HAYWARD TYLER

ENGINEERING EXCELLENCE
SINCE 1815
200 YEARS

Submersible Motor Support and Upgrades

Spare parts, service and upgrades for higher reliability, longer life, and elimination of unplanned outages

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

100+
years of submersible motor experience

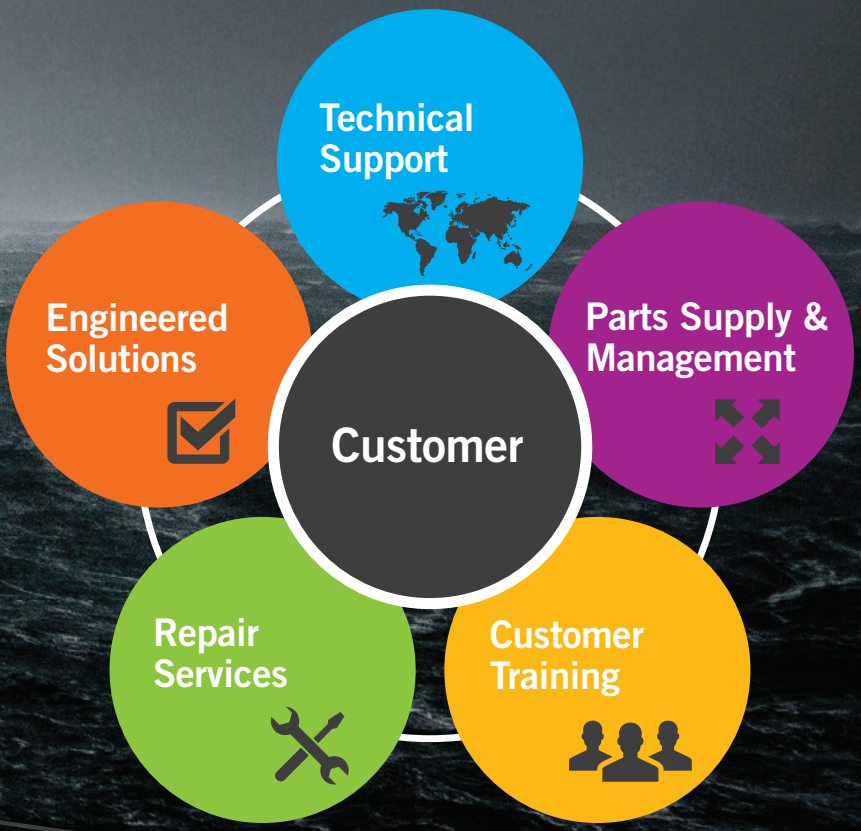
24/7/365
customer care and servicing across the globe

5+
year maintenance cycle

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



Improve performance and extend asset life by upgrading your existing submersible motor

At Hayward Tyler, we have been designing submersible pumps and motors for over 100 years. Through field experience, research and development, we have continued to enhance our designs to offer state-of-the-art upgrades to existing submersible motors from any manufacturer.

In addition to shop repairs, spare parts, and reverse engineering capabilities for submersible motors, our design upgrades can increase reliability and extend Mean Time Between Failure (MTBF) to improve the reliability of your operations.

Local service

We understand the need to provide best-in-class lead times to our customers. We work with zby our global engineering expertise. This combination allows us to provide our industry-leading design features to your existing brand of submersible motor. The combination of support local to your operations and motor upgrades provides a more economical solution for your service needs.

