STORK EQUIPMENT & ENERGY SOLUTIONS

PRODUCT & SERVICES OVERVIEW
STORk, a Fluor Company

GLOBAL BUSINESS WITH A STRONG LOCAL PRESENCE

Stork maintains, modifies and assures the integrity of production workshops in a variety of industries, including oil and gas, chemicals and processing, metals and mining, food and pharmaceuticals, power, and manufacturing. Stork is part of Fluor Corporation, a global engineering, procurement, fabrication, construction and maintenance company that designs and builds capital-efficient facilities. Stork assists clients by providing a life cycle asset solution which is innovative, cost-competitive and always respects the key values of safety, integrity, teamwork, client focus and excellence.
Stork’s division Equipment & Energy Solutions delivers integrated operating and maintenance solutions for the entire power train. We use our extensive knowledge of process, rotating and electrical equipment to drive integrated and creative solutions. This reduces the cost of ownership stimulates ongoing improvements in technology and maintenance management. Which ensures EBIT optimization and reliable returns.

ADDED VALUE

- Optimize plant performance and reduce costs.
- Our focus on customer priorities.
- A one-stop supplier of all operating, maintenance and modification requirements.
- Manufacturing and repair with very short lead time.
- Modification and reverse-engineering of spare-parts and complete machines.
- Access to state-of-the art engineering solutions.
- More than 80 year experience as Original Equipment Manufacturer (OEM) of products and components.
- Fully certified according to global standards (ISO, VCA and more).

REACH BEYOND ZERO Stork is dedicated to being recognized as an industry leader in HSEQ by our employees, Clients and industry peers. REACH Beyond Zero, our value-driven HSEQ engagement program, helps us to achieve this goal.

REACH Beyond Zero is our HSEQ vision to encourage all Stork employees to challenge themselves to do more to improve our HSEQ culture and performance. As an organization, we REACH Beyond Zero by functioning as one team with shared values and serving as a driving force to transform our HSEQ culture and performance.

Safety is our core value and we are committed to translating our HSEQ ethos into sustainable and effective operations. REACH Beyond Zero communicates information on environmental, quality, health and safety issues in order to ensure that it is a truly employee-led program.

www.stork.com/reachbeyondzero
Stork combines high-quality product engineering with independent provision of in-depth asset integrity management. Stork can supply OEM equipment to EPC, provide custom-built machines based on the clients’ specific requirements, and replace obsolete machines with new and improved designs.

Our extensive knowledge of brand-independent solutions allows us to re-engineer and manufacture equipment and components with the shortest available lead time on the market.

By working closely with our clients from the very beginning, we are able to fully understand the requirements and develop a customized solution. Our creative and solution-driven engineers assess the situation and develop solutions tailored to the clients’ specific needs. Quality levels are discussed and agreed upon upfront. As a trusted partner with clear processes, we deliver on our promises.
Gearboxes from Stork are used in high-demand market segments (Marine, Industry, Power), where our clients expect a rapid response in order to minimize downtime costs. That’s why we offer worldwide gearbox support 24 hours a day. We are not tied to any single manufacturer, which means that we can develop customized solutions that are the most effective and efficient for our clients.

**ADDED VALUE**

- **Speed**, we combine over 50 years of experience with modern manufacturing facilities and an extensive inventory to deliver fast and impeccable products.
- **We have extensive experience** with designing and manufacturing of hundreds of specialized gearboxes.
- **Through reverse engineering** our staff can manufacture gearboxes for all types of applications.

**CUSTOM-BUILT SOLUTIONS**

Equipped with the latest design software, our engineering staff undergoes a continuous learning and developing program and is capable of designing solutions that meet both international standard or Classification society, such as Lloyd’s, ABS, Bureau Veritas and many others. We have:

- More than 50 years of experience.
- Out-of-the-box thinking and innovative solutions.
- State-of-the-art design software used by experienced engineers in accordance with the latest standards.
- Resulting solutions that are available in any 3D solid format which can be seamlessly incorporated in our customers drivetrain.
- Tailor-made solutions which support the required design philosophy – we never compromise on any part of the driveline due to usage of a standard gearbox program.
- ISO 9001 and VCA certifications.

**PRODUCT DETAILS**

Stork is the Original Equipment Manufacturer (OEM) of the following gearboxes:

<table>
<thead>
<tr>
<th>BRAND</th>
<th>TYPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stork</td>
<td>All</td>
</tr>
<tr>
<td>Rademakers</td>
<td>All</td>
</tr>
<tr>
<td>Jahnel Kestermann*</td>
<td>All</td>
</tr>
<tr>
<td>Brevo/Kuypers/Conrad</td>
<td>All</td>
</tr>
</tbody>
</table>

*JaKe has nominated Stork to be the exclusive partner for JaKe gearboxes, original spare parts and after sales services.
Stork pumps has a rich, 150-year history as an OEM of pumps. We provide custom-engineered pump solutions for virtually any application or market, including service, upgrades, overhauls and spare part components. We make life easier for our customers by understanding hydraulics and pump operations. We offer the best-fit pump solutions focused on total cost of ownership.

