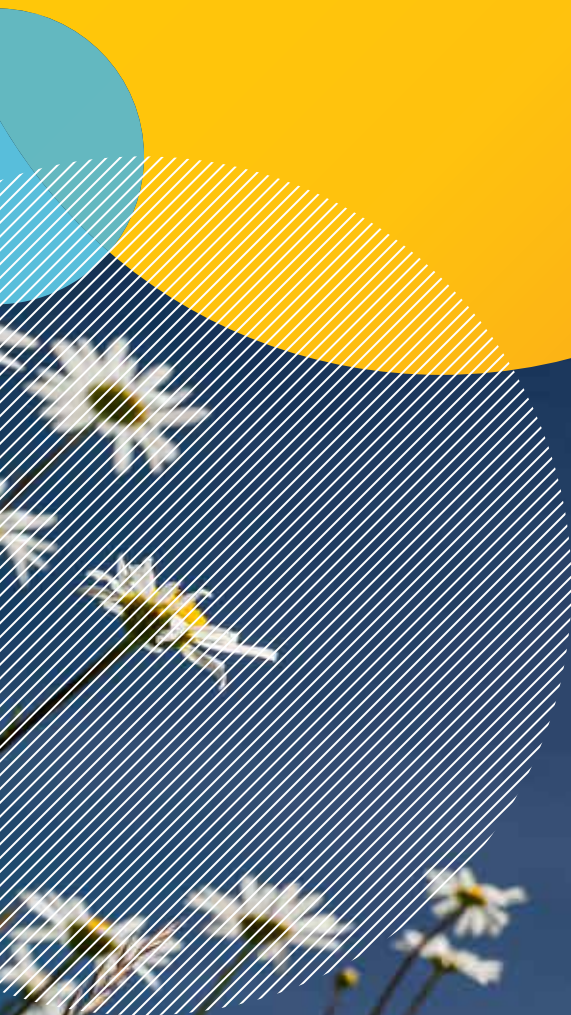




# POWERING QUALITY & SAFETY

Global services and technology for the power industry that minimize risk and maximize operations





Power operators around the world rely on Intertek's Total Quality Assurance services and innovative technology to manage their assets, reduce risk and improve safety, performance and reliability.

### The changing face of power generation

Global demand for a supply of reliable electricity is increasing as a result of rising population growth and improving economic conditions. Over the coming decades, as new power generating technologies are implemented, the industry faces the formidable challenge of meeting global energy demand while maintaining reliable output, utilizing reduced operating and maintenance budgets; aging conventional power plant fleets and transmission networks; and a complex electrical grid that becomes more challenging to maintain year after year.

Alongside the ever-increasing energy demand and operational maintenance challenges are new and more stringent regulations, introduced to ensure reliability, increase safety, reduce emissions and confirm compliance to waste regulations. For power operators, non-compliance is not only expensive, but also time consuming requiring continuous monitoring and oversight. As the power generation industry trends toward utilizing distributed electricity powered more by wind and solar resources, power plant owner and operators that use more traditional resources such as coal, oil and nuclear energy face growing public and environmental safety concerns which often lead to more regulations.

### Energy Sectors

Regardless of industry trends, Intertek continues to support the following sectors with a wide range of quality assurance services:

- Power Generation & Equipment
- Power Transmission & Distribution
- Wind & Solar
- Wave & Tidal
- Nuclear
- Oil & Gas
- Coal & Solid Fuels
- Biofuels

Intertek's expertise and strategic approach drive the development of new technologies, producing leading-edge software products that optimize the operational cycles of our customers' plants so they can recover the costs.

### Our Innovative Technologies

#### Aware™

The Aware Asset Performance Management suite of software products helps power plant owners and operators organize data and increase cooperation among groups for improved asset integrity management. This highly flexible, web-based, interactive data management program fosters collaboration to understand the condition of complex equipment assets for determining run, repair, and replace decisions.

It manages all of the data and knowledge collected during inspections and equipment repairs, allowing the user to manage inspections and create interactive drawings to map failures and repair locations.

