PLEUGER

Part of
FLACKS GROUP

The reliability experts for submersible pumps, motors and related services in critical applications

PLEUGER Care®

Customer service solutions for Submersible Pumps and Motors

PLEUGER. Reliable. Always.

PLEUGER CARE®

Expert service from the submersible pump and motor experts.

PLEUGER Customer Care division has been built and designed specifically around customer needs.

We take immense pride in how we support our customers and their products, which is based on over 90 years experience in pump system consultancy, engineering and manufacturing. We are renowned for being the reliability experts for submersible pump and motor systems and related services in critical industrial applications.

Our products are engineered and manufactured in Germany and used all over the world. PLEUGER products and services are recognised as premium solutions with superior quality and reliability.

- 90+ years' experience operating as an OEM
- More than 100 countries using our products, onshore and offshore

RELATIONSHIP DRIVEN SERVICE, EXCEPTIONAL SUBJECT MATTER EXPERTISE, DELIVERED AROUND YOUR NEEDS.

Our fully comprehensive support services cover all aspects of support and consultancy that might be needed during the life-cycle of owning, operating and maintaining submersible pumps and motors.

OUR ADVANTAGES AT A GLANCE

- Maximum reliability and availability of your equipment
- Lower and more predictable cost of ownership
- Support for the extended life of machinery
- Predictable machine operation and maintenance
- Original spare parts, available at the right time
- Call upon our skilled and experienced staff for reliable, expert support as an extension to your team

PLEUGER

PLEUGER. Reliable. Always.

PARTS SUPPLY

PEACE OF MIND. ASSURANCE. RELIABILITY.

Our pumps are designed for an extended service life, often running 30+ years. In the event of needing spare parts for your PLEUGER product or system, you can obtain these quickly anywhere in the world.

SPARE PARTS

- Readily available parts for regularly scheduled maintenance and emergency callouts
- Latest standards
- Guaranteed quality and performance
- Stock and manufacture spare parts for heritage pumps no longer produced but still operational

REFURBISHED PARTS

- Accredited inspections to refurbish where viable
- Core pump components such as casings, hydraulics and electrical parts will be refurbished

REVERSE ENGINEERED PARTS

- Accredited inspection procedures
- Re-engineering where different performance is required
- Obsolete parts from other submersible manufacturers

State-of-the-art scanning and computer modelling capabilities ensure any reverse engineered product meets or exceeds the original specifications.

KITTING SERVICES

Many component replacements can be supplied in kit form, making it easy to purchase, ship, service and remove the need for pre-assembly.

REPAIRS & OVERHAULS

PERFORMANCE. EFFICIENCY. LIFETIME EXTENSION.

PLEUGER's repair facilities provide world-class support through our international master service centers and service partner network. Our professional and highly skilled staff are ready to support.

REPAIR SHOPS

In our Centres of Excellence in Hamburg, Germany and Orléans, France - or through our global network of fully qualified service centres.

- Replacement pumps and motors
- Inspection, repair overhaul and maintenance
- Mechanical overhaul incl. shot blast and painting capabilities
- Electrical overhaul incl. motor rewind and connection
- Lifetime extension and upgrade

INSPECTION SERVICES

Pump and motor system diagnostics and health-check for all parts. Field service and service centre options.

- Pump unit inspection, analyse and RCA capabilities
- Non-destructive case testing and inspection in accordance to industry standards as follows:
  - Dye penetrant inspection
  - Magnetic particle inspection
  - Ultrasonic inspection
  - Positive Material Identification (PMI)
  - Ferrite content measurements
  - X-Ray
  - Hydrotest up to 1000 bar static pressure

UPGRADES

PERFORMANCE. EFFICIENCY. LIFETIME EXTENSION.

Protect the value of your ageing assets through upgrades minimize capital expenditures maximise the performance of your pump or motor. PLEUGER upgrades ensure the ongoing performance and reliability of your equipment.

UPGRADE CAPABILITIES

- Component material and design upgrades
- Performance increase upgrades
- Efficiency upgrades
- Extend service intervals
- Complete revamps
- Pump system consultancy

SYSTEM UPGRADES

Equipment life extension: Recognising 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.

System extension: PLEUGER can provide different solutions to upgrade your system by active or passive anode systems (to prevent corrosion), chlorination systems (to prevent marine growth), electrical control (e.g. motor protection, soft starter, etc.)