ADDED VALUE

Stork Pumps have excellent quality and thorough engineering design. Some of our pumping stations which were built in the 1920s and ’30s are still successfully operating today.

We make custom-engineered products. Our engineering departments are very experienced in designing pumps in full compliance with customer specifications.

We have much experience in engineering, developing, building, installing, commissioning, and maintaining customized large volume water pumps.

Our pumps are environmental friendly because they are custom engineered on best efficiency point.

CUSTOM-BUILT

Our engineers develop custom-engineered pump designs with the newest Computational Fluid Dynamics (CFD) software and experience to fulfill and exceed customer needs. Based on our experience and heritage, we can fully meet our customers’ needs by providing the best-fit solutions.

PRODUCT DETAILS

<table>
<thead>
<tr>
<th>PUMP TYPES</th>
<th>TYPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axial Flow</td>
<td>SHG, SH, OPH, OVOP</td>
</tr>
<tr>
<td>Concrete Volute</td>
<td>BCV, BSV, BVOP, BPV</td>
</tr>
<tr>
<td>Vertical Suspended</td>
<td>VO, VOx2, VOA, VSO, VOP</td>
</tr>
<tr>
<td>Between Bearing</td>
<td>HGT, VGT</td>
</tr>
</tbody>
</table>

In addition to our focus on water pumps, Stork pumps also provides other pump solutions for the market, such as:

- API: OH2, OH3, OH5.
- API: BB2, BB3.
- Internal gear pumps.
- Other pumps / installed base Stork pumps.
Air compressors are indispensable in today’s industries. As the common refrain goes: “no compressed air, no production” Stork delivers newbuild centrifugal air compressors from Hanwha Power Systems, a South Korean energy equipment manufacturer which entered the market in 1997. By combining Hanwha’s power generation solutions with Stork’s engineering and aftermarket services, we deliver brand new compression systems with the assurance of our excellent maintenance and service program. Stork is able to provide operations against reduced costs with maximum performance. With our access to the newest available technologies, our clients can rest assured that we always offer the optimal solution for every company.

**ADDED VALUE**

- **Excellent performance** related to specific power electricity input versus delivered airflow.
- **Proven reduction** of CO2 emissions.
- **Reduced Total cost of Ownership (TCO)** due to higher performance and smarter maintenance.
- **Turnkey solutions** enables the client to focus on their core business.

**OUR SERVICES**

- Complete installation of compressors included piping and high voltage components.
- Service and maintenance contracts.
- Performance tests.
- Open source / custom-made compressor control systems.

**PRODUCT DETAILS**

<table>
<thead>
<tr>
<th>SERIES</th>
<th>Feature</th>
<th>Flow rate (m3/hr)</th>
<th>Pressure (barA)</th>
<th>Maximum Power (kw)</th>
<th>Cooling type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SM100 SERIES</strong></td>
<td>High efficiency</td>
<td>3,300~32,000</td>
<td>3.5~13</td>
<td>3,100</td>
<td>Water Cooled</td>
</tr>
<tr>
<td><strong>SM SERIES</strong></td>
<td>Industrial standard</td>
<td>3,300~21,000</td>
<td>3.5~18</td>
<td>2,350</td>
<td>Water Cooled</td>
</tr>
<tr>
<td><strong>SME SERIES</strong></td>
<td>Low Initial cost</td>
<td>3,300~21,000</td>
<td>3.5~11.4</td>
<td>2,000</td>
<td>Water Cooled</td>
</tr>
<tr>
<td><strong>SA3100</strong></td>
<td>Water Shortage</td>
<td>3,300~5,500</td>
<td>3.5~13</td>
<td>580</td>
<td>Air Cooled</td>
</tr>
</tbody>
</table>

Phone: +31 88 089 15 00 - Email: info.turboservice@stork.com
Efficiency, flexibility, heat and power: Stork designs, builds and services state-of-the-art clean energy plants which convert biomass, fossil fuels, Municipal Solid Waste (MSW) and biofuels into heat and/or power. Stork specializes in tailor-made boiler systems. Combining engineering, production, commissioning and maintenance, Stork has a unique concept for operating companies working in (renewable) power generation, (petro)chemical and process industries by using Computational Fluid Dynamics (CFD) software to analyze fluid flow and heat transfer. For welding boiler membrane walls, different welding machines are available in Stork’s own production facility.

