Engineering portfolio

FLEAD
HYDRAULIC
SOLUTIONS

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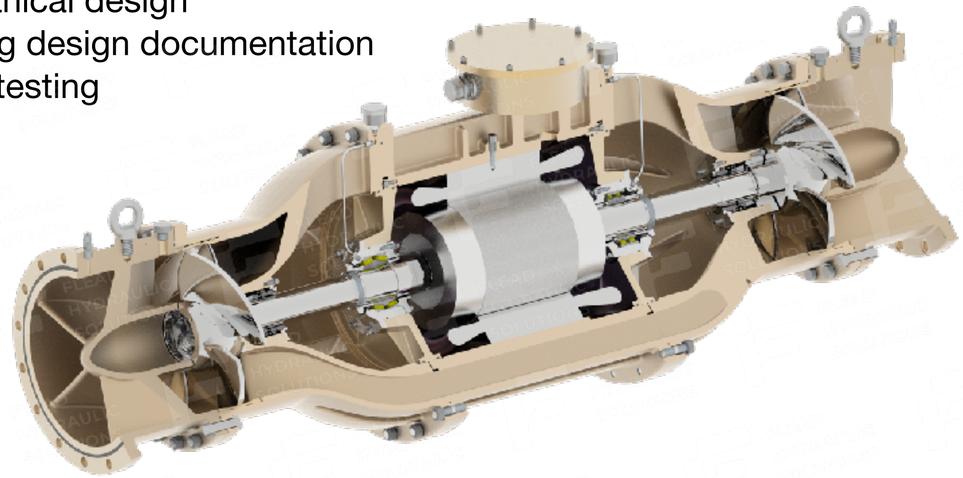
1. Axial flow reversible pump

Scope of work:

- Hydraulic design (impeller, diffuser)
- Full mechanical design
- Engineering design documentation
- Prototype testing



Designed for heeling, trimming and other ship systems. The hydraulic design consists of two geometrically identical axial flow impellers and flow guide vanes installed in suction and discharge of each impeller. This allows pumping in both directions with the same performance and efficiency. Selected materials have high level of corrosion resistance suitable for seawater of many kinds. Electrical double-shaft ended motor is located between impellers and cooled by pumped flow. Motor and ball bearings are protected against water ingress by labyrinth, mechanical and lip seals installed in series.

Multiple pumps of this design have been successfully manufactured, inspected and tested in accordance with norms and regulations of the local Maritime Register of Shipping and comply with the Technical Regulations for the Safety of Sea Transport Facilities.

Installed in several icebreakers.

