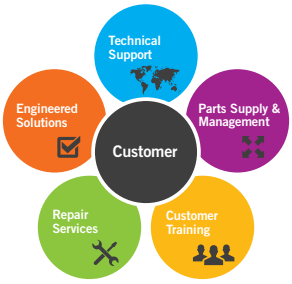
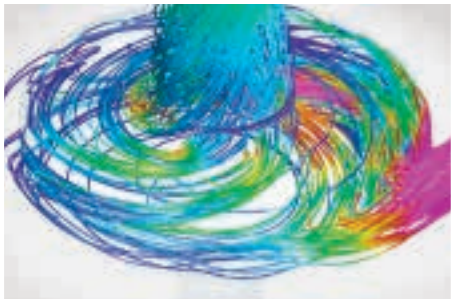
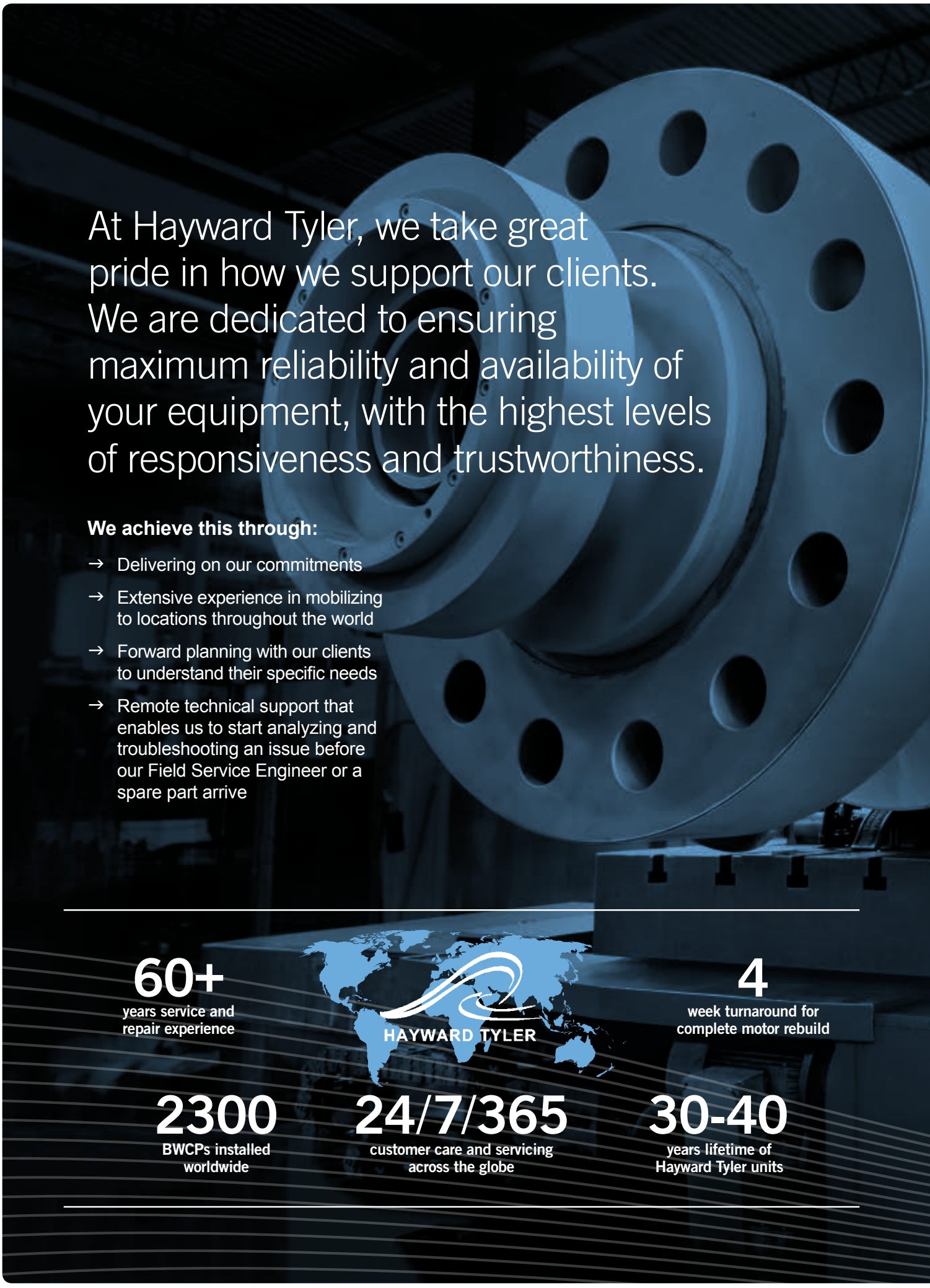
HAYWARD TYLER



Customer Services

Reliable through-life service and support for performance-critical pumps and motors





At Hayward Tyler, we take great pride in how we support our clients. We are dedicated to ensuring maximum reliability and availability of your equipment, with the highest levels of responsiveness and trustworthiness.