ADDED VALUE
- Integration into existing system
- EPC contractor
- Turn-key solutions

EPC CONTRACTOR AND MANUFACTURER OF:

Customized boilers for industry
- System flexibility.
- Energy recovery.
- Boiler replacement.
- Fuel flexibility.

Boiler projects on renewables
- Steam/warm-water.
- Biomass.
- MSW.
- Waste wood.
- Biofuels.
- Pyrolysis.
- Waste heat.

STORK IS PARTNER FOR:
- Energy flexibility and storage solutions.
- Hybrid boilers.
- Electrical boilers.
- Accumulators.

PRODUCT DETAILS

<table>
<thead>
<tr>
<th>BOILER TYPE</th>
<th>WATER TUBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion</td>
<td>Stork OEM burner system</td>
</tr>
<tr>
<td>Boiler capacity</td>
<td>&lt; 2-200 MWth</td>
</tr>
<tr>
<td>Steam pressure</td>
<td>&lt;130 bar(a)</td>
</tr>
<tr>
<td>Steam temperature</td>
<td>&lt;550 °C</td>
</tr>
</tbody>
</table>
The modern energy transition has set new standards for boiler plants and energy consumers. Therefore, Stork has developed a new type of boiler: a hybrid boiler. Our patented hybrid boiler uses both traditional fuels and electricity as energy sources for the generation of heat and can instantaneously switch from one source to another.

**ADDED VALUE**
- **Converting** renewable electricity into heat.
- **Lowest cost** of heat by shifting fuel and electricity.
- **Reducing emissions** footprint.

**PRODUCT DETAILS**

<table>
<thead>
<tr>
<th>HYBRID BOILER</th>
<th>WATERTUBE BOILER (CONVENTIONAL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response time</td>
<td>&lt;10 sec</td>
</tr>
<tr>
<td>Heat</td>
<td>Up to 500°C</td>
</tr>
<tr>
<td>Pressure</td>
<td>Up to 50 bar(a)</td>
</tr>
<tr>
<td>Turndown</td>
<td>1:50 MWe per unit</td>
</tr>
<tr>
<td>Technique</td>
<td>Combustion + Electrode</td>
</tr>
</tbody>
</table>

Hybrid Boiler

Heat production by:
- Combustion of (bio) fuel
- Instantaneous switchover
- Electricity (Electrode technology)
Integrating advanced deaerating concepts into state-of-the-art power plant engineering is a challenge. The Stork spray type deaerator is a single-vessel patented design with a worldwide installed base of more than 5,000 deaerators. Applying the Stork deaerator in power plant design caters to three needs: reducing capital investment, providing the lowest Total Cost of Ownership (TCO), and delivering excellent performance combined with high reliability. The robust design allows for lifetimes of more than 25 years and up to as long as 80 years.

**PRODUCT DETAILS**

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Application</th>
<th>Water flow capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HORIZONTAL DEAERATOR</strong></td>
<td>Standard for power generation, process industry and marine.</td>
<td>10 t/h to unlimited.</td>
</tr>
<tr>
<td><strong>VERTICAL DEAERATOR</strong></td>
<td>Where a small footprint is required.</td>
<td>10 to 650 t/h.</td>
</tr>
<tr>
<td><strong>INTERNAL DRUM DEAERATOR</strong></td>
<td>Installed inside the Low Pressure (LP) drum of HRSGs. No external steam source required.</td>
<td>50 to 450 t/h.</td>
</tr>
<tr>
<td><strong>NUCLEAR DEAERATOR</strong></td>
<td>Ideal for nuclear power plants.</td>
<td>Unlimited.</td>
</tr>
<tr>
<td><strong>VACUUM DEAERATOR</strong></td>
<td>Full vacuum as well as overpressure design, operating pressure down to 0.2 bar(a).</td>
<td>10 to 2,000 t/h.</td>
</tr>
<tr>
<td><strong>INSIDE CONDENSER</strong></td>
<td>Applicable, if demi-water deaeration inside of condensers is necessary, operating pressure 0.1 to 0.2 bar(a).</td>
<td>Operation with or without external steam source.</td>
</tr>
</tbody>
</table>

**ADDED VALUE**

- No maintenance required.
- One vessel only (minimal piping, easy to control, etc).
- No oxygen scavenger.
- Very large operating window.

Phone: +31 88 089 11 00 - Email: info.thermeq@stork.com
Stork provides direct-fired burners for almost all combustion installations, varying from boilers to fired heaters and from superheaters to incinerators. Our burners enable our clients to fire virtually every fuel or waste stream cleanly. Based on our extensive experience, we will advise our clients on the optimal strategy in firing fuel streams with the lowest costs and emissions.