Rated parameters: Q=2000 m^3/h, H=8 m, N=86 kW, n=1500 rpm

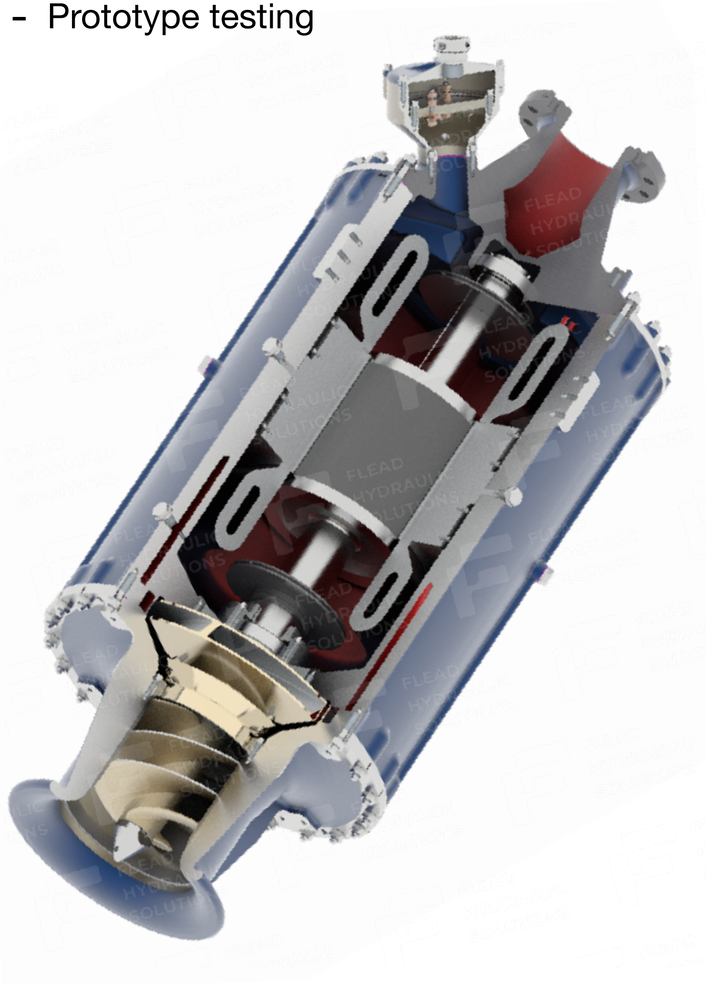
2. Submersible LNG-tank unloading pump

Designed to be installed in liquified gas tankships. The built-in electrical motor and the special ball bearings are designed for operation in pumped cryogenic liquid assuring excellent cooling. The sealless design provides high reliability and extended mean time between overhauls.

To meet targeted NPSHr and achieve stable operation at low suction pressure, special inducer has been designed as the first stage of pump. High performance and compliance to the project specification have been confirmed by testing the full-scale prototype at specially designed cryogenic test bench.

Scope of work:

- Hydraulic design (impeller, inducer, diffuser)
- Full mechanical design
- Engineering design documentation
- Prototype testing



Designed as part of the R&D project

Rated parameters: Q=900 m³/h, H=129 m, NPSHr=1.5 m, t=-161.5°C, n=1500 rpm, eff=0,85