EQUIPMENT UPGRADES

Pump upgrades: If your existing pump and motor are not performing to meet your current system needs, we can re-design your existing system characteristics to deliver the performance you require.

Motor upgrades: PLEUGER motors are fully rewindable and can be upgraded to more complex electrical requirements (e.g. variable frequency drive, high temperatures of pumping fluids, changed environmental conditions). In additional there are several mechanical up-grade kits available for mechanical seals, bearings, etc. (see below).

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.

Bearing upgrades: PLEUGER has developed a bearing technology especially designed for higher robustness against severe operating conditions. The Heavy Duty Thrust Bearings (HDB) provide a substantial increase in reliability for customers with demanding applications.

Sensor solutions: Sensor solutions for temperature, vibration, conductivity (water ingress) or motor filling leakage offer the customer a close condition monitoring of the PLEUGER submersible units to improve the performance and conditions of the units and for better planning of maintenance cycles.

Mechanical seal upgrades: Several design upgrades for mechanical seals are available for handling high content of sand and sediments or include leakage monitoring by using an additional motor liquid reservoir or conductivity sensor.

INSTALLATION & SUPPORT

MINIMIZE RISK. READY-TO-GO ASSURANCE. RELIABILITY

As reliability experts in submersible pumps and motors we provide sound engineering expertise and specialist advice.

INTERNATIONAL SERVICE TEAM

- Installation planning and on-site support at customer sites
- Project management
- Supervision of installation to start-up and commissioning
- Extensive training at our service centers

We recommend using PLEUGER field service technicians to ensure all the connections and control systems are setup correctly for a stable and reliable operating system from the outset.

SPECIALIST CERTIFICATIONS

- BOSIET
  - OPITO (Basic Safety Induction & Emergency Training)
  - Inclusive HUET (Helicopter Underwater Escape Training) with Emergency Breathing System
- CA-EBS – Compressed Air Emergency Breathing System Training
- H2S (Gas Course)
- Medical Certificate for Fitness for Offshore Work

INSTALLATION AND SUPPORT CAPABILITIES

- Installation supervision and planning
- Inspections
- Motor removal and installation supervision
- Start-up and commissioning support
- Worldwide support and project management

ENGINEERING SERVICES

PERFORMANCE. EFFICIENCY. LIFETIME EXTENSION.

For comprehensive engineering consultancy services, including feasibility studies, design proposals for new installations, or plans to remodel, expand or upgrade existing submersible pumping systems.

As the leading experts for reliability in submersible pumps and motors, our engineering consultancy services are often called upon to solve some of today's toughest challenges.

From retrofitting new solutions to subsea oil storage facilities in the North Sea; system analysis and improvements for various offshore platform applications; to potable water distribution across some of the most barren desert on the planet; PLEUGER's expertise has been paramount in increasing reliability, or upgrading efficiency and performance; while at the same time reducing long-term operating cost for the customer.

- Site inspections
- Customer system analysis
- Pump integration into systems
- 3D Scanning and re-engineering, also for other brands
- CAT IV vibration analysis
- Structural dynamic analysis
- Advanced hydraulic design
- Advanced 3D modelling
- Metallurgical analysis
- Rotor lateral / torsional analysis
- Fully equipped service facilities
- Solutions Engineers direct / on-site

CASE STUDY Engineering Services

Subsea oil storage (SOST)

Subsea oil storage tanks (SOST) are used as temporary storage solutions for oil platforms, particularly in the North Sea as they enable extraction from small oil pools without the need to build fixed line infrastructure. As these storage tanks are located on the seabed, the crude oil needs permanent circulation and warming (40°C/104°F) to maintain its liquefied state.

PLEUGER was commissioned to develop two motors and retrofit existing pump equipment for a SOST system in the North Sea.

The primary pump unit for permanent circulation, and a secondary unit for redundancy and for rapid offload purposes.

Challenges:

- Retrofit new high performance PLEUGER motors and reuse the existing pumps and pump systems as much as possible, including riser pipes etc.
- Very small caisson (gap around the motor of only 16mm/0.6 inch), with a unit diameter of 850mm (33.5 inch).
- No water cooling for the pump system was possible, so air cooling was required, using external cooling units. These units were specifically developed due to restricted space availability as well as restrictions on noise outputs.
- The pumps were also required to expunge seawater from the subsea tanks during production start-up, as well as crude oil pumping in the operating phase.
- As these pumps are retrofitted to the platform, the very tight space limitations and the retrofitting process require very complex and detailed installation procedures.

