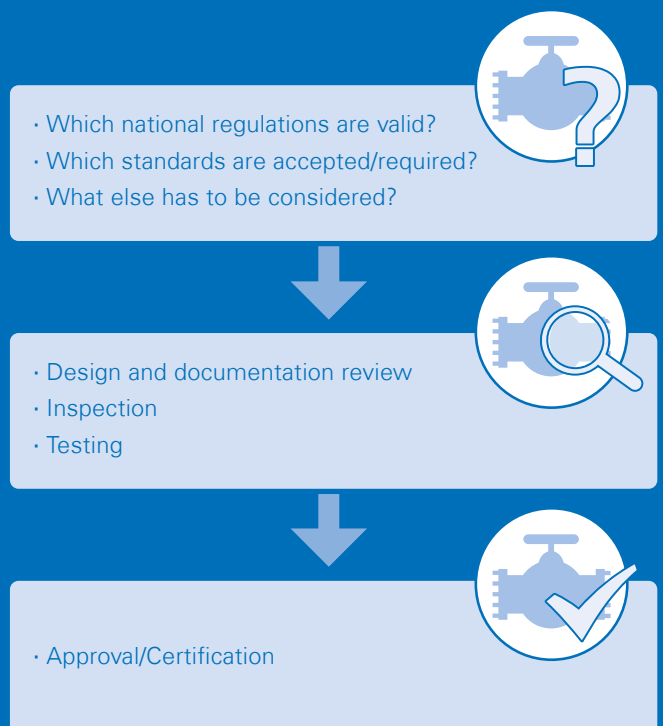
Rapid shifts in global trade and competition make it necessary to manufacture in accordance with multiple regulations, codes and standards. We assist you in acquiring and managing the various certifications required for your product around the world. Our worldwide network of experts supports you with a full range of services, providing a one-stop-shop solution for your industrial component export needs.

3 STEPS TO MARKET LAUNCH

Our experts regularly work in different standard bodies and committees responsible for setting up new standards and norms. Working with us, you can be sure to receive the most up-to-date information.

In order to launch a product on a foreign market additional safety certificates, conformity certificates and/or test marks may be required. Where to find all the information? And where to obtain the approvals for the market entry from? That is where TÜV Rheinland Market Access Services support. We provide knowledge on the regulatory requirements and relevant certification services. Benefit from a faster time to market, more sales and greater profit with our services from a single source. And this is how it works.

LEARN HOW WE CAN ASSIST YOU IN MEETING THE REQUIREMENTS OF YOUR TARGET MARKET!



We can support you in gaining approvals for a wide range of industrial components including pressure equipment, machinery, lifting equipment, electrical and fire protection systems as well as equipment and protective systems intended for use in potentially explosive atmospheres. Our services span your complete approval process, starting with material and product testing at the manufacturer's site or in one of our laboratories, performing design reviews, followed by inspection services during manufacturing or erection and ultimately achieving certification.

IN EUROPE TÜV RHEINLAND IS ACCREDITED AS A NOTIFIED BODY FOR MANY DIFFERENT DIRECTIVES AND REGULATIONS:

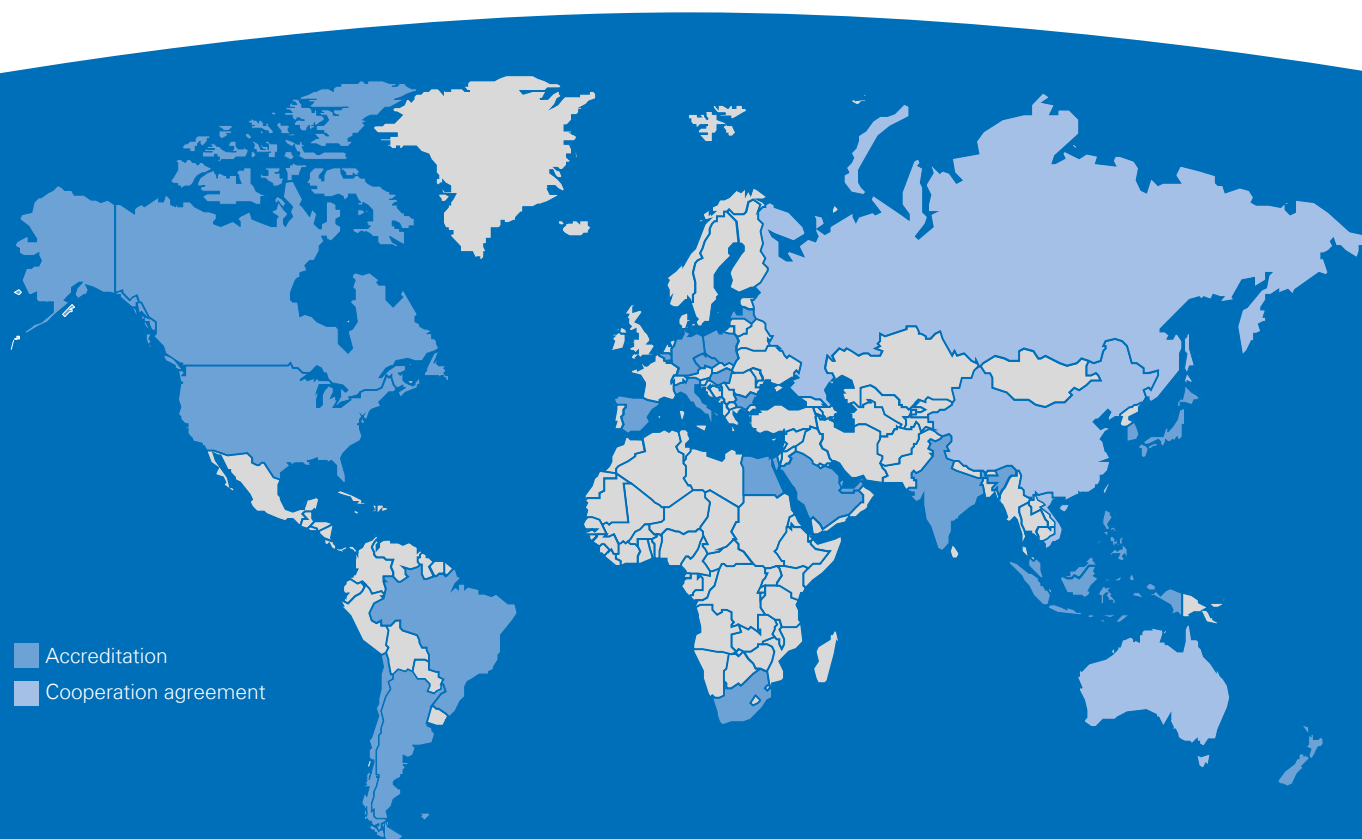
- Stationary and transportable pressure equipment (PED, SPVD, TPED),
- Construction products regulation (CPR),
- Explosion protection equipment (ATEX),
- Lifting equipment,
- Machinery

Beyond the European market, we are also accredited to provide approvals and certification services for many other countries and regions.

AN EXTRACT OF OUR ACCREDITATIONS

- Inspection body for newly built pressure equipment approved by various national and regional authorities e.g. USA/Canada/Mexico (ASME BPVC), India (IBR), Malaysia (DOSH), Serbia (3A), Singapore (MoM), and South Africa (SANAS)
- Inspection Body for lifts, lifting equipment and amusement park rides e.g. Egypt, Philippines, Qatar, Saudi Arabia, South Africa and United Arab Emirates
- Designated overseas inspection agency for the Japanese market for in-country inspections of boilers, pressure equipment and mobile cranes
- Cooperation agreement on technical safety for pressure equipment, lifts, and explosion proof apparatus in Korea (KOSHA)

In addition, our comprehensive portfolio includes development support services and handling of local approvals and certificates required. Making it easy to distribute your product globally, we also provide pre-shipment and commercial inspection services to ensure that your imports comply with national regulations.



WORLDWIDE MARKET ACCESS

Do you want an overview of all standards and requirements for the

most important import and export countries? Visit our website for more details! www.tuv.com/mas

Successful international projects – along the supply chain.

In times of globalization, when industrial projects, production and purchasing are increasingly becoming cross-region activities, we are your reliable partner worldwide. Using the diverse professional background of our experts, we work in multidisciplinary teams to find the right solution for your industrial sector during vendor selection, production, shipment, installation and operation.

The management of and procurement for international projects in today's industry can entail dealing with complex manufacturing and supply chain processes. You need to be certain that contractors adhere to all terms in the agreement such as time frames, pricing, and technical

parameters as well as the quality of equipment and works.