We achieve this through:

- → Delivering on our commitments
- → Extensive experience in mobilizing to locations throughout the world
- → Forward planning with our clients to understand their specific needs
- → Remote technical support that enables us to start analyzing and troubleshooting an issue before our Field Service Engineer or a spare part arrive

60+
years service and repair experience

HAYWARD TYLER

4
week turnaround for complete motor rebuild

2300
BWCPs installed worldwide

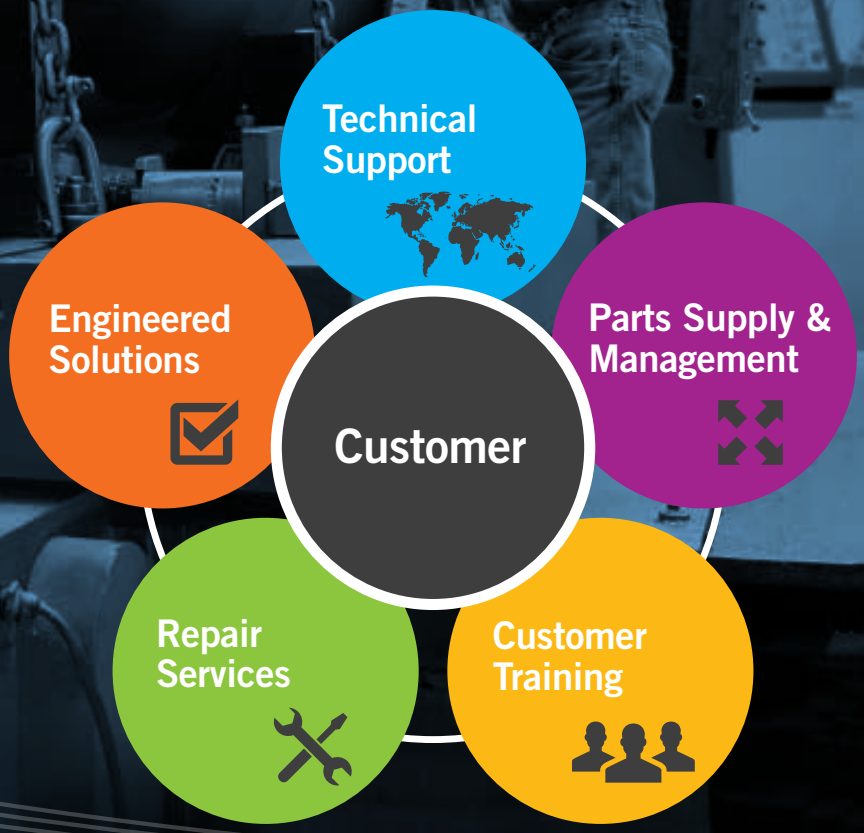
24/7/365
customer care and servicing across the globe

30-40
years lifetime of Hayward Tyler units

Our Five Dimensional (5D) Support Model, developed around your needs.

The Hayward Tyler 5D Support Model is designed to cover all aspects of support that might be needed during the life cycle of owning, operating and maintaining electric motors and pumps for performance-critical applications.

- → Maximizes reliability and availability of equipment
- → Lowers cost of ownership
- → Supports extended life of equipment
- → Allows more predictable maintenance
- → Provides availability of critical spare parts at the right time
- → Ensures that support will be available when needed



World-class products and support for lower life cycle costs

At Hayward Tyler, we deliver world-class support for all our products to ensure maximum reliability and lower cost of ownership. We are committed to serving the most demanding applications in the energy sector as the trusted provider of on-going support for our customers.

Dedicated Support Team

Our customer service teams are ready and able to support you in maximizing the reliability and availability of your equipment. Our highly skilled engineers and technicians provide services around the clock and around the world. Accustomed to working under tight time constraints, they are committed to solving problems and reducing downtime.

Supported by design and technical staff based in the UK, China and the USA, our engineers can be rapidly mobilized to your facility. This responsive approach, together with an international network of partner companies offering local assistance, ensures we have the right personnel to provide solutions in the quickest repair time possible.

At Hayward Tyler, our team members are experts in their respective fields, including technical support, field and shop maintenance, commissioning, and replacement parts.

Continuous Investment in People

We invest in the development of our staff to ensure they are in the best position to support you. We do this through continual professional education in areas such as health & safety, engineering, and project management. Our commitment is to both developing the individual and continual improvement of our customer service.