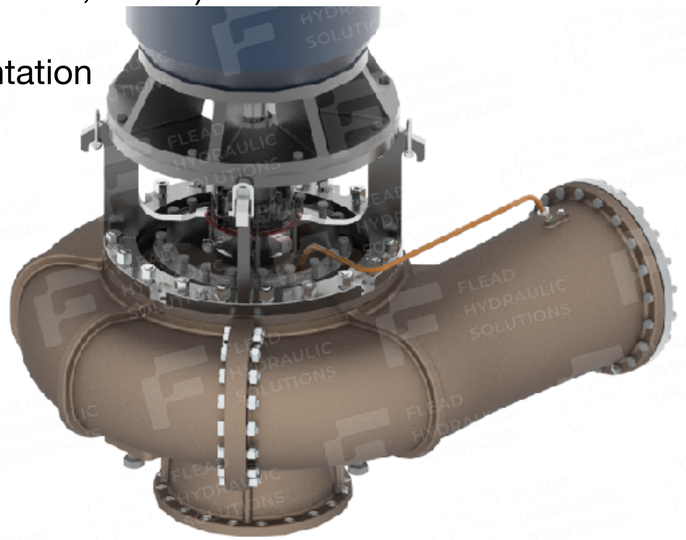
3. High flow seawater centrifugal pump

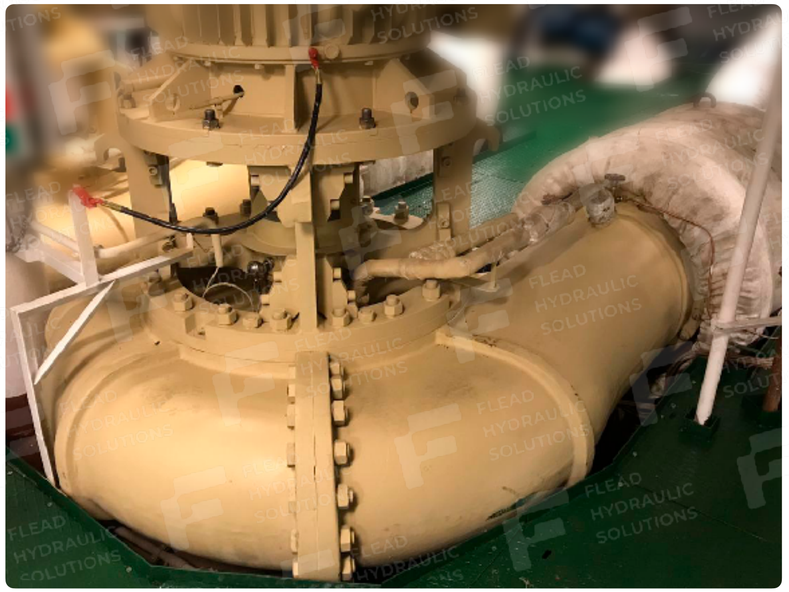
Water-cooled condenser of a large nuclear icebreaker ship requires a stable high flow of cold water going through it. This requirement is usual for other classical cases related to pumps for marine application, such as narrow ship internal space, therefore need of having a good access to pump units for easy and quick service. These made the project scope quite challenging. The pump has been designed as vertical, with semi-axial (almost axial) impeller, classical volute and radial discharge orientation. Mechanical design allows the full rotor to be pulled out vertically. At the same time, very massive and heavy volute keeps its position, there is no need to disconnect suction and discharge pipes, what is really appreciated considering the above limitations.

The manufactured pumps have been successfully manufactured, inspected and tested in accordance with norms and regulations of the local Maritime Register of Shipping and comply with the Technical Regulations for the Safety of Sea Transport Facilities.

Scope of work:

- Hydraulic design (impeller, diffuser, volute)
- Full mechanical design
- Engineering design documentation
- Prototype testing





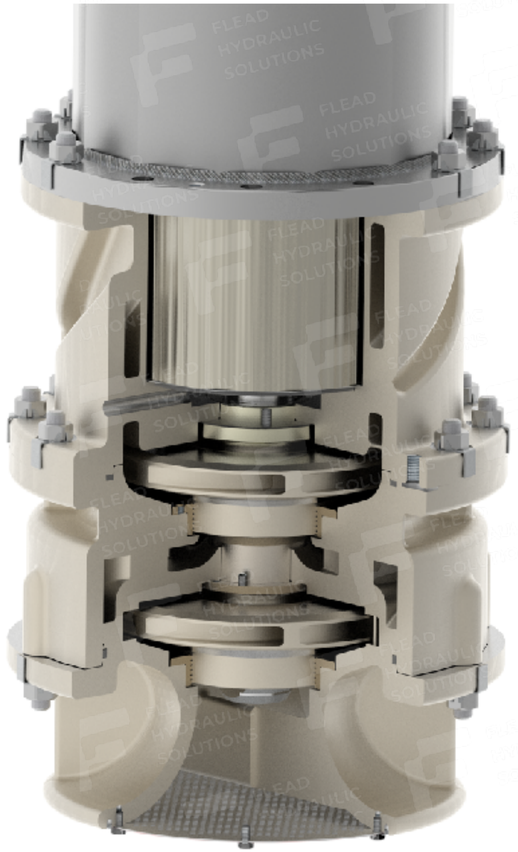
Rated parameters: Q=5000 m³/h, H=14 m, NPSHa=11 m, n=750 rpm, eff=0,91

4. Firefighting polder submersible pump

This range of pumps is designed for installation in offshore platform firefighting emergency system, for continuous seawater pumping. It can also perfectly fit for other applications related to seawater pumping (marine ballast systems, floating docks etc.). As the main advantage and initial design requirement, this pump model has its wet end and suction eye located at the bottom. Such design allows asynchronous liquid-filled (water-glycol mixture) electrical motor to be effectively cooled by pumped seawater. Wet end has labyrinth shaft seal to minimize external leakage and volumetric losses. Mechanical shaft seal is located inside of electrical motor chamber and prevents water-glycol mixture leakage. In addition, motor internal pressure is balanced by a special membrane. Several sizes of this model, including single- and multistage configurations, were tested using specially designed test-bench and implemented for serial production.