**ADDED VALUE**
- Turn-key solutions.
- Specialized in multi-fuel solutions.
- Years of experience in water/steam cycles.

**PRODUCT DETAILS**

<table>
<thead>
<tr>
<th>IMPULS BURNER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi Gas &amp; Multi Oil.</td>
</tr>
<tr>
<td>Fuel staging.</td>
</tr>
<tr>
<td>From 5 to 60MW.</td>
</tr>
<tr>
<td>Ultra low Nox &lt;45 mg/nm3@3.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DOUBLE REGISTER BURNER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extreme fuel flexibility &gt;10 fuels.</td>
</tr>
<tr>
<td>Air staged burner.</td>
</tr>
<tr>
<td>From 5 to 100 MW.</td>
</tr>
<tr>
<td>Applicable in combined Turbine Exhaust Gas (TEG) &amp; Fresh Air (FA) or TEG modes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INLINE GRID BURNER</th>
</tr>
</thead>
<tbody>
<tr>
<td>High turndown.</td>
</tr>
<tr>
<td>Plug &amp; Play construction.</td>
</tr>
<tr>
<td>TEG, FA with flying takeover.</td>
</tr>
<tr>
<td>Low Pressure drop.</td>
</tr>
<tr>
<td>Patented augmenting TEG.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INLINE CIRCULAR DUCT BURNER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid &amp; Gaseous fuel flexibility.</td>
</tr>
<tr>
<td>Gas liquid combi firing.</td>
</tr>
<tr>
<td>TEG, FA with flying takeover.</td>
</tr>
</tbody>
</table>
In any combustion process, the trend is clear: NOx emissions have to be reduced, as do CO, SOx, dust, heavy metals and other pollutants. The downward trend of allowable emissions of pollutants is forcing operators of fired equipment to take extra (secondary) measures in order to comply with emission legislation. Stork’s Selective Catalytic Reduction (SCR) Systems and Selective Non-Catalytic Reduction (SNCR) Systems help with this issue.

**ADDED VALUE**
- **Decrease NOx** by up to 96%.
- **Cost effective reduction** of pollutants.
- **Environmental compliance.**

### PRODUCT DETAILS

#### SELECTIVE CATALYTIC REDUCTION
- **Operation temperature range**: 180 – 540°C (optimum between 200 – 500°C).
- **Dust applications**: Low dust (<300 mg/Nm3).
- **Nominal Flue gas flow**: 8500 Nm3/h and higher.
- **NOx reduction**: >96% (depending on amount of catalyst).
- **SO2 to SO3 conversion**: <0.5%.
- **Reagents**: Ammonia (aqueous solution or gaseous).
- **Reagent evaporation**: Direct injection in the flue gas path.
- **Pre-evaporation by air blower (electrically heated).**
- **Pre-evaporation by hot gas blower (uses hot flue gases).**

#### SELECTIVE NON-CATALYTIC REDUCTION
- **Temperature window**: 850 – 1050 °C
- **Dust applications**: Applicable in low dust and high dust environments.
- **Typical NOx reduction**: 50 – 70% (depending on process conditions).
- **Reagents**: Ammonia (aqueous solution).
- **Urea (aqueous solution).**
SwirlFlash technology is the state-of-the-art water injection technology for gas turbine power augmentation and NOx reduction. SwirlFlash uses hot pressurized water to obtain a power increase of up to 15% in the output of a gas turbine and to obtain a NOx reduction of up to 40%.

**ADDED VALUE**

- **Increased power** output by 10-15% instantaneously.
- **NOx reduction** more than 40% at diffusion burners.
- **Applicable in moderate climate and in colder seasons** too, meaning more operating hours compared to competing systems.

**THE POWER OF WATER**

The SwirlFlash system is a hot over-spray system. This means even more power output in high humidity conditions. The water injection takes place in the bell mouth, just before the first row of compressor blades. The hot pressurized water will flash once in ambient pressure which ensures constant production of small droplets (average 3 microns). The very small droplet size allows over-spraying without causing damage to the compressor blades.

**PRODUCT DETAILS**

<table>
<thead>
<tr>
<th>MAIN FEATURES SWIRLFLASH</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power increase</td>
<td>10 to 15%</td>
</tr>
<tr>
<td>Use in high humidity</td>
<td>Excellent</td>
</tr>
<tr>
<td>Use in low temperature</td>
<td>Excellent</td>
</tr>
<tr>
<td>Risk of blade erosion</td>
<td>Low</td>
</tr>
<tr>
<td>NOx emission reduction</td>
<td>High</td>
</tr>
<tr>
<td>Additional kWh/year</td>
<td>High</td>
</tr>
<tr>
<td>Complexity</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Phone: +31 88 089 11 00 - Email: info.thermeq@stork.com
Renewable energy is generated by Stork’s biomass-fired boiler system. Stork designs, builds and services state-of-the-art clean energy plants converting biomass and biofuels into heat and/or power. The energy transition has set new standards for boiler plants, and Stork is an optimal partner for energy flexibility and energy storage solutions. The Stork biomass-fired boiler system is a reliable green alternative for heat and power generation.