Advantages of Choosing Hayward Tyler Service and Support:

- → 200-year history with 60+ years servicing history
- → Global reputation for trust and responsiveness
- → Dedicated and professional support team
- → 24/7/365 worldwide support service

Worldwide Support

Hayward Tyler provides worldwide support with a team of internationally-experienced field service engineers and office-based staff. We have dedicated resources for rapid mobilization to any facility when needed. Forward planning is developed in collaboration with our customers and is essential for performance-critical applications.

- Improved product reliability and availability
- Lower and more predictable cost of ownership
- Supporting the extended life of machinery
- Predictable machine operation and maintenance
- Critical spare parts available at the right time
- Assurance that support available when needed

5D Support Model

Customized service agreements can be structured using any combination of services offered within the 5D Support Model.

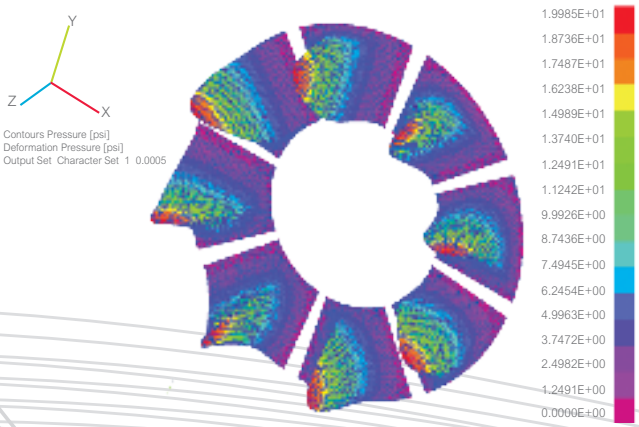
Technical Support

Hayward Tyler has provided engineering technical support to the global energy market for over 200 years. Our in-house design engineering teams are experienced in analyzing complex engineering problems to address your most demanding operational issues.

Engineering Services

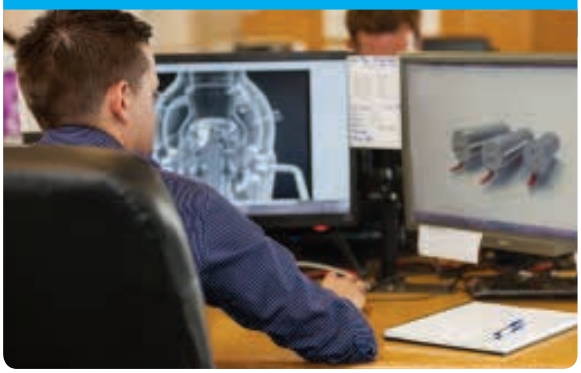
All our mechanical designs are carried out in 3D using Solidworks design package. A number of simulation tools are utilized to verify the performance of the designs, including Maxwell electrical simulation, Computational Fluid Dynamics (CFD) for hydraulic flow simulations, Finite Elements Analysis (FEA) for structural analysis, and XLrotor for torsional dynamic simulation. In addition, we use Motor Design Limited (MDL) software for analysis of electrical thermal data. All designs meet as default ASME, CSA, PED or customer-specific pressure standards and quality requirements such as API610, IBR and RCCM codes.

New bearing materials are validated in Hayward Tyler's R&D laboratory to assess wear resistance and durability, dimensional stability in water, and other key performance parameters. Unit electrical and hydraulic performance is validated in the test area where full-scale testing can be completed, and the results are fed back into the design to improve correlation between simulation and test. For new high-power, high-speed motor developments, FEA tools are used for new component design and evaluation. Testing of these comprises high-pressure cycling, thermal cycling, and vibration tests. Fluid dynamics are then evaluated with a high-speed rotor test rig.



Technical Capabilities:

- → Engineering Design:
  - Pressure Vessel Design
  - Structural Design
  - Hydraulic Design
  - Advanced Bearing Design
  - Advanced Motor Design
- → Pump and Motor Redesign
- → Rotor Dynamics
- → Seismic Analysis
- → Finite Element Analysis
- → System Troubleshooting
- → Condition Monitoring
- → Technical Evaluation
- → Commercial-Grade Dedication
- → Specification Writing
- → Registered Professional Engineers (RPE)



Nuclear

We have substantial experience working with ASME Section 3 (Nuclear) designs, in addition to seismic evaluations, nuclear technical specification writing, technical evaluations and code year reconciliations. Having been involved in the design of nuclear components since the 1970s, we thoroughly understand the requirements and complexity of the nuclear industry.