#### Aware RealTime

We developed Aware RealTime so our customers can better control the costs of operations and maintenance. Aware RT is a real-time analytics software that helps fossil, steam, and combined cycle power plant personnel monitor and analyze equipment damage and the economic impact of operation.

The Asset Performance Management program relies on Intertek's industry-leading "cost of cycling" methodology to generate a real-time damage profile and the cost of each cycling transient (e.g. startup, shut down, or load swings) to optimize equipment life and unit performance minimizing equipment damage and ensuring cycling costs are included in their energy bids.

The program uses state-of-the-art artificial neural networks and engineering models to give operators, plant management, and engineering staff an easy interface in which to review performance metrics, equipment damage, and costs.

#### WindAware

Managing the life of wind turbine generator assets is a constant challenge. Operators need a tool that provides organized, readily available equipment data to make informed operational, maintenance, and inspection decisions. Intertek developed WindAware to be the tool that solves this challenge.

WindAware is a software solution to help owners and operators manage inspection and performance data, maintain reliability and safety, and minimize costly equipment failure.

#### Ingrid™

Ingrid is a web-based online database and analytics platform that provides detailed statistics and benchmarks on fossil power generation. Ingrid has been utilized to study the operation of over 2000 operating fossil generators to understand past performance metrics, in particular power plant cycling, impact on plant reliability, and emissions.

This powerful tool allows us to benchmark operations at highly granular timescales (minutes to annual) and develop forecasts on performance metrics.

#### OPCON™

OPCON is a Condition Monitoring and Degradation Management software for Nuclear Steam Generators and was developed to meet the requirements set in Nuclear Energy Institute's NEI 97-06 guidelines and other industry specific technical codes. OPCON has the unique modeling feature of providing multi-cycle models based on site-specific inspection data to determine fitness for service of steam generators.

The range of assessments spans from relatively straightforward deterministic evaluations to full probabilistic Monte Carlo simulations. OPCON has been used in support

of numerous reports submitted to the Nuclear Regulatory Commission to support both condition monitoring and operational assessments.

#### TubeMod®

TubeMod is a patented technology used to improve boiler tube life and reliability.

TubeMod was developed as an extension of Intertek's TubeAlert – Remaining Useful Life methodology to provide a cost-effective alternative for superheater and reheater component replacement. The technology has been implemented at sites as a boiler tube failure reduction (BTFR) retrofit for conventional steam fossil boilers.

#### Intertek Inlight™

Intertek Inlight is a complete web-based supply chain risk management program that helps businesses to identify 'blind spots' and find opportunities for improvement, providing continuous transparency to supply chain management.

Intertek Inlight enables organizations to map their supply chain, mitigate risks and bring visibility to the workings of their vendor partners. The end-to-end Assurance solution provides assessment and analysis of risk events at all points in the supply chain, from the sourcing of raw materials and compliance of customer and international regulations, to end-use by consumers.

Through Intertek's proven supply chain expertise, global network and accessible local knowledge, Intertek Inlight is uniquely positioned to provide clients with validated business insights that enhance transparency, help them to manage supply chain risk, safeguard their reputation, strengthen their supply chain resilience and empower them with new efficiencies to make informed, cost-effective decisions.



With our Total Quality Assurance expertise, we deliver consistently with precision, pace and passion, enabling you to power ahead safely.

### Assurance, Testing, Inspection & Certification Services

Power plants, whether they are fossil steam fired, combined-cycle or renewable (such as wind, solar or hydro) are integrated sites with not only a complicated system of moving parts, but also multiple large-scale components and modules that need to seamlessly fit together and meet all regulatory and site specific requirements. As these components, modules, materials, equipment and piping are brought together during construction, ensuring their integration is clash (interference) free is crucial for maintaining project timelines and budget while ensuring personnel safety and long term availability.

One of the biggest barriers for reliable power generation is the ability to maintain complex power plant equipment. Maintaining this equipment helps plant owners and operators meet changing market and environment requirements as well as ongoing energy demands while enhancing plant operations and performance, improving efficiency, reducing risk of failure, and optimizing equipment life.