ADDED VALUE

Guaranteed performance: a reliable and robust boiler design.

Low emissions and small footprint.

Integration into existing system.

SPECIFICATIONS

A Stork biomass power plant is a total package solution, including a fuel handling system, a fully assembled water tube boiler with an integrated biomass combustion system, and efficient flue gas cleaning. The modules are suitable for road transport.

Stork optimizes standard solutions in order to satisfy and emphasize our clients’ specific strengths and needs. These optimizations can include a steam accumulator, a flue gas condenser, and a heat pump to accommodate for fluctuations in heat demand and/or a steam turbine for electricity production.

PRODUCT DETAILS

<table>
<thead>
<tr>
<th>BOILER</th>
<th>EDL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion</td>
<td>Moving grate or fluidized</td>
</tr>
<tr>
<td>Boiler capacity</td>
<td>&lt;50 MWth</td>
</tr>
<tr>
<td>Steam pressure</td>
<td>&lt;60 bar(a)</td>
</tr>
<tr>
<td>Steam temperature</td>
<td>&lt;500 °C</td>
</tr>
<tr>
<td>Efficiency (LHV)</td>
<td>90% - 107%</td>
</tr>
</tbody>
</table>
SERVICES AND SPARES

We assist our customers in maintaining their installations, both on site and in our own service shops. We value long-term relationships in order to understand our clients’ needs and to get to know their installations, thus preventing any unnecessary breakdowns.

Our extensive experience ensures the best preparation for overhauls and turnarounds, resulting in the shortest possible downtime, lowest costs and optimized performance.

With our OEM background and many years of experience we have built up knowledge and skills which enable us to come up with innovative solutions such as for lifetime extensions and performance as well as environmental upgrades.
GEARBOX MAINTENANCE PROGRAM

To ensure that our clients’ equipment continues to run at optimal levels, we offer a complete gearbox maintenance program. The equipment will be looked after through regular check-ups and preventive maintenance. The client will also receive regular reports on the condition of his equipment with our recommendations as to any major required maintenance work.

Outsourcing maintenance allows our customers to focus on their core competencies and daily operations.

Other benefits: improved availability and reliability of the primary process, reduction of repair costs, less unplanned maintenance, better risk and safety management.

Our services include:
- Vibration measurements.
- Visual and videoscopic inspections.
- Multichannel vibration measurements.
- Oil analysis.
- Infrared monitoring.
- Non-destructive research.
- 24-hours service availability.
- Onsite bearing exchange.
- Full spares support backup (optional).
- Equipment management.
- Wear protection through laser cladding.

SPARES

Stork manufactures gearbox components to OEM quality standards with unrivaled speed.

Flexible in-house component manufacturing capabilities give us full control of the overall gearbox repair process. We offer proven high quality up to and exceeding OEM standards, as well as unique repair solutions for re-use of existing components. With over 50 years of machining experience, we can repair, modify and manufacture virtually all gearbox components, no matter how complex. All machines are operated by skilled and experienced engineers, dedicated to creating quality components. All of our equipment meets the highest standards, and our machining department is staffed round-the-clock to provide our clients with a fast, responsive service.

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PUMP MAINTENANCE PROGRAM

Pumps are an essential element of the production process. A faulty pump will often lead to reduction in production capacity or even production downtime. Stork is a partner for fast and effective maintenance, repairs and overhauls of almost all brands and types of pumps. Thanks to Stork’s Machine Diagnostic Services, the client can prevent production disruption due to unforeseen machine downtime. Stork also offers round-the-clock support for urgent pump problems. We supply made to order solutions to meet all of our clients’ needs.

Regular, effective maintenance is essential to ensure optimal pump function. Preventive maintenance can help in prevent any sudden production downtime and related expenses. We perform Machine Diagnostic Services in order to determine what the precise condition of our customers pumps is.

Our services include:
- First line maintenance.
- Pump overhaul & repair.
- Maintenance engineering.
- Condition monitoring.

OEM SPARE PARTS DELIVERY PROGRAM

Access to both in-house and outsourced component manufacturing gives us flexibility and control over the general pump repair process. As OEM, we offer high-quality pump spare parts and unique repair solutions by state-of-the-art reverse engineering techniques. We can repair, modify and manufacture virtually all pumps and components.