CASE STUDY:

Advanced Scanning and Computational Fluid Dynamic Analysis on Safety-Related Impeller

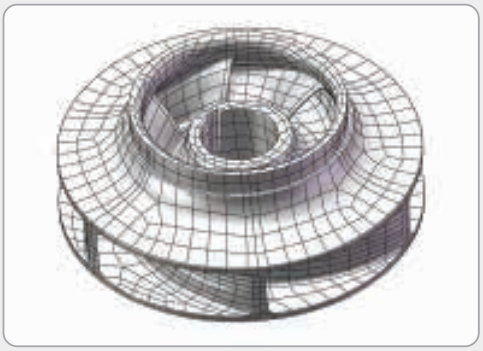
Hayward Tyler supplied a replacement impeller for use in a Nuclear Safety Related Component Cooling Water application. The original equipment was supplied in the early 1970s and the pattern had been subject to degradation. To validate the repaired pattern, Hayward Tyler modelled and analyzed the refurbished pattern and the impellers produced from it.

The newly-poured impellers were scanned by an industry-leading inspection company to create a 3D model. Traditional 3D scanning can be difficult due to the sweeping vane geometry and blind internal surfaces. A new proprietary technique was used to scan the entire impeller passage and create the model. This is non-destructive and provides data for all surfaces.

The scanned model was combined with other key pump features (including the fluid volume) and analyzed in Computational Fluid Dynamic (CFD) software. The CFD software was commercially dedicated using their NQA-1 Commercial Grade Dedication program to validate use on a Safety Related component. The result proved the acceptability of the new impeller without the need for large scale performance testing.

This technique can be used to reverse engineer existing equipment or upgrade equipment without the need to performance test.

Impeller pattern



Impeller model produced from scanning

PUMP DETAILS		
Pump Type	10” Suction x 8” Discharge with 16” Double Suction Impeller	
Fluid Pumped	Demineralized Water	
Operating Temperature	160° F	71° C
Rated Flow	3500 gpm	795 m3/hr
Specific Gravity	1.0	
Rated Head	179 ft	55 m
Design Pressure	150 psig	10 bar
Design Temperature	160° F	71° C
Impeller Material	ASTM A216 WCB	
Pump Case Material	ASME SA216 WCB	

CODES AND STANDARDS	
Design	ASME Section III 1971 Class 3 Winter Addendum 1971
Flange Standard	ANSI B16.5
Materials Standard	ASME / ASTM
Nozzle Loading	Customer defined

WEIGHTS (APPROXIMATE DRY)		
Rotating Element	380 lbs	172 kg
Pump	1500 lbs	680 kg
Pump and base	3950 lbs	1792 kg

Parts & Supply Management

Having the right parts at the right time is critical for delivering the world-class service our customers expect. We take a proactive approach to parts and supply management, with a keen attention to detail and deadlines to deliver solutions that meet your operational demands.

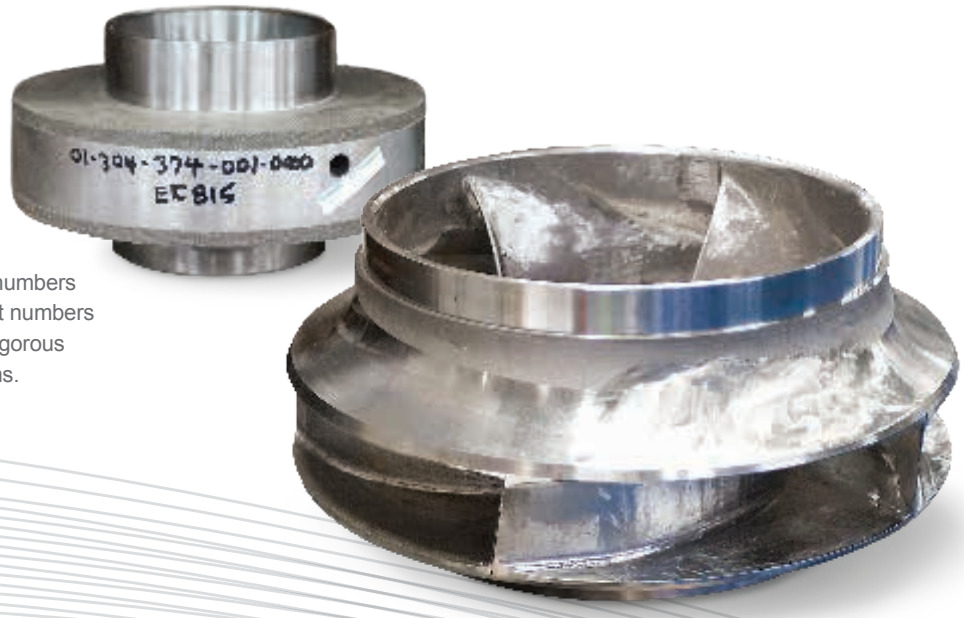
Replacement Parts

Hayward Tyler parts are built to the highest quality standards to ensure maximum reliability and availability. When you buy a spare part from us, you do so with the assurance there is no compromise on quality.