Scope of work:

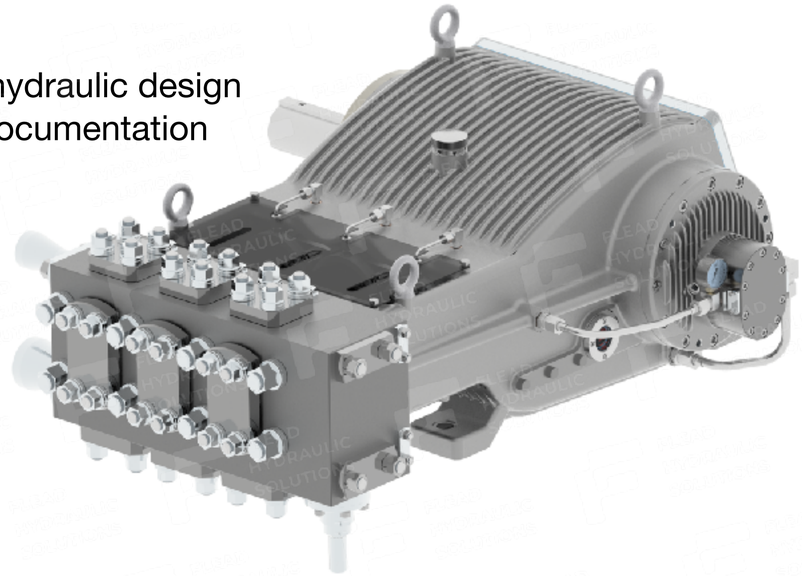
- Hydraulic design (impeller, diffuser)
- Full mechanical design
- Engineering design documentation
- Prototype testing



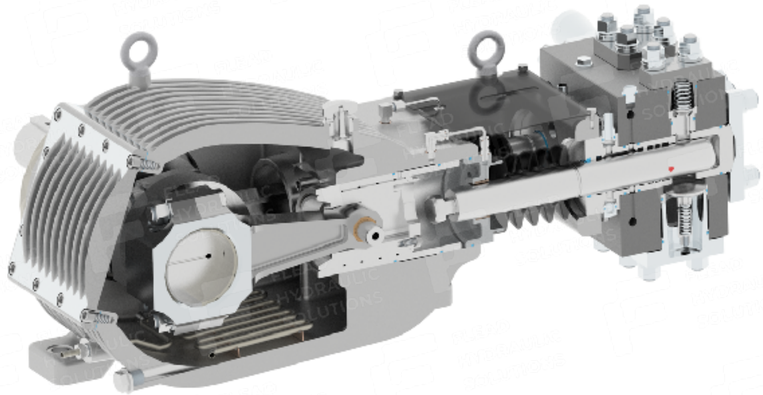
Rated parameters: Q=50 m³/h, H=90 m, n=3000 rpm, eff=0,65

5. Plunger pump

Scope of work:
- Full mechanical and hydraulic design
- Engineering design documentation
- Prototype testing



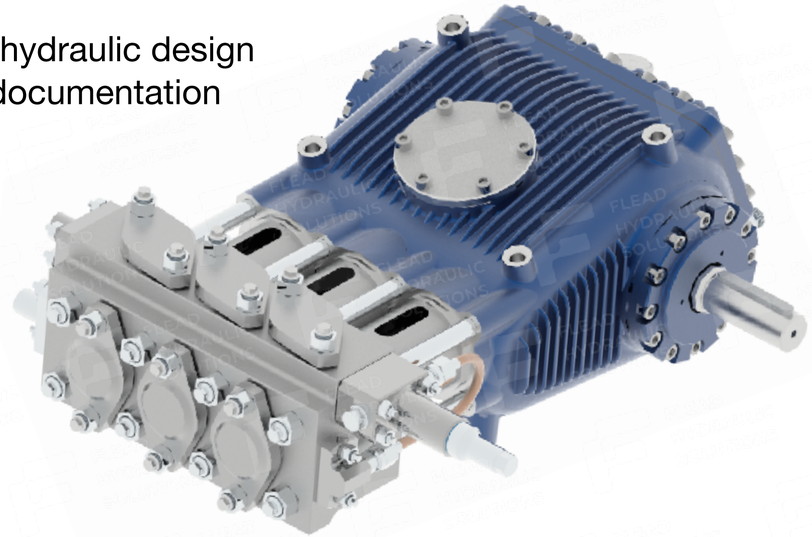
Plunger pump was designed, manufactured and tested for pumping boron solution. The design includes three plungers and crankshaft. Casings were made of cast steel alloy. The plungers material is austenitic steel with Al_2O_3 ceramic coating at the seal areas. Lip type and packing seals are used together for sealing plungers. In addition, plungers titanium material option is available for seawater application.