Materials upgrades

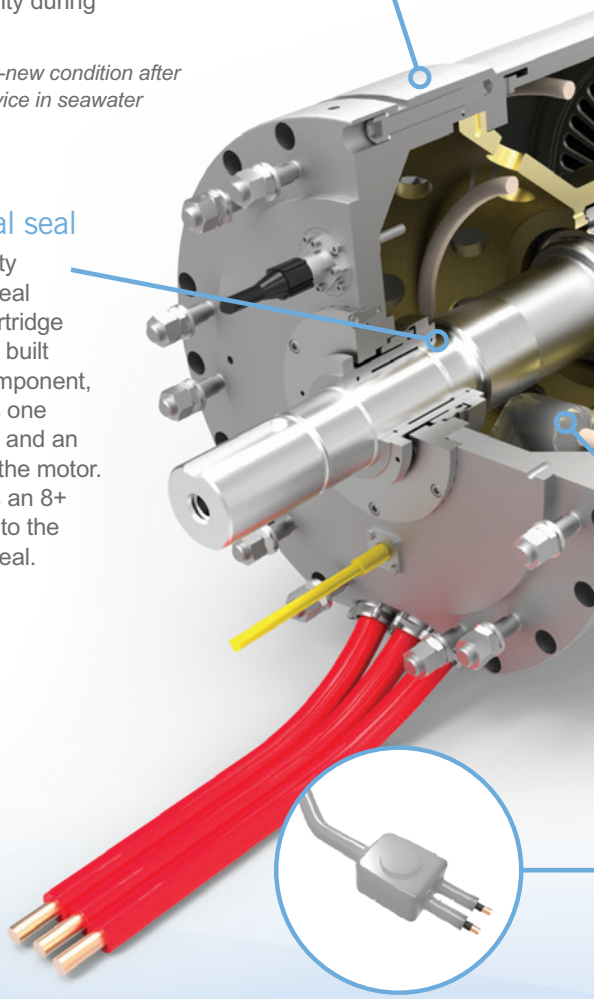
Sea water contact: Use of Super Duplex to the highest international standards, including PREN40/42 where specified. Provides extremely high resistance to corrosion.

Bearing Housing: Upgrade to NiAlBr to provide greater thermal stability during operation.

Top right: Near-new condition after nine years service in seawater

Mechanical seal

Highest-quality mechanical seal features a cartridge design that is built as a fixed component, interfacing as one with the shaft and an intrinsic fit to the motor. This provides an 8+ year lifespan to the mechanical seal.



A header tank can be retrofitted to replace your standard diaphragm system. This prevents seawater ingress to the pump and motor while providing a visual indication of any leaks.

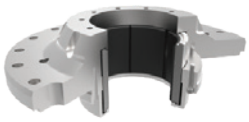
5+
YEARS BETWEEN MAINTENANCE CYCLES

100
YEARS OF OFFSHORE EXPERIENCE

5000
START/STOP CYCLES WITH NEGLIGIBLE WEAR IN LAB TESTING

Our state-of-the-art design features available for your existing submersible motor

Bearings upgrades

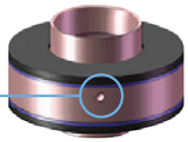


HT hydrodynamic tilt pad bearings: Most stable design against bearing instability, it reduces friction losses, increases efficiency, improves cooling, and lowers starting torque.

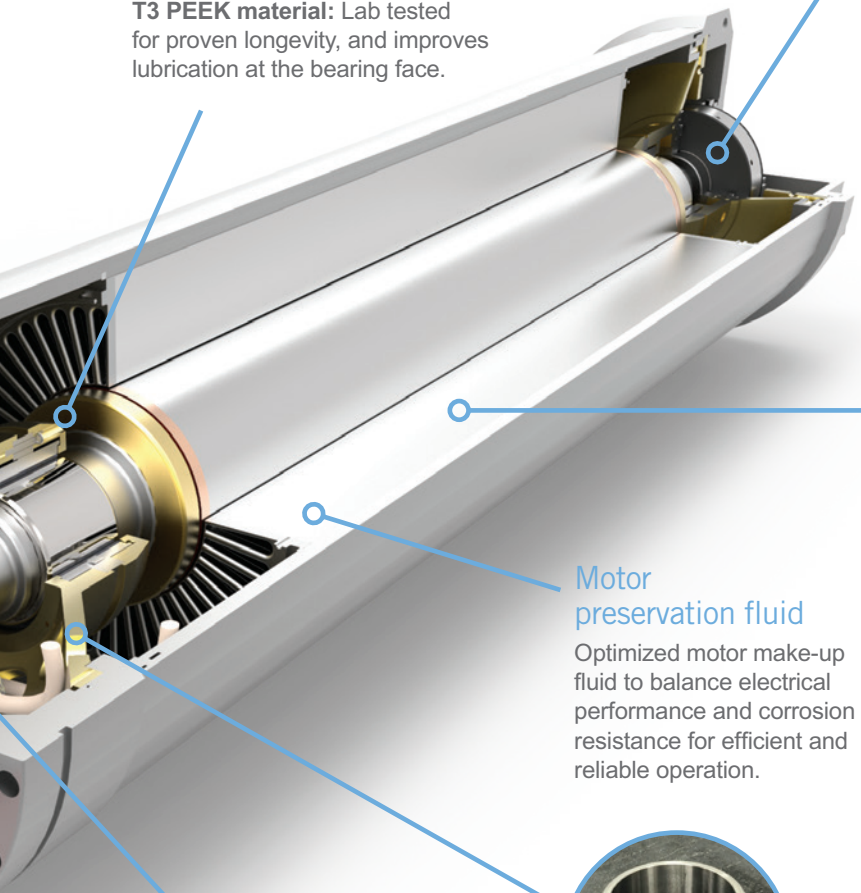
T3 PEEK material: Lab tested for proven longevity, and improves lubrication at the bearing face.