Hayward Tyler can supply spare parts for all our pump and motors, including legacy products such as GE Boiler Water Circulation Pumps, Babcock and Wilcox Nuclear and Conventional Pumps and Westinghouse Condenser Circulating Water Pumps. For each of these product ranges we maintain all engineering data, Bills of Material, drawings, test results and patterns. Through our Parts Value Stream (PVS) we can offer like-for-like replacement parts or design upgrades applicable to your current needs. Our parts production is governed by strict quality standards, such as ISO 9001 and ASME NQA-1. We have a comprehensive inspection department with state-of-the-art equipment, including the ability to reverse engineer.

Parts & Supply Capabilities:

- → OEM spares
- → Non-OEM spares and unobtainable parts
- → Refurbished parts
- → Tooling
- → Inventory inspection
- → Inventory management
- → Kitting services
- → Parts storage and stock holding service



We use batch numbers and unique part numbers as part of our rigorous quality programs.

Commercial Grade Dedication

Our NQA-1 compliant quality program allows us to apply a dedicated process in re-qualifying commercially-purchased parts or materials in order to qualify them as Safety Related as defined in US Code of Federal Regulations, 10CFR 21. This process verifies that the material or part meets the critical characteristics and will perform its intended function.

We are able to utilize this procedure to become a preferred supplier to our customers in providing safety-critical parts. Our US manufacturing facility holds a NPT stamp, allowing us to stamp parts as required.

Long Lead Parts

Working with our customers, we accurately identify the critical spare parts for their equipment. Proper identification and stocking of these parts helps to reduce customer downtime and repair turn-around time. Having the right parts on hand at the right time is essential to an effective planned maintenance program.

At Hayward Tyler, we manage a “min-max” stocking program, ensuring that long-lead items that are critical to our customers are maintained in stock at all times.

Tooling

We can supply both special purpose and standard tooling for all your maintenance needs. This can include the re-supply of special tooling if the original supplied with our equipment has been lost or damaged. We also offer specialist tooling, such as maintenance and storage stands and multi-head tensioning equipment. In addition, we can rent tension equipment for site use, mitigating the need to purchase your own.

If you have bespoke tooling requirements, we can help you with its design and manufacturing.

USING “MIN-MAX” ALLOWS US TO ENSURE AVAILABILITY OF CRITICAL PARTS

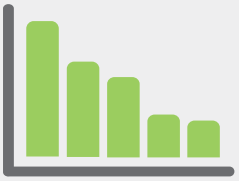
Repair Services

Hayward Tyler's global repair facilities provide world-class aftermarket support. With service centers, industry-leading turnaround times, and fast-response field service teams, we exceed customer demands for technical support.

Shop Service

Our Service Value Stream (SVS) was specifically developed based on lean manufacturing principles and the elimination of waste (5s). Our dedicated SVS teams have reduced repair turnaround times by over 75% — minimizing our customers' outages and maximizing overall availability. We have extensive experience repairing wet and dry stator motors along with conventional pump types. We maintain the N, NPT, NA, NS and U ASME stamps. Our global service facilities also maintain complete machine shops, including: vertical turning and milling, horizontal boring, CNC drilling and milling, CNC lathes, dynamic balance machines, surface grinders, process ovens, and Electrical Discharge Machining (EDM). Our welding operations and welders comply with ASME and other international accreditations.

We continue to improve our performance to meet and exceed customer expectations, and we're proud to be an industry leader in the development of lean manufacturing standards.



75% REDUCTION IN SHOP TURNAROUND TIME

50% IMPROVEMENT IN ON-TIME DELIVERY

Based on average BCP repairs from 2012-2017 in Hayward Tyler's US facility

Shop Service Capabilities:

- → Complete overhaul/repair to OEM specification (HTI, GE)
- → Other overhaul/repair capabilities include: IR, Westinghouse, Torishima, Fuji, KSB
- → Low and medium voltage testing
- → Turn-key operation: removal, repair, installation and commissioning
- → Complete machining and fabrication
- → Design engineering expertise
- → Performance testing
- → Dedicated Service Value Stream Team
- → 24/7/365 technical support

Complete machine shops

- – Vertical turning and milling
- – Horizontal boring
- – CNC drilling and milling
- – CNC lathes
- – Dynamic balance machines
- – Surface grinders
- – Process ovens
- – Electrical Discharge Machining (EDM)
- – Accredited welding operations