Rated parameters: P=25 MPa, Q=16 m^3/h, Power=160 kW, eff=0,93

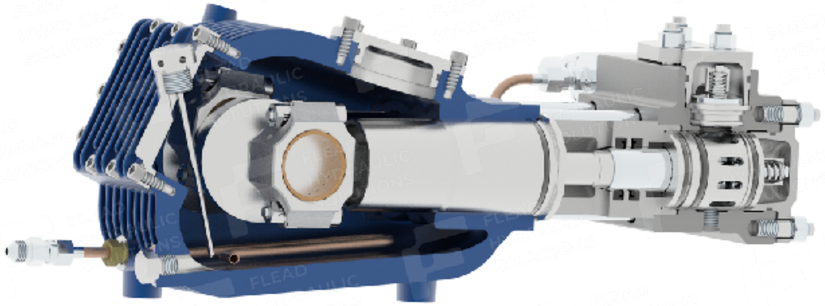
6. Plunger pump

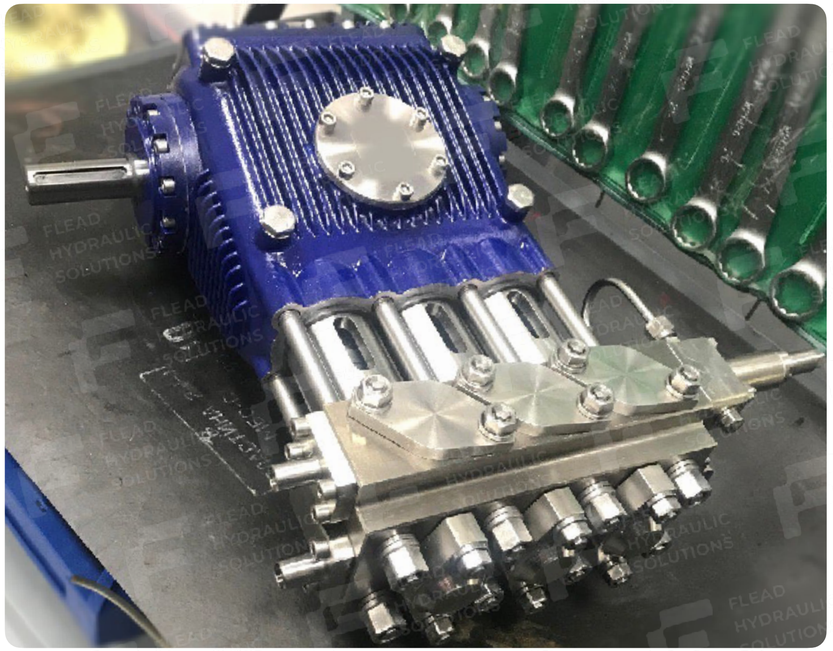
Scope of work:
- Full mechanical and hydraulic design
- Engineering design documentation
- Prototype testing



The pump was designed, manufactured and tested for pumping water and liquid with similar properties. Casings are made cast aluminum. The plungers` material is Austenitic steel with Al2O3 ceramic coating at the seal areas. Lip type and packing seals are used together for sealing plungers. In addition, plungers titanium material option is available for seawater application.

Application:
- to supply water to fire-extinguishing systems with fine spray water;
- to supply water to desalination systems using reverse osmosis.