Phone: +31 88 089 11 00  -  Email: pumps@stork.com
STEAM TURBINE MAINTENANCE PROGRAM

Stork offers complete turbine repair, including fact-finding, problem-solving and commissioning support. We offer Independent Service Provider (ISP) services at OEM level without OEM lead times.

Our services include:
- Steam turbine modification, overhaul and repair with minimal downtime.
- Failure and root cause analysis, solutions for recurring malfunctions.
- Retrofits and modifications to changed process/operating parameters.
- Timely delivery of spare parts required during the overhaul.
- General services: cleaning, inspection, vibration measurements, lubrication, balancing, run-out measurements.

SPARES

Stork supplies high quality blades and components for all types of steam turbines and virtually all types of gas turbines. Stork works for all major OEM’s, service companies and directly for end users.

TURBO MACHINERY COMPONENTS

| Equipment | Steam turbine blades & vanes, diaphragms, seals, steam valve spindles, bearings, shaft, locking pieces, shrouds, damping wire and more. | Any range, all sizes steam turbine blades. For conventional and geothermal plants. |
| Service | Engineering support, adaptive organization, flow path optimization, Computational Fluid Dynamics (CFD), Finite Element Method (FEM), frequency tuning, blade redesign, blade repairs. | Capable engineers and extensive knowledge database. On-site data gathering to minimize downtime, and adaptive organization to aid asset owners in the best manner. |
| Parts | Rotors, casings, shafts, diaphragms, nozzles, seals, gland housings, gears and more. | Other components possible due to our extensive network, trusted partners & intercompany resources. |

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COMPRESSOR MAINTENANCE PROGRAM

Stork helps maximizing your asset operability and maintainability, thereby improving output while reducing operating costs. We deliver major cost benefits with integrated solutions for all components of the turbo-compressor train. Our proven portfolio of inspection, repair, maintenance, modification and engineering services is based on a unique combination of expertise and experience.

We support all turbo-compressor types, including:
- Axial & centrifugal turbo compressors.
- Single & multistage turbo compressors.
- Horizontally split / barrel type.
- Single shaft / gear type.
- Oxygen turbo compressors blowers.

SPARES

Stork supplies high-quality compressor parts. Based on our high-end reverse engineering and manufacturing capabilities we are able to make components for a wide selection of compressors.

- Axial compressor blades & Vanes.
- Radial compressor impellors, shaft, accessories, and more.

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GER : Phone: +49 201 8667 10 00 - Email: ivt.essen@stork.com
GASTURBINE MAINTENANCE PROGRAM
Stork offers complete gas turbine repairs, including fact-finding, problem-solving, commissioning and start-up support. We offer independent services at the OEM level for competitive pricing.

Our services include:
• Gas turbine inspection, repair and major overhauls with the shortest customer downtime.
• Failure and root cause analysis and solutions to eliminate recurring malfunctions.
• Modifications and retrofits to improve operating parameters.
• A spare parts management program for scheduled and unscheduled maintenance.
• Specialty services such as DLN tuning, rotor alignments, vibration measurements and analysis, rotor balancing and (remote) monitoring and diagnostics.
• Operation and maintenance of entire power plants.

SPARES
Stork supplies high-quality blades and components for all types of gas turbines. Stork works for and delivers to all major OEMs, independent service providers/ISPs and end users. Stork makes gas turbine compressor blades for virtually every type of gas turbine. Stork has already reverse engineered most types and has a stock program for the most popular types of gas turbines. We deliver the highest quality standards quickly for competitive prices.

GAS TURBINE COMPONENTS
Diaphragms, nozzles, assembly parts, heat shields, spacers, hot parts (buckets) of turbines. Compressor refurbishment including coatings.
Gas turbine accessories for all turbines (and gas turbine compressors). Shims, keys, screws, washers, bearings, and more.

| GE ENERGY |
| Gas turbine | Type | Description / Alias |
| MS3001 | A-G / H-J | Frame 3 |
| MS5001 | A / B / D / K-M&R / N-P / L-A | Frame 5 |
| MS6001 | B / FA | Frame 6 |
| MS7001 | B / EA / F / FA / FA+E / FA+E/S | Frame 7 |
| MS9001 | B / EA / F / FA / FA+E / FA+E/S | Frame 9 |

| ALSTOM POWER |
| Gas turbine | Type | Description / Alias |
| GT11 | B / D4 / D5 |
| GT11 | N1 / N2 / NM |
| GT13 | D / DM |
| GT26 | B |
| GT13 | E / E1 / E 2 / E2MXL |

| SIEMENS |
| Gas turbine | Type | Description / Alias |
| TA | 1750 AC, CT & PT | Ruston TA1750 |
| TB | 4000 AC | Ruston TB4000 |
| TB | 5000 AC | Ruston TB5000 |
| SGT-200 | 1S / 2S | Ruston Tornado |
| SGT-600 | GT10B |
| SGT5-2000E | V94.2 |
| SGT6-2000E | V84.2 |
| SGT5-3000E | V94.2A |
| SGT5-4000F | V94.3A |

| WESTINGHOUSE |
| Gas turbine | Type | Description / Alias |
| W171 | G / M |
| W191 | G |
| W251 | A / AA / B1-B8 / 89-B12 |
| W501 | D4 / D5 / DSA |

OTHER
Your gas turbine not listed above? Our extensive archive may offer help! Please contact one of our facilities to discuss the possibilities, or visit our website www.stork.com/turboblading.