AS LITTLE AS

4

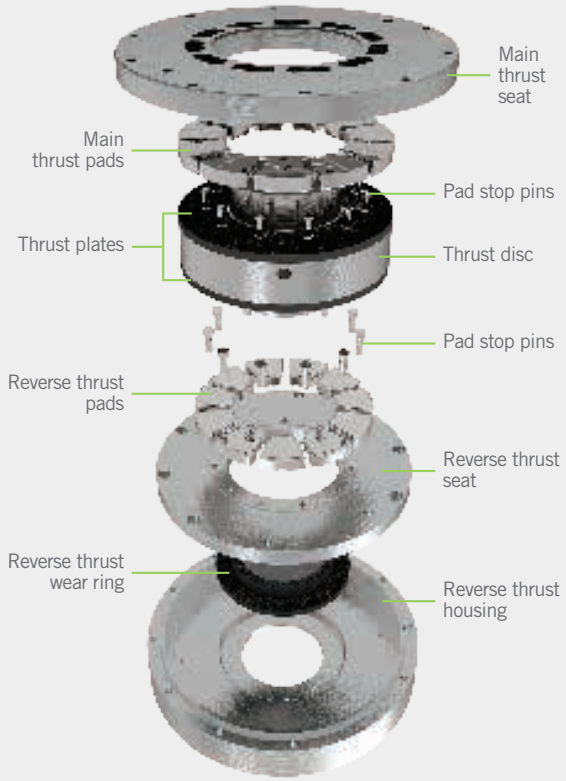
WEEK TURNAROUND FOR COMPLETE MOTOR REBUILD

Global Field Service Coverage

Our international field service team provides on-site support at any of our customer sites. All of our field service technicians undergo extensive training at our service centers, as well as a 10-hour OSHA training course, prior to being approved to provide field service at customer sites.

We provide a wide range of vital field services, including complete turn-key motor and pump overhauls, supervision expertise to site personal, thrust bearing inspections, and complete pump overhauls that include the rewinding of stators. Working in close collaboration with your staff and drawing on our lean manufacturing principals, our field specialists work diligently to ensure the smoothest possible process from start to finish.

TYPICAL PARTS FOR THRUST INSPECTION
BASED ON DOUBLE THRUST CONFIGURATION



Field Service Capabilities:

- → Turn-key maintenance
- → Complete overhaul/repair to OEM specification (HTI, GE); including field rewinding
- → Motor removal and installation supervision
- → Pump/motor start-up and commissioning
- → In-situ thrust bearing inspections
- → 24/7/365 technical support
- → Tooling and equipment rentals
- → Global coverage
- → Extensive nuclear experience, including “hot” work
- → Pump case boroscope inspections

Global capabilities

With dedicated resources in the UK, USA, India, and China, as well as specialist field personnel, we deliver a full range of service options for all levels of repairs, and for planned and predictive maintenance cycles and inspections.

Engineered Solutions

We offer a variety of options to upgrade or replace your existing installed equipment to help maximizing the performance of your pump or motor.

Operational Equipment Upgrades

Motor and Pump Upgrades: If your existing pump and motor are not performing to meet you current system needs, we can re-design your existing hydraulics to deliver the performance you demand.

Material Changes and Upgrades: Our design engineers have extensive experience in selecting the correct material for pumping applications and can offer customers upgrade options or changes from those originally specified.

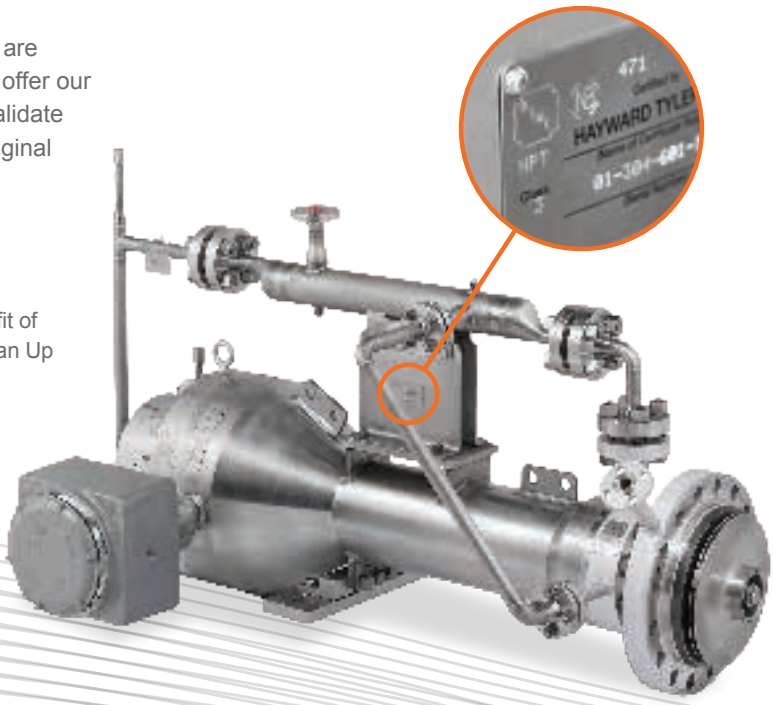
Sealless technology retrofit: If your pump and motor configuration is subject to frequent maintenance activities or leaking mechanical seals, we can retrofit a sealless technology to your existing application. This option utilizes a leakproof, glandless design that allows the existing pump to be retained.