Basic design details:

Main Unit	
Rated Flow	1250 m³/h (5503.6 US gpm)
Rated Discharge Pressure	20 bar (290.1 PSI)
Rated Motor Power	1300 kW (1743.3 US hp)
Voltage supply	6,6 kV
Motor Frame	30"
Cooling Unit	
Noise Limitations	75 dBA
Space Limitations	2,7 x 1,2 x 1,8 m (8.9' x 3.93' x 5.9')

Solution:

PLEUGER developed two bespoke 30" motors and dedicated cooling units to enable the reuse of the existing pump-end. These met all the cooling requirements as well as space and noise limitations on the platform.

Furthermore, a detailed installation procedure for the crude oil pumps has been developed in close cooperation with the customer, to minimise risks during the installation procedure of the pump units.

PUMP SYSTEM CONSULTANCY

EXPERTISE. INNOVATION. TROUBLESHOOTING.

As world experts in submersible pump systems, our engineering and design teams can provide a range of consulting services. This enables you to plug in expertise where it is needed and accelerate your project delivery, with the assurance you have the very best advice possible.

NEW PRODUCTS & CAPITAL PROJECTS

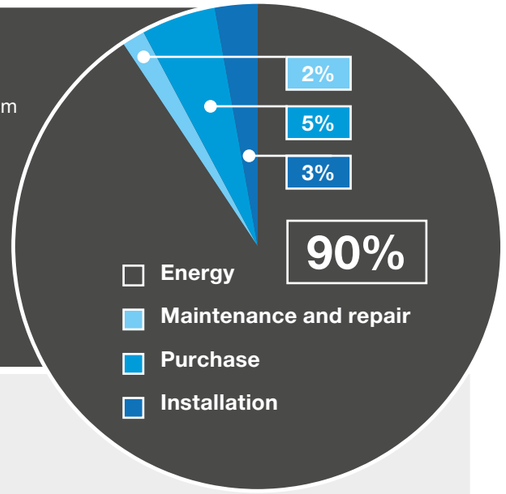
We support product development and innovation projects to help drive performance, reduce development cost and shorten time to market.

OPERATIONS & SYSTEMS

We troubleshoot machinery and process systems to eliminate recurring mechanical seal failures and instabilities and help reduce operating cost and downtime.

LIFE CYCLE COST SOLUTIONS

- Typically, 90% of the total life cycle cost (LCC) of a pumping system is accumulated after the equipment is purchased and installed.
- PLEUGER has created an extensive suite of solutions to provide unprecedented value and cost savings to customers throughout the life span of the pumping system.
- These solutions account for every facet of the life cycle, including capital and operating costs.



CASE STUDY Consultancy

OPEX consulting for improving pump reliability and performance across 55 wells

Beneath the desert in southern Jordan and northwestern Saudi Arabia lies the Disi aquifer, 320 km long and 500 m below ground. From 55 wells in the aquifer, water is piped 325 km to Amman the Jordanian capital, as well as other cities on the pipeline.

PLEUGER has been supporting the Operator and the Owner of the well field with constancy from the early stage of the commissioning of the facilities until now. PLEUGER, the Operator and the Owner permanently focus on improving the reliability and the efficiency of the aquifer pumping system.

PLEUGER engineered a range of solutions to tackle the challenges and improve pump reliability and performance:

- Upgrade to the pumps with PLEUGER's new heavy duty thrust bearings to improve performance and reliability
- New material design to extend mechanical seal life

PLEUGER provided support and assistance in the construction of the Wellfield Network Hydraulic Model completed by the Operator.

That model enlightened pathways to improvement for the operation of the pumps and of the well field.

- Start-stop procedures were analyzed and simulated. New procedures were proposed to upgrade the original ones in order to reduce equipment impact and water hammering.
- Operating scenarios for adjusting the settings of the orifice plates at the discharge of the pump rising main are tested, considering the response of the entire hydraulic system. Those scenarios are combined with simulations of adjustments of the number of stages of the pumps in order to find out the best operating strategy in the long run i.e. the strategy that allows finding the lowest specific energy consumption for abstracting the water that is supplied to Amman.

PLEUGER and the Operator share the same strong interest for innovation and do address that subject as an important lever to improve pump monitoring in order to anticipate on incipient decrease of the performance. For instance, addition of new sensors to the pump system has been discussed. These new sensors would be able to monitor vibration and conductivity to detect bearing abrasion and environmental water ingress. This visibility would open up preventative maintenance scheduling, less downtime and increased reliability.