### Asset Management

We provide a comprehensive suite of services and technology focusing on maintaining the operational integrity and safety of power generation equipment. Aging facilities and equipment require special care and detailed maintenance. Time constraints and unexpected equipment failure can negatively affect your bottom line and productivity. Having a trusted service partner to support you at a moment's notice has helped bring our clients the peace of mind they need to ensure their operations run efficiently.

With our broad portfolio of asset integrity management and advanced engineering techniques we can pinpoint priority repairs and eliminate unnecessary plant work. Intertek's "run and maintain" asset integrity services are geared towards continuous maintenance and lifecycle extension/management of assets.

### Building & Construction Services and Geotechnical Due Diligence

Before construction can begin there are years of feasibility studies, surveying and permitting activities, economic analyses, technology assessments, vendor auditing, and much more. Carefully working through these pre-construction activities can ensure the safe and successful construction and operation of your power plant and corresponding assets.

### Construction Services

Our experts provide a variety of acoustic, fire, failure analysis, AV, mechanical, electrical, industrial, roofing and enclosure consulting services to ensure proper design and installation of critical systems. We also ensure that site, subsurface, and the indoor environment meet criteria and regulations for acquisition, development, construction and occupancy.

### Condition Assessment

Intertek has successfully completed thousands of projects for clients in the power industry including field inspection services and design or operations review of high energy piping systems, boilers, turbines, heat recovery steam generators, pressure vessels, compressors, and other equipment. Our experts have first-hand knowledge of plant engineering, from construction to retirement, and possess a thorough understanding of the design, operation and maintenance of the equipment.

One of the key components of any condition assessment inspection is identification of potentially hazardous conditions before they lead to failure. We have the expertise, methodological approach, and tools required to evaluate specific conditions, capture and record findings, and recommend and implement cost-effective solutions.

### Cost of Cycling Power Plants

Market conditions and demands have led to increased cycling of conventional power plants. Intertek is a leading authority, with several publications and hundreds of studies, on the techniques and methods used to determine the impact of power plant cycling on cost of operation, reliability and equipment life.

Our range of services help you understand your cycling startup, shutdown and load follow costs and provide guidelines to operate more efficiently. We have assisted our clients in every step of this process – determining actual costs, modifying them as valid inputs in industry standard models, interpreted the results of these studies and provided expert testimony to defend our methodology.

Plant operators have implemented our recommendations for design improvements, equipment upgrades/replacement and operating process improvements to ensure that power plants operate more efficiently and reliably. Our experience goes beyond determining these costs and is leveraged by regulators, utilities and national laboratories.











We bring quality and safety to life with our global services.

### Failure Analysis & Forensic Engineering

Intertek's multi-disciplined team of knowledgeable forensic engineers is experienced in performing on-site investigations into the root cause of failures as well as possible contributing factors to accidents, complex failures, fires, and explosions. The failure modes we investigate often include fatigue, fracture, creep, corrosion, erosion, low-quality welds, wear, improper material selection, poor design or improper maintenance.

### Grid Level Energy Storage

The variable nature of renewable energy sources requires power plants to increase load cycling to meet demand, resulting in higher operation and maintenance costs. Integrating the proper energy storage system is necessary to balance intermittent renewables and reduce the cost of power generation and distribution. In addition to energy balancing, energy storage also offers the advantages of emergency power, frequency regulation, load demand reduction, voltage control, and other ancillary services.

Grid Level Energy Storage is fast evolving, but costs of implementation are still very high. Intertek's expert team performs technology reviews including economic modeling and performance analysis for our customers. Our performance analysis includes review of power capacity, energy capacity, recharge

rates, efficiency, availability, degradation, warranty and life and environmental impacts. Intertek also provides hazard and risk management services for new technologies and deployments.

### High Energy Piping Integrity Management

High energy piping (HEP) system examinations are necessary to ensure the safety of personnel and reliable operation of power plants. Intertek's comprehensive risk based program includes a Grade 91 evaluation program based on walkdowns, stress analysis, support adjustments, remaining life estimation; life management assessment with complete design review, hot and cold pipe support walkdowns, as-designed and as-found stress analyses, code compliance and life consumption analyses; and a condition assessment program that utilizes conventional and advanced non-destructive examination methods.