Reverse engineering: Through our NQA-1 accredited inspection program we have the capability to reverse engineer existing components for situations where the originals are no longer available or a different performance is required. State-of-the-art scanning and computer modelling capabilities ensure any reverse engineered product meets or exceeds the original requirements.

Equipment life extension: Recognizing that plants are being operated past their original design intent, we offer our customers Equipment Life Extension Reviews to validate continued operation of plant equipment past the original design life.

Engineered Solutions Include:

- → Motor and pump upgrades
- → Material changes and upgrades
- → Re-rating/upgrading hydraulics
- → Sealless technology retrofit
- → Replacement pump and motors
- → Reverse engineering
- → Equipment life extension



Canned Motor Retrofit of a Reactor Water Clean Up (RWCU) application

CASE STUDY:

Increasing flexibility of operation with a hydraulic design retrofit

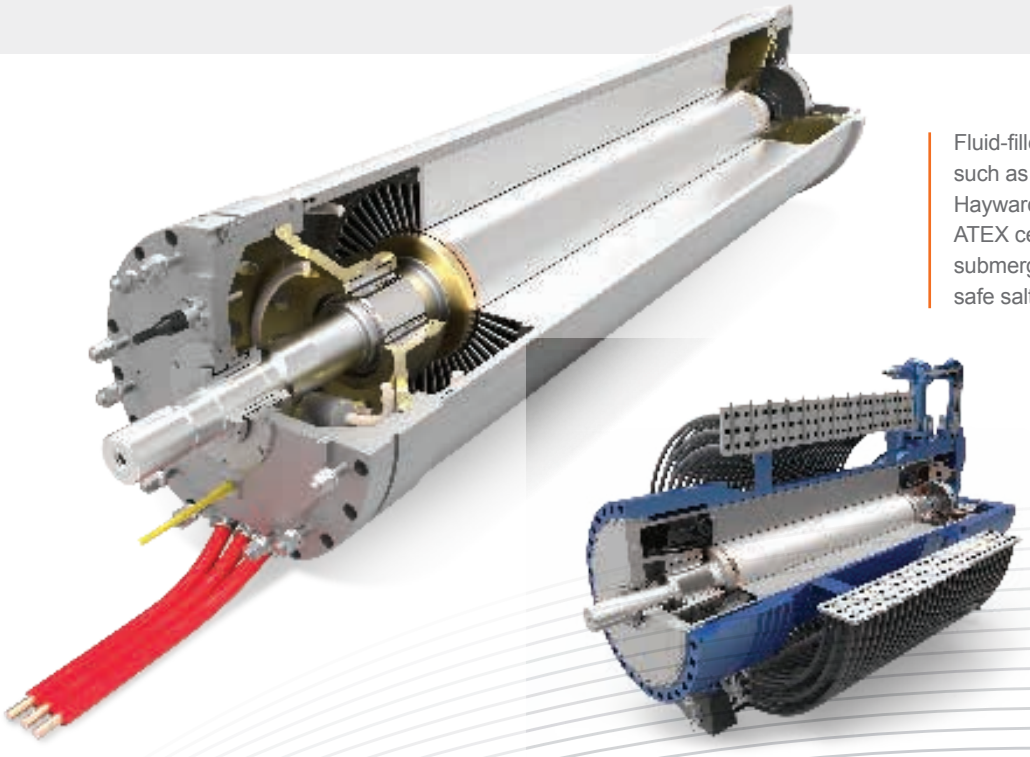
A site in North America was having operational problems with their pump and experiencing frequent failures. Hayward Tyler engineers evaluated the operational conditions and the hydraulic design, and concluded that a better hydraulic selection was available for the type of operating the plant wanted to undertake. The original specified design condition caused a hydraulic selection that was limited in the flexibility of operation across the complete pump curve.

Through discussion with site managers, it was determined that it was more important for the pump to be able to cover a wide range of operating conditions than a single duty point. A new hydraulic end (impeller, diffuser and suction tube) was designed that was compatible with the existing pump shaft and could be retrofitted into the existing pump case.

The hydraulic design was validated through Computational Fluid Dynamics, and the pump was performance-tested at one of Hayward Tyler's manufacturing facilities. The factory performance test and subsequent plant operation showed the new hydraulics met the objectives of successful varied operational conditions.

This process is applicable if you want to change performance capabilities to provide increased flexibility of your existing pump, or if you are having operational issues.

HYDRAULIC COMPONENTS



Fluid-filled submersible motors, such as those supplied by Hayward Tyler, do not require ATEX certification as they are submerged in an intrinsically safe salt-water environment.

Customer Training

We actively promote and encourage training to educate our customers on correct operation and maintenance of their equipment. Correct operation is the first line of defense when it comes to ensuring reliable operation of critical equipment.