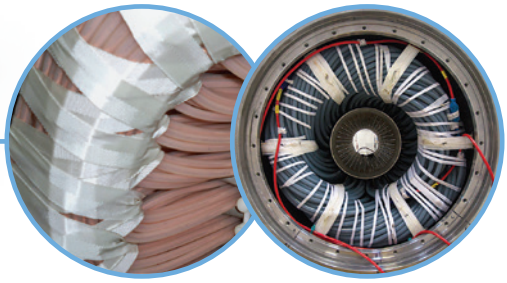
Thrust bearing

LP PEEK material: Superior thrust bearing material increases MTBF and improves reliability. Inclusion of double thrust to accommodate unexpected reverse loads.



Auxiliary impeller: Thrust disc acts as an impeller to improve cooling flow through the motor.





Motor winding

Upgrade from concentric to basket wind

- Higher motor efficiency
- Consumes less winding cable
- Lower stator copper loss

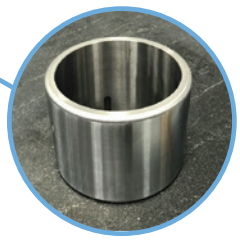
A higher grade of insulation ensures homogeneity of the insulation system, improving overall reliability, compactness and performance. Restraining the cable reduces movement and fretting of insulation, for increased reliability.

Re-rate motor:
Power upgrades available for your motor.

VFD upgrades:
Upgrades available to allow compatibility with a variable frequency drive.

Motor preservation fluid

Optimized motor make-up fluid to balance electrical performance and corrosion resistance for efficient and reliable operation.



Internal joints

Pressure retaining gland:
Designed pressure gland for the cable exit area to ensure mechanical integrity and safety of the gland exit.

Crimped ferrule with injection molded joints:
HT XLPE injected molded joint is a high-voltage, high-integrity joint formed around a mechanical ferrule that is tested via X-ray. Qualified, proven, proprietary jointing technology, this is a reliable long-life joint solution.

Journal sleeve

Chrome plated or hardened:
Hardened surface for journal bearing interface. Improved wear resistance and avoids wearing expensive shaft.

A complete service solution: fixing the *why*, not just the *what*.

Root cause analysis

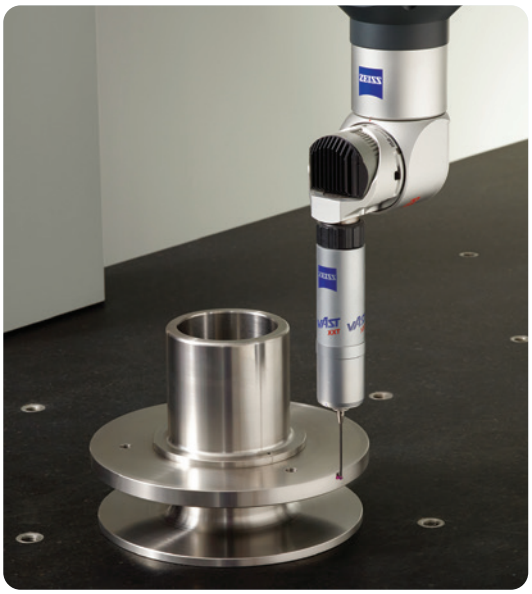
We have the ability to perform root cause analysis on your submersible pumps and motors to make sure repairs will be effective in addressing the failure or degradation mechanisms occurring on your equipment. Our extensive experience, acquired over 100 years of submersible motor design, gives us the foundation to diagnose your pump or motor issue. Once the root cause is determined, we can make operational or design suggestions to eliminate the premature failures that can severely impact your operations.