Our Flow Accelerated Corrosion (FAC) program techniques detect damage both online and offline, and our engineering expertise helps efforts to minimise damage to piping systems.

### Metallurgical & Mechanical Testing

Operating a full-service, independent, fully equipped metallurgical laboratory, welding shop, and mechanical testing laboratory means we can provide failure analysis, probable root cause analysis, specialized mechanical testing, weld

procedure specification reviews, remaining life assessment, boiler and heat recovery steam generator (HRSG) tube sample analysis, and creep rupture testing. Our highly trained and experienced metallurgists and technicians are committed to providing you with the specialized expertise needed to simultaneously reduce equipment failures, operating and maintenance costs, or capital expenditures.

Our services include:

- Eddy Current Testing
- Fractography
- Hardness Testing
- Image Enhancement
- Inspection Equipment
- Materials Analysis
- Mechanical Testing
- Metallography
- Optical Microscopy
- Photography
- Radiography
- Scanning Electron Microscopy
- Ultrasonic

### Surveying Services

Correcting manufacturing defects and integration issues can be time consuming and costly. Intertek's surveying services team provides detailed information about your power plant's infrastructure, so you can be confident that component integration will be successful.

### Product & Systems Certification

Intertek's certification marks show equipment, product or system conformance to regulatory and industry standards and ensures ongoing verification of conformance and performance.



### Wind Energy Services

Wind energy production is an alternative source of power generation, and it financially competes with conventional power generation sources such as coal and nuclear.

Wind turbine supply chains are complex, and as the size and intricacy of wind turbines grow, so do the manufacturing process requirements and a need for third party inspection, materials expertise, reliability and asset management expertise.

Wind turbine operation and maintenance costs constitute a sizeable share of the total annual costs for wind energy. Most wind turbines have initial warranties, but as more wind installations come out of warranty, the financial risk significantly increases on the owner to provide cost-effective operation and maintenance.

Intertek supports wind power industry manufacturers, owners, developers, and operators with critical services including product and system certification, structural analysis and inspection, field inspection and labeling, reliability engineering, failure analysis, independent verification, and monitoring.

Our experts have embedded themselves in many standardization committees and branch organizations, creating access to the latest developments and insights into the wind energy industry.

Through our industry-leading expertise and innovations, we bring the reliability, safety, risk management and cost control that our clients have come to rely on giving them peace of mind so they can focus on their core business and operations.

### Vendor Surveillance

Whether you are building a new facility or upgrading and expanding an existing one, it is important to purchase and utilize equipment and materials that are of the highest quality.

Choosing reliable and compliant vendors from the start can mean the difference between safe and efficient operations and unexpected failures and downtime.

Intertek's expert vendor inspectors and technical auditors efficiently manage complex supply chains to ensure that equipment and material meet customer and industry quality standards.

In addition to quality, another important function is the on-time delivery of those items which ensures that your project remains on schedule and costly delays are avoided.

We understand the complexity of your supply chain and our onsite technical experts can quickly respond to and address any critical issues that could impact scheduling and completion deadlines.

### Non-Destructive Examination

Intertek provides nondestructive testing, both in discrete projects and in conjunction with our engineering evaluations and condition assessments.

We utilize non-invasive evaluation and testing methods such as visual, liquid penetrant (PT), magnetic particle (MT), ultrasonic (UT), and radiographic (RT), to determine the integrity of materials, components or structures such as pipelines and piping systems, turbines, generators, boiler tubes, storage tanks, and structural steel.

Our systems have the capability to detect relevant defects and measure their position, size, and location, especially considering the issues with P91 and other advanced alloys occurring within the power industry.

Testing capabilities include, but are not limited to:

- Corrosion Mapping
- Field Metallurgy
- Mechanized Angle Beam
- Phased Array
- Positive Material Identification (PMI)
- Pulsed Eddy Current
- Time of Flight Diffraction
- TubeAlert



 [industry.services@intertek.com](mailto:industry.services@intertek.com)

 [intertek.com/power-generation](https://intertek.com/power-generation)