NL : Phone: +31 88 089 12 90 - Email: info.turboblading@stork.com
USA : Phone: +1 607 277 4968 - Email: sales@usa.stork.com
CONTROLS RETROFIT AND MODERNIZATION

Stork supplies turbine controls and compressor controls as individual component replacements or integrated control solutions for turbine generators or turbo compressor sets. Based on our in-depth turbo machinery and process know-how, we deliver harmonized controls (identical system and program structure, look and feel) for equipment from different manufacturers. Both integration and harmonization reduce complexity in operation and maintenance.

Our services include:
- Customized control packages.
- Individual component replacements.
- Integrated control solutions for turbine-generators and turbo-compressor sets.
- Consultancy, engineering and risk analysis / Safety Integrity Level (SIL) rating / SIL rating.

CONTROLS MAINTENANCE

Hydraulics Maintenance & Repair including Spare Parts Delivery for:
- ASKANIA jet pipe regulators.
- Hydraulic actuators.
- Electrohydraulic actuators.
- Hydraulic governors.
- Hydraulic protection devices.

Sensor and Loop Testing, Calibration & Repair including Spare Parts Delivery for:
- Vibration monitoring systems.
- Temperature / pressure transducers.
- Restoration of leak tight cable glands.

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ELECTRIC MACHINERY SERVICES

Technological advances, a rapidly changing global market and ever more stringent environmental controls are bringing new challenges to the chemical, oil, gas and power industries, among others. That is why electric machinery maintenance and the purchase of essential parts are prerequisites for safe, reliable production. Stork acts as an independent service company for electric machinery, operating internationally with several service shops located in the Netherlands and Germany.

The following electric machinery are serviced in our shops:
- Turbo generators.
- Hydro power generators.
- Exciters.
- Electric Motors (AC and DC).
- Generator auxiliary systems.

Our services include:
- Maintenance & repair.
- Diagnostics & analysis.
- Manufacturing of windings.
- Engineering & modernization.

SPARES

Sleeve bearings, roller bearings, retaining rings, H2 seal rings, coupling bolts, rotor fan blades, stator- and rotor slot wedges, coils and bars for stator- windings, slip rings, collectors, rectifiers, bushings, wipers and more.

PHONE: +49 941 91 03 338  -  EMAIL: info.turboservice@stork.com
**ELECTRIC MOTOR SERVICES**

Our clients’ operations depend on electric machines running safely, smoothly and reliably. Stork gives that assurance, regardless of type or manufacturer. With our extensive knowledge on electric motors we help our customers’ business running.

**Our services include:**
- Inspection, testing and diagnostic measurements.
- Engineering.
- Condition monitoring.
- Repair and overhaul.
- Rewinding of stators.
- Renewal of laminations.
- Maintenance- and Project-management.
- Repair and Rewinding of AC- and DC-rotors.
- Renewal of collectors and slip rings.
- Balancing.
- Site works: disassembly, assembly, alignment, power connection, commissioning, vibration measurement.
- Overhaul, repair and renewal of components (fans, coolers, bearings, collectors, slip rings etc.).

**ELECTRIC MACHINERY SERVICE FOR**

- 3-phase AC motors with High Voltage and Low Voltage.
- AC- motors with squirrel cage rotors and slip ring rotors.
- ATEX motors.
- DC-motors.
- Exciters.
- Pump motors.
- Power converters.
- Emergency generators.
- Railway motors.

**SPARES**

- Coils.
- Sleeve bearings and roller bearings.
- Coolers.
- Fans.
- Collectors and slip rings.
- Couplings.

**BOILER SERVICES**

Stork’s boiler services expertise supports in improving and maintaining boiler performance. We assist our clients from initial brainstorming through to commissioning new in-house built boiler components. The key business drivers will determine the scope of our activities in order to reach common goals, and the client will benefit from Stork’s integrated approach as a turnkey service provider.

**Our services include:**
- Efficiency and performance studies.
- Boiler inspections.
- Boiler overhauls.
- Boiler modifications.
- Root cause failure analysis.
- Residual lifetime inspections.
- Service Level Agreements (SLAs).
- 24/7 call out service.
- Planned maintenance during outages.
- Supply of spare parts & repairs.
- Emission measurements.
- Retubing condensers.