A task of mammoth proportion, client requirements must be met, compliance of products to national or international regulations must be ensured and timely delivery must

be guaranteed. Under such critical circumstances, it is prudent to rely on the services provided by an independent party such as TÜV Rheinland. We help you to select competent suppliers, assure quality of materials and components as well as to minimize delays.



Image: © Shutterstock / QiuJu Song

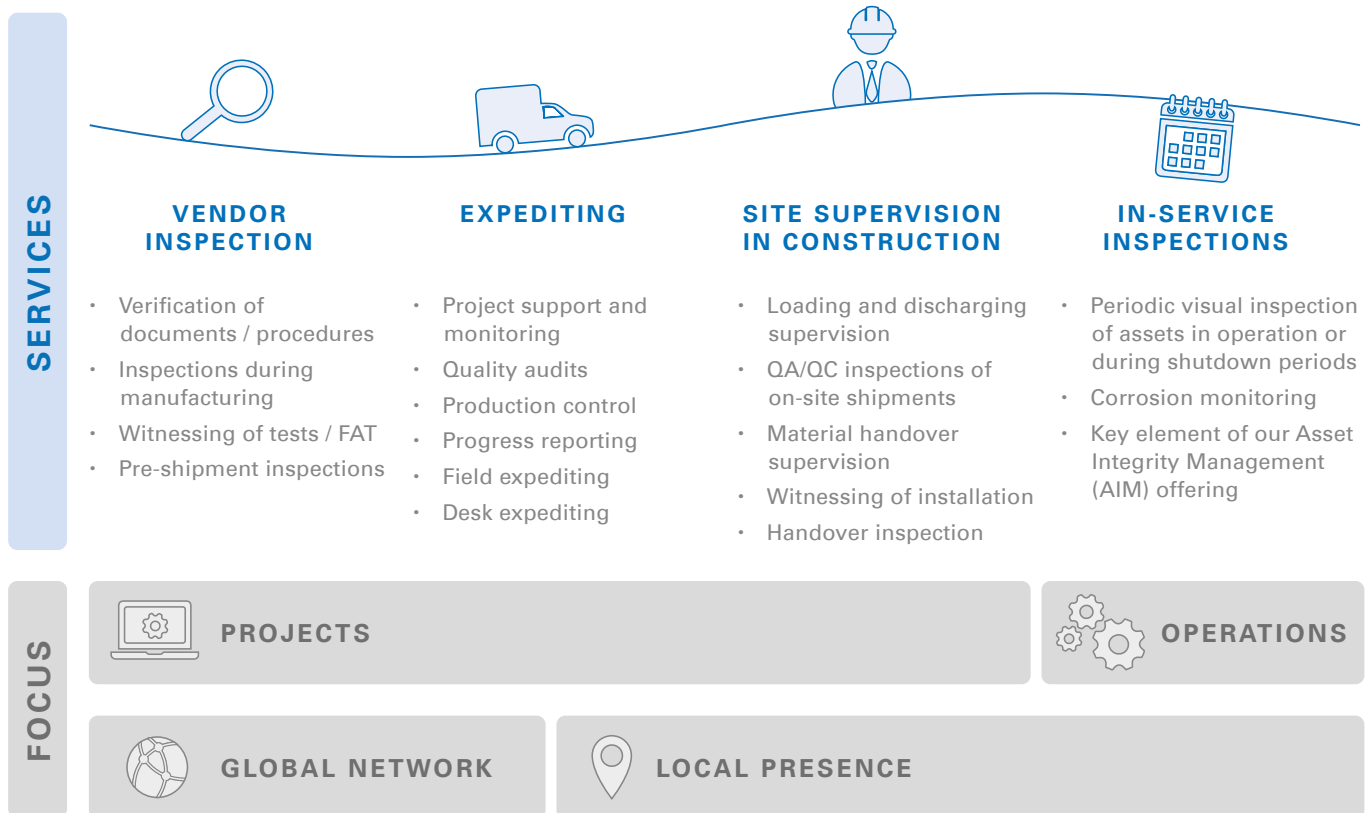
OUR SPECIALIST KNOW-HOW AT YOUR SERVICE

Our experts conduct comprehensive audits, inspections or verifications according to your inspection and test plans or specifications as well as applicable international standards and codes. We also ensure safe and appropriate loading, shipment and off-loading at locations worldwide

in order for you to receive the right goods and materials properly and intact. Furthermore, we are on-site to supervise and monitor all activities until successful completion of the project. Even once your asset is in operation, we continue to assist you with our inspections, assessing the condition and thus reducing the risk of

unplanned outages or breakdowns. Providing a wide variety of services, including assessment, qualification, inspection, testing, and supervision, we prepare a customized service package to find the best solution for you whether it covers the management of your entire project, asset, or just a single service.