To this end, we offer you a wide range of training options — from single-day product awareness training that highlights key features and considerations for equipment use, to multi-day courses that educate users on the operation and maintenance of your specific equipment.

General or Specific

Our training courses are flexible to cater to any individual needs, from an operator or plant technician who must understand how to correctly start up your equipment, to a manager who simply needs an overview of equipment functionality, operation, and maintenance.

We also provide training at all levels. Newcomers with a need for basic knowledge as well as experienced personnel who want to maximize equipment performance can all benefit from training with us. We have a wide range of standard courses for our products, but can also create training programs customized to specific needs.

Training Facilities

All training is delivered by experienced Hayward Tyler specialists, supported by professionals in various fields of expertise. We can host training at any of our facilities around the globe, your facility, or an off-site location that's convenient for your staff. When training courses are held at our facilities, they include a tour of the manufacturing plant covering the processes we use to build your equipment.

Benefits of training:

- → Increased knowledge of equipment operation
- → Improved equipment reliability
- → Better maintenance planning
- → Reduced down time
- → Demonstrable staff competence

We provide training on:

- → Boiler water Circulation Pumps/ Wet Stator Units
- → Canned Motor Pumps
- → Submersible Motors
- → Subsea Motors
- → Vertical Turbines

Courses cover:

- – Basic equipment overview
- – Design Features
- – Installation / Commissioning / Decommission
- – Long Term Storage Procedure and Checking
- – Maintenance Recommendations
- – Advanced Equipment overview
- – Pumps 101
- – Equipment troubleshooting

Advanced Factory Simulation

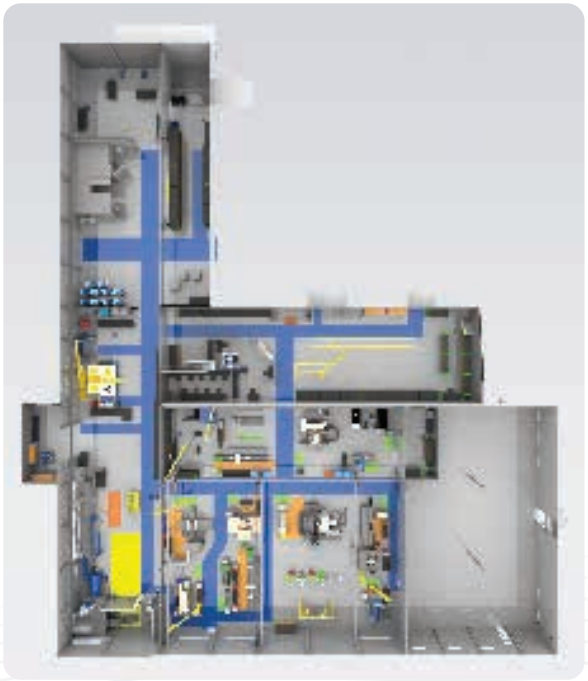
At Hayward Tyler, we utilize advanced factory simulation software to understand our capacity and resource constraints, allowing us to identify bottlenecks in our facilities, develop lean manufacturing processes, and realize significantly shorter lead times for our customers.

Through our propriety systems, we have a clear view of the shop loading and resource allocations. This provides our operations team with an understanding of the efficiency of our factory. By simulating, we identify issues or problems that may cause delays in our processes, allowing us to mitigate these before they occur. This helps ensure on-time delivery and correct resource scheduling that encompasses the entire supply chain.

Improvements across all facilities

We have 3D-modeled all of our factories, which allows us to understand the most effective plant layout for each. We can make adjustments to the plant layout in these models, and run the factory simulation software to understand the impact on current and future predicted work. This allows us to maximize the effectiveness of our factories, with a key focus on the delivery of quality products, on-time to our customers.

Center of Excellence- certified as Fit for Nuclear (F4N) and ISO Class 9 nuclear compliant for cleanliness, Luton, UK



ASME N Stamp accredited facility, Vermont, USA



Our global facilities

We have manufacturing facilities in the UK, USA, India and China to provide global support to our customers.

Each location offers repair services and has field service support capable of providing technical expertise to you, know matter where your location. Additionally, we have a network of partners across the globe to allow us to provide the most convenient options for your aftermarket support. We offer a wide range of repair options for all planned and predictive maintenance cycles, as well as comprehensive electrical and mechanical inspection capabilities.

Our field service support teams can be used on a supervisory or turnkey basis. With turnkey growing in popularity as an effective means of reducing staff overhead, Hayward Tyler is there to meet industry needs.

For further information on Hayward Tyler's customer services, please contact us at a location below or visit:
www.haywardtyler.com/service-and-support

HAYWARD TYLER

Engineered solutions for the global energy sector

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