

# **Wet Stator Units for Oil and Gas**

Upgrade and support services





# Electro-submersible Pump Maintenance

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*Sulzer has the in-house capability to provide specialist service support to the upstream oil and gas industry for all large water filled electro-submersible pumps manufactured by Sulzer and third party pump companies, including:*

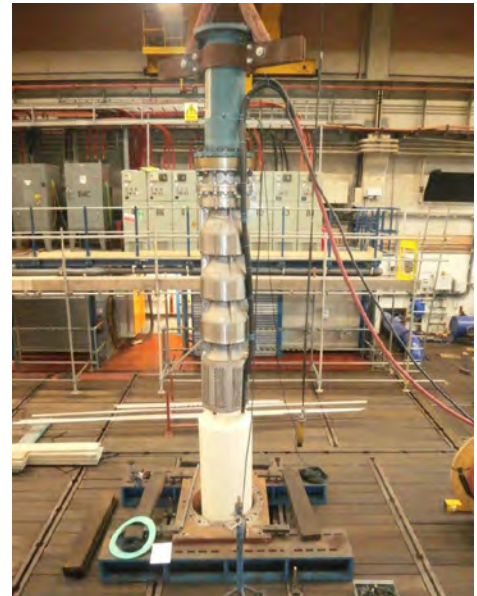
- *seawater lift pumps*
  - *firewater pumps*
  - *subsea drive motors*
  - *sea plough machines*
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Through our frontline service centres located in Aberdeen and Stavanger as well as our purpose built repair facility in Leeds, Sulzer is able to coordinate all inspection, maintenance and overhaul activities associated with offshore wet wound submersible motors.

Service activities include:

- Full strip down, mechanical inspection and non-destructive testing of critical components
- Insulation resistance and flash testing of stator winding and leads
- Core loss testing of stator and rotor packs
- Rotor bar testing
- Detailed 'as found' inspection reports with digital photographs
- Re-lamination of stator and rotor packs
- Re-brazing of rotor bars
- Re-designed stator end plates for improved cable protection
- Re-winding of stator core with modern cable and improved winding configurations
- Incorporation of winding support cages for enhanced cable security
- Upgrading of journal and thrust bearing materials
- Vulcanised jointing of motor away leads to main power cable
- 'Plug-in' type motor cable connectors
- Phase rotation test prior to final motor assembly
- Dynamic balancing of rotors up to 2000kgs
- Rebuild of submersible motor and completion of as-built reports
- New mechanical seal configurations
- Pressure testing
- Final electrical inspection and performance testing of subsets prior to despatch

In line with the highest reliability standards demanded by the offshore industry, Sulzer is able to incorporate modern designs and materials technology into your offshore electro-submersible pump assets. We recognise that many of these units are used for production critical and / or safety-related applications where maximum possible availability and reliability are paramount. This approach has led to the development of modern winding arrangements, upgraded bearing materials, new mechanical seal designs and the inclusion of the latest generation of material technology.



# Upgrade Equipment to Maximise Operational Reliability

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*Due to their offshore location and installed position at the end of a column pipe string, the cost of removal and re-installation of electro-submersible units is extremely high and could leave a platform / FPSO exposed from a safety or production perspective. By improving reliability through asset improvements the overall cost of plant ownership is reduced.*

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## Subsea drive motor overhauls

Sulzer has pioneered the use of improved winding / winding support arrangements to maximise the service life of wet stator units overhauled through our facilities. The Sulzer half-lap winding arrangement with integral support cage inhibits the excessive movement of the stator windings in service and reduces the risk of insulation faults through abrasion between coils and on end plates.

Our specialist polymer-composite bearings have a proven track record of reliability in both journal and thrust bearing applications. Traditional wet stator bearings containing asbestos were banned in 2004, and our modern bearings are non-asbestos equivalents which are designed to be directly interchangeable while offering enhanced wear resistance.

Sulzer has worked closely with mechanical seal suppliers to bring improved seal designs and installation arrangements to the offshore submersible market. The inclusion of a motor header tank as part of a seal update permits a visual indication of seal integrity and helps prevent motor casing contamination and corrosion of stator cores.

Materials technology has advanced significantly since many North Sea subset assets were originally installed, and Sulzer is able to offer upgraded materials and specialist coatings for both static and rotating components which will extend equipment life in service.



# Benefit from the Latest Technology and Reduce Maintenance Costs

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*We currently operate a component stock management program for our long term wet stator contracts to ensure that availability of critical long lead components does not compromise delivery. Similar arrangements can also be applied to the offshore industry as a means of reducing repair turnaround times.*

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We have a dedicated wet stator store area within our Leeds Service Centre and zones can be established for the efficient storage of client free-issue components and materials as part of an overall asset management contract. Our close relationships with key suppliers of winding cable, stator and rotor laminations as well as bearing materials, means that we are well-positioned to leverage the best possible deliveries of these items where they are not required to be stocked.





# Optimise Inventory to Minimise Asset Turnaround Time

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*The wet stator workshop in Leeds contains equipment which is capable of insulation resistance testing of up to 5kV DC and flash testing of windings up to 15kV AC. This workshop contains a dedicated test tank for all static electrical checks.*

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The Leeds facility also houses a test shop allowing direct on line starting of motors up to 6.6kV, and soft starting of units up to 3.3kV. Independent electro-submersible motor units are subject to electrical tests and a light run. Complete pump sets are installed into a dedicated test loop to check operation under load. Pump sets can also be performance tested to verify head, absorbed power and efficiency at a range of duty points.

Sulzer can also offer specialist retrofit engineering support in cases where clients wish to increase the performance of their pump assets. Using the skills and analysis tools available in Leeds, we are able to provide performance upgrades to existing pumps, preventing the need for capex spend on new assets.

All tests are conducted in accordance with ISO 9906.





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