INDUSTRIAL INSPECTION



WITH OUR EXTENSIVE KNOWLEDGE OF INDUSTRIAL INSPECTION SERVICES FOR NATIONAL AND INTERNATIONAL PROJECTS AND OUR REPUTATION FOR CONSCIENTIOUS AND RELIABLE WORK, WE PROVIDE CUSTOMER SATISFACTION AROUND THE GLOBE AND HELP ENSURE SUCCESSFUL PROJECT AND ASSET PERFORMANCE.

Optimized processes with the integration of Functional Safety and Cyber Security.

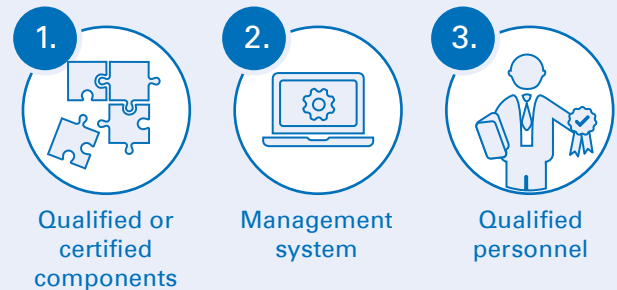
Throughout various industries the issue of increasing system complexity brings new challenges for companies: both in terms of protecting systems and of the safety and reliability of assets. With over 140 years of experience in industrial safety and nearly 20 years in Cyber Security, we are your ideal partner in digitalization strategies.

SAFETY AND SECURITY BY DESIGN

Industrial systems consist of individual components that are integrated to a single structure, enabling the performance of specific functions. These systems are developed, operated and needed to be maintained. Typically, three partners are involved in a system lifecycle: the component manufacturers, the integrators, who are responsible for product design, functioning and implementation, and the end users, who operate and maintain the systems. This results in two approaches for Functional Safety and Cyber Security, namely "safety by design" and "security by design."

The aim of our services for Functional Safety and Cyber Security is to provide you with legal certainty, optimized processes, and ensure trouble-free operation. You can profit from our many years of industry experience and high expectations of quality.

SAFE OPERATION OF INDUSTRIAL SYSTEMS



You can trust in our longstanding experience as a recognized certification provider as well as our expertise in industry 4.0 and digitalization. Forge a new path with us as your competent partner!

CYBER SECURITY

Defense against negligent and willful actions to protect devices and facilities



FUNCTIONAL SAFETY

Defense against random and systematic technical failure to protect life and environment



Sustainable industrial performance.

TÜV Rheinland to contribute to a future that meets both human and environmental needs on a sustainable basis.

Sustainability is a core concern for us and determines our actions. We are profit-oriented with respect to our social and environmental responsibility. We truly believe companies can only be successful in the long term, if they incorporate sustainability into their philosophy and the way they manage their businesses.

Our most important asset is, therefore, the trust our customers invest in the safety, quality and integrity of our services. We define success by developing and maintaining a long-term partnership and are committed to optimizing the value chain of your business by providing fast turnaround times, cost-effective solutions, technical advice, project management support and accurate, timely reporting in many languages.

We have pledged ourselves to upholding the principles of the UN Global Compact, where we have been a member since 2006, promoting sustainability and combating corruption. Another visible example of our dedication to global sustainability is our membership in the International Federation of Inspection Agencies.



Image: TÜV Rheinland ©

ALWAYS A GOOD SIGN. THE TÜV RHEINLAND TEST MARK.



This mark stands for all the relevant customer information about products, services and systems that are tested, certified or inspected by TÜV Rheinland. This information is available online anytime, anywhere, and can be viewed in a matter of seconds at the click of a button. This means optimal transparency and top performance in terms of safety, quality and reliability – always. Global, systematic and eye-catching – communicated through a unique and multifunctional mark. The TÜV Rheinland test mark.

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