CUSTOMER TRAINING

EXPERTISE. KNOWLEDGE SHARE. RELIABILITY.

Our customer training programmes ensure the ongoing reliable operation of your equipment.

Make sure your equipment operators and service staff have the knowledge and skills to optimize system and equipment performance and increase relaibility of your pump systems.

Our leading engineers provide the training and technical support your team needs.

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.

Our programmes can be tailored for teams or individuals who are new operators, as well as refresher training.

Single day product awareness

Product awareness training over the day, to demonstrate key features and considerations for equipment use.

Multi-day operation and maintenance

PLEUGER multi-day courses educate users on the operation and maintenance of your specific equipment.

We have a wide range of standard courses for our products but can also create training programs customized to specific needs.

Training facilities including on-site

All training is delivered by experienced PLEUGER specialists and supported by experts in specific subject areas. 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 either our Hamburg or Orléans facilities, they include a tour of the plant showing the processes we use to build your equipment.

Courses comprise both classroom and workshop activities.

Courses cover

Submersible Pumps

- General function
- Working range of Pumps
- Cavitation and NPSH value and air suction of pumps
- Necessary submergence of pumps
- Erosion and Abrasion of pumps
- Down and up thrust of pumps

PLEUGER Submersible water-filled motors

- Design overview
- Motor functions
- Cooling design of motors
- Starting of motors
- Monitoring submersible motors
- Application of oil filled motors & pumps
- Submersible pumps / motors duty maintenance and repair
- Manuals

Installation of Submersible Pumps & Motors

Overall information for installation in general

- Maintenance of pumps / motors:
- Transportation and storage
- Sample technical data of pump and motor
- Detailed information about installation
- Electrical connection of motor cables, motor protection etc.
- Motor filling, type of filling fluid, procedure of filling
- Commissioning, start-up and shut-down pumps/motors
- Maintenance of pump and motor, general information
- Sample repair instruction for water-filled submersible pump & motor

TEST FACILITIES

3RD PARTY TESTING CAPABILITIES.

We have extensive test facilities that can be used by 3rd party manufacturers and end users that need specialist test capabilities at our Centre of Excellence in Hamburg, Germany.

PLEUGER provides 10kV electrical test capabilities, 7 test stands for various pump alignments and types, multiple crane options options and configurations, and easy transport and packing and dispatch capabilities.

Testing includes high-pressure test, thermal test, rotor balance and vibration tests. Recorded electrical and hydraulic test data are validated by our engineering teams. FEA tools are used for new component design in high-power, high-speed motor developments.

ELECTRICAL TEST FACILITIES

General voltage supply:
220 – 10,000 V at 50 Hz
200 – 1,000 V at 60 Hz

Power supply:
1,500 kW at 50 Hz
211 kW at 60 Hz

TEST STANDS

Submersible pumps, horizontal installation:
Maximum capacity: 40,000 m3/h (176,115 USGPM)
Maximum head: 60 m (197 ft)

Submersible pumps, vertical installation:
Maximum capacity: 4,500 m3/h (19,813 USGPM)
Maximum head: 1000 m (3,281 ft)

Plunger and centrifugal pumps:
Maximum capacity: 1,200 m3/h (5,283 USGPM)
Maximum head: 4,000 m (13,123 ft)

Centrifugal pumps:
Maximum capacity: 8,600 m3/h (37,864 USGPM)
Maximum head: 160 m (525 ft)

Test stand depth: 40 m (131 ft)