Reverse engineering

We have the expertise to reverse engineer spare parts from your existing submersible pump and motor. This includes everything from basic concentric shapes to complex geometry components, like impellers.

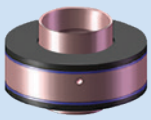
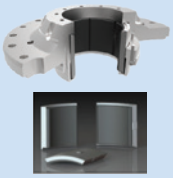
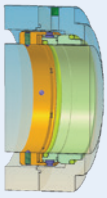
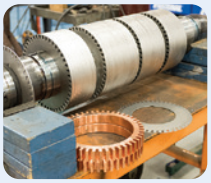
Using advanced inspection and scanning equipment, we start by creating 3-D models of existing components. Our design team verifies the critical features and properties of the parts to ensure the original design intent is maintained or improved. From there, we can offer upgraded designs or materials to improve the reliability of your existing submersible motor, no matter the OEM.

By developing 3-D models, we reduce the manufacturing time for replacement parts, allowing for quicker turnaround for complete repairs.



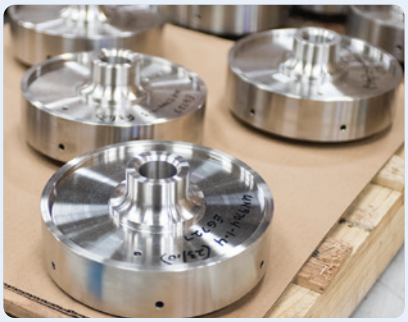
Our state-of-the-art equipment, used by highly-skilled engineers and technicians, enables us to analyze complex engineering problems to solve your most demanding operational issues.

Submersible motor upgrades

Existing design	Available upgrade	Picture of the upgrade	Issue before upgrade	After upgrade
Plain thrust bearing	**Thrust bearing with auxiliary cooling**		Insufficient cooling, lower efficiency, lower MTBF, lower mechanical seal life due to thrust load.	Improved cooling and higher MTBF, improved mechanical seal life.
Non-XLPE cable insulation system	**XLPE cable insulation system with qualified XLPE injection-molded joint technology**		Poor thermal performance, leading to accelerated deterioration of cable insulation & shorter life. Poorly constructed joints cause premature failure and weakness in insulation system integrity.	Proven XLPE long-life cable insulation, with integral homogeneous molded jointing, ensures optimization of the electrical insulation protection and removal of a common failure mode for submersible motors.
Plain journal bearing	**T3 hydrodynamic tilting pad bearing with optional NiAlBr bearing housing**		High bearing wear and thermal distortion, leading to bearing failure and potential catastrophic damage to rotor & stator.	Improved efficiency and reliability under all operating conditions.
Mechanical seal	**HT specified high-quality seal**		Early failure, leading to fluid loss, unplanned outage, and increased repair costs.	Lower leakage rates, higher reliability, and longer service intervals.
External power cable joint	**Proprietary qualified over-molded XLPE internal power cable joint**		Handling easily causes damage to an external joint during de-crating and installation.	Internal joint eliminates the risk to the joint and provides a better electrical solution and performance.
System re-rates	**HT re-rate of existing machine possible through system analysis or upgrade of the rotor/stator design within existing motor enclosure**		System no longer meets production requirements.	Improved performance with plant life extension for minimal investment.
VFD Integration	**HT reconfiguration of motor system to incorporate VSD to allow pump systems to operate at duty**		Inefficient operation of existing equipment at full capacity when production demand is low.	Higher control with better efficiency, leading to the conservation of energy, associated cost savings, and reduced overspill.

Combining global expertise with local service convenience.

Using local service centers combined with our state-of-the-art design upgrades allows us to repair and improve your existing submersible motor in the locations convenient to you.



For further information on Hayward Tyler's after-market offerings, please contact us or visit: **www.haywardtyler.com**

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