**SPARES**

- Membrane walls.
- Headers.
- Superheaters (bundles).
- Economizers.
- Evaporators.
DEAERATOR SERVICES

Our experts can design and manufacture the optimum solutions based on the available footprint (type of plant, capacity and location). With over 5,000 references, we have experience dating all the way back to 1933.

Design criteria includes reducing steam consumption as much as possible and ending the use of oxygen scavengers, resulting in the lowest possible operating cost.

Our services include:
- Customer-oriented deaerator design.
- Customer support during FEED.
- Software tool for Deaerator Designer tool.
- Continuous R&D program.
- Manufacturing.
- Commissioning.
- Feasibilities study for retrofits (of existing dome / tray type deaerators).
- Executing Retrofits.

RETROFITS

To gain the advantages of our design in an existing plant, we can retrofit the dome/tray type deaerator into a Stork Spray Type deaerator. This can be executed within a lead time of 5 to 10 working days. Average payback time is two years and can be calculated for each specific situation.

SPARES

One of the things that makes the Stork Spray Type deaerator unique is that maintenance and spares are not required: simply follow the local guidelines for inspections for pressure vessels.

Phone: +31 88 089 11 00  -  Email: info.thermeq@stork.com

BURNER SERVICES

Stork’s Aftermarket Parts & Service department provides a wide range of spare parts for all of our OEM burner products. Critical components such as scanners, valves and instruments can also be rush-delivered with the exact specifications for the installation of the client.

In addition to replacement parts, Stork can also provide inspection services with our SCIOS-certified service engineers and a range of on-site services to keep our clients’ installation well maintained and operating problem-free.

Our services include:
- Burner OEM spares and replacement parts.
- Critical burner installation parts such as flame scanners, valves, instruments.
- Installation services.
- Burner preventative maintenance programs.
- On-site inspection services.
- Operator training.
- Start-up and troubleshooting assistance.

SPARES

- Oil burner parts.
- Gas burner parts.
- Coal burner parts.
- Valves.
- Instruments.
- Other Auxiliary parts.

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<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our company</td>
<td>3-4</td>
</tr>
<tr>
<td>Our added value</td>
<td>5</td>
</tr>
<tr>
<td>Safety</td>
<td>6</td>
</tr>
<tr>
<td><strong>PRODUCTS:</strong></td>
<td></td>
</tr>
<tr>
<td>Rotating Equipment</td>
<td></td>
</tr>
<tr>
<td>Gearboxes</td>
<td>9-10</td>
</tr>
<tr>
<td>Pumps</td>
<td>11-12</td>
</tr>
<tr>
<td>Compressors</td>
<td>13-14</td>
</tr>
<tr>
<td>Process Equipment</td>
<td></td>
</tr>
<tr>
<td>Boilers</td>
<td>15-16</td>
</tr>
<tr>
<td>Hybrid Boilers</td>
<td>17-18</td>
</tr>
<tr>
<td>Deaerators</td>
<td>19-20</td>
</tr>
<tr>
<td>Burners</td>
<td>21-22</td>
</tr>
<tr>
<td>SCR &amp; SNCR</td>
<td>23-24</td>
</tr>
<tr>
<td>Swirflash</td>
<td>25-26</td>
</tr>
<tr>
<td>Biomass Plants</td>
<td>27-28</td>
</tr>
<tr>
<td><strong>SERVICES &amp; SPARES</strong></td>
<td></td>
</tr>
<tr>
<td>Rotating Equipment</td>
<td></td>
</tr>
<tr>
<td>Gearboxes</td>
<td>31</td>
</tr>
<tr>
<td>Pumps</td>
<td>32</td>
</tr>
<tr>
<td>Steam Turbines</td>
<td>33</td>
</tr>
<tr>
<td>Compressors</td>
<td>34</td>
</tr>
<tr>
<td>Gas Turbines</td>
<td>35-36</td>
</tr>
<tr>
<td>Turbo Machinery Control Systems</td>
<td>37</td>
</tr>
<tr>
<td>Electric Equipment</td>
<td></td>
</tr>
<tr>
<td>Generator &amp; Motors</td>
<td>38</td>
</tr>
<tr>
<td>Electric Motors</td>
<td>39</td>
</tr>
<tr>
<td>Process Equipment</td>
<td></td>
</tr>
<tr>
<td>Boilers</td>
<td>40</td>
</tr>
<tr>
<td>Deaerators</td>
<td>41</td>
</tr>
<tr>
<td>Burners</td>
<td>42</td>
</tr>
</tbody>
</table>