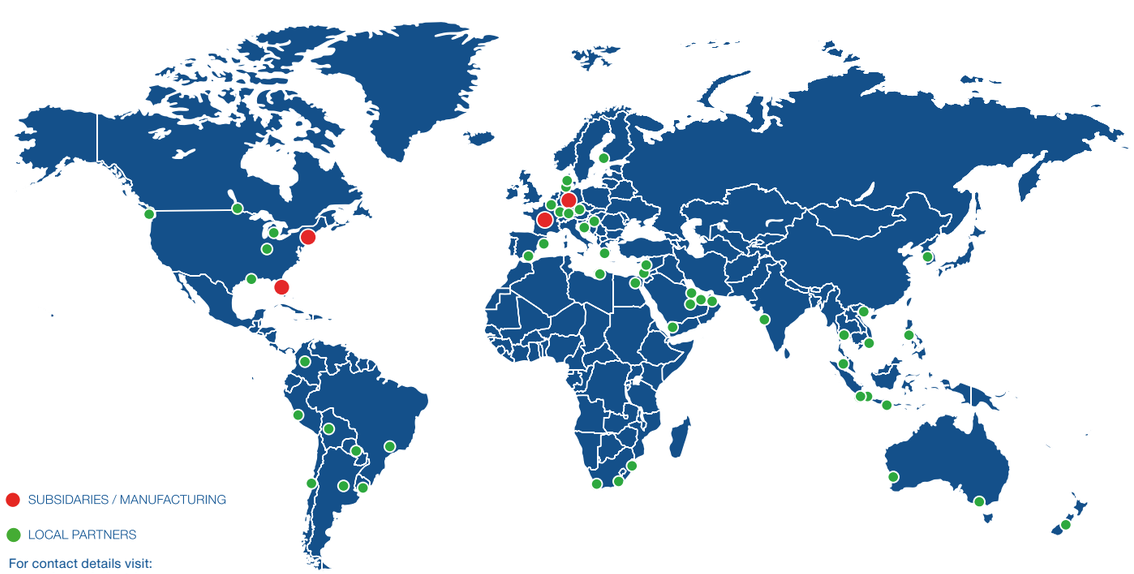
PACKING AND DISPATCH FACILITIES

Packing facilities:
4.5 x 4.5 x 20 m (14.7 x 14.7 x 65.6 ft),
up to 40 tonnes (44 US tonnes)

BUILDING BAY AND CRANE DATA

BAY DIMENSIONTYPE		NUMBER	CAPACITY	HEIGHT UNDER HOOK
20 metres (65.5 ft)	ABUS	2	20 tonnes (22 US tonnes)	6,50 m (21.3 ft) electr.
20 metres (65.5 ft)	ABUS	2	10 tonnes (11 US tonnes)	6,50 m (21.3 ft) electr.
16 metres (52.5 ft)	DEMAG	4	5 tonnes (5.5 US tonnes)	6,50 m (21.3 ft) electr.
16 metres (52.5 ft)	STAHL	1	16 tonnes (17.6 US tonnes)	6,50 m (21.3 ft) electr.

Larger craneage available through our trusted partners



For contact details visit:
www.pleugerindustries.com

INTERNATIONAL STANDARDS

Design Standards: NSF / API 610 ANSI / ASTM / CE marking / DIN / Hydraulic Institute / SO / NORSOK / Customer specific or tailored

Hydraulic Standards: API610 / ANSI/HI / EN ISO / NFPA20

Electrical Standards: EC / IEEE / NEMA. **Certifications:** ACS / ABS / CSA / DNV GL

CUSTOMER CARE AGREEMENTS

ASSURANCE. PEACE OF MIND. WARRANTIES.

Use a cost-effective customer care agreement for the services you need to mitigate your downtime, enhance operational performance and benefit from additional various warranty options.

PLEUGER takes great pride in providing the best submersible pump system support, designed around your needs of maximum reliability and availability of your equipment. Our cost-effective service level agreement enhance operational reliability through preventative maintenance of your equipment and various warranty options.

All customers within a service agreement receive discounted rates on any additional services they purchase during the term of the agreement.

Customized service packages are available upon request.

SERVICE AGREEMENTS BENEFITS

- Assurance for reliability and availability
- Lower and more predictable cost of ownership
- Support for the extended life of machinery
- Predictable machine operation and maintenance
- Original spare parts, available at the right time
- The assurance that support will be available when needed
- Fixed monthly fee

SERVICE FRAMEWORK OPTIONS

PLEUGER. Reliable. Always.

DEDICATED SUPPORT TEAM

Committed to solving problems and reducing downtime,
the dedicated PLEUGER Care support team are there for you 24/7.

INVESTMENT IN PEOPLE

We invest in the development of our staff 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.

CERTIFIED MANAGEMENT SYSTEMS

We work to the highest quality assurance standards throughout the entire product life cycle, including ISO 9001

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THE RELIABILITY EXPERTS FOR SUBMERSIBLE PUMP AND MOTOR SYSTEMS

ADVANTAGES OF PLEUGER CARE®

- Experts in reliability of submersible pump systems
- Decades of market / application experience including Oil & Gas, mining, water and general industries
- Dedicated support team
- Global reputation for reliability and committed to maximising the reliability and availability of customer equipment
- Worldwide network of support partners
- Equipment installed in over 100 countries

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