Designed as part of the R&D project

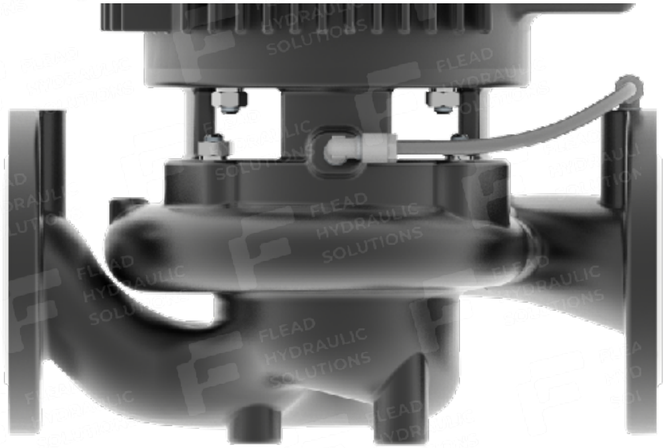
Rated parameters: P=15 MPa, Q=3 m³/h, eff=0,87

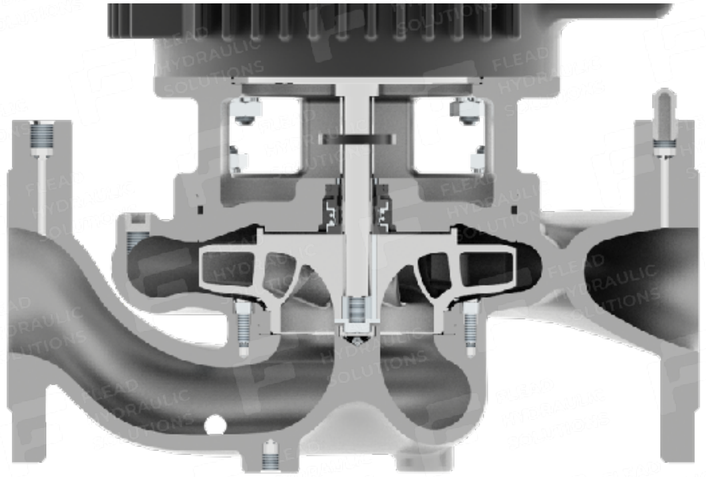
7. In-line type clean water centrifugal pump

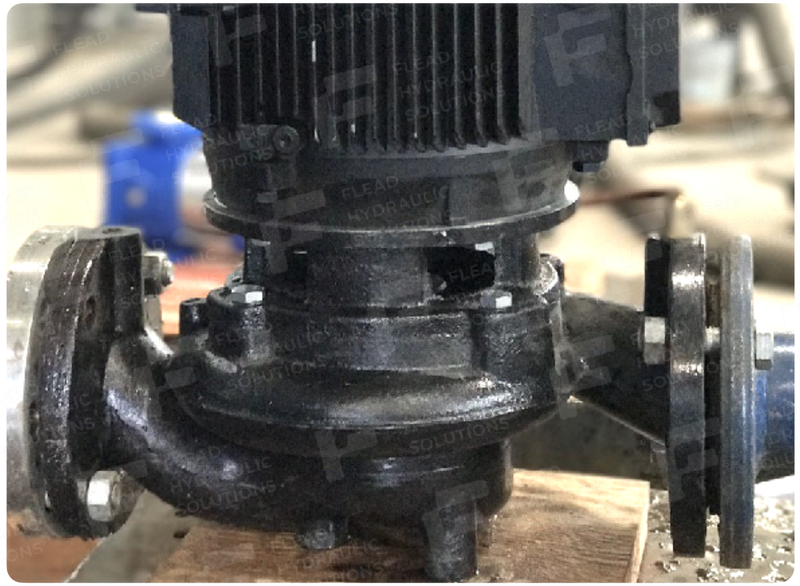
Designed for production in large series, combines reduced manufacturing cost with high performance. The design is adjustable for various flange orientations: inline bottom casing can be also replaced by straight suction pipe. High efficiency has been achieved by using computational fluid dynamics calculations and innovative approach designing hydraulics components.

Scope of work:

- Hydraulic design (impeller, inlet casing, volute)
- Full mechanical design
- Engineering design documentation
- Prototype testing







Installed on the stations of Moscow water supply systems.

Rated parameters: Q = 43 m³/h, H=34 m, n = 3000 rpm, eff=0,82

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