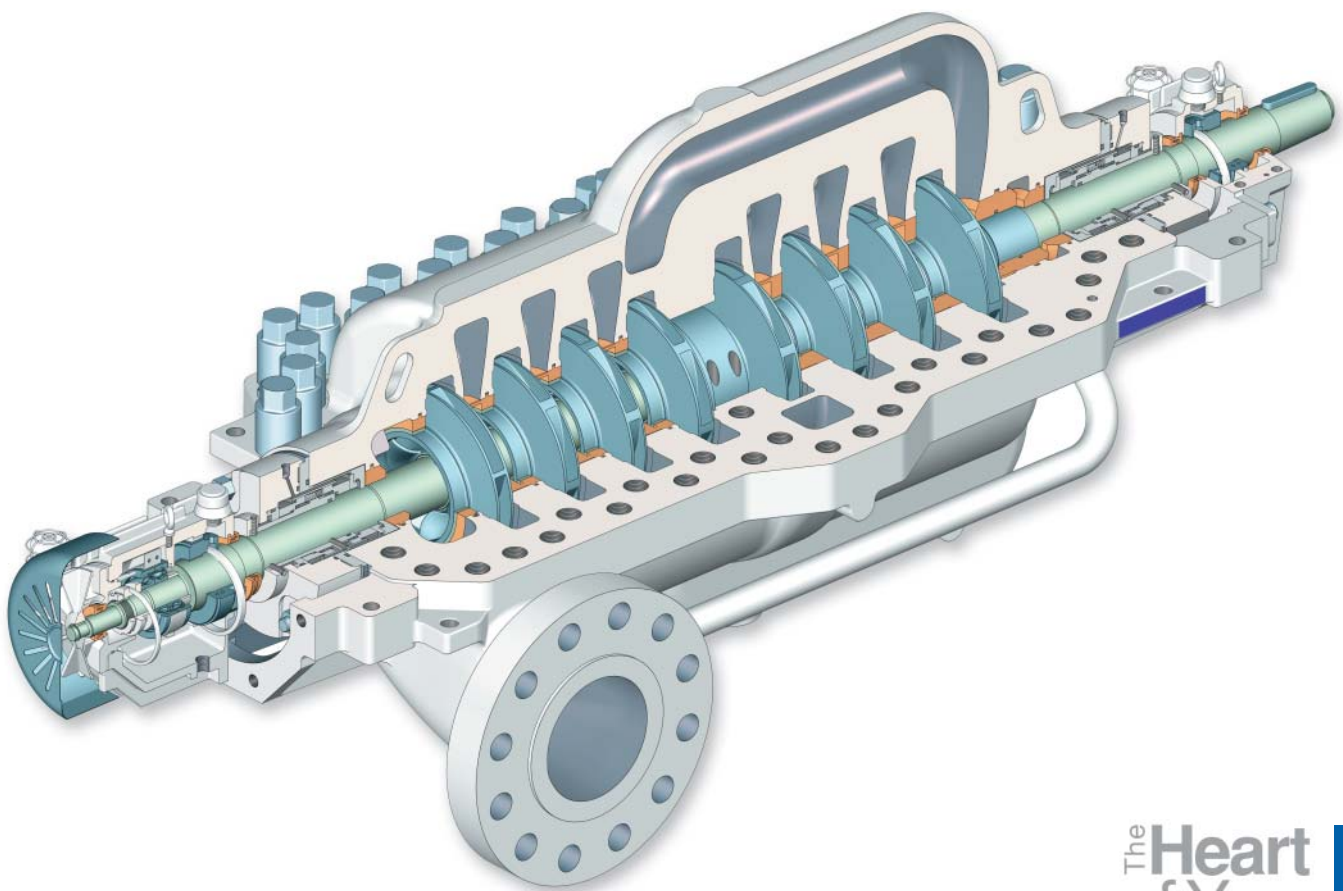


MSD Axially Split Multistage Pump



Sulzer Pumps – Leader in Pump Technology

Sulzer Pumps is a leading global supplier of reliable products and innovative pumping solutions for end users. Our active research and development, detailed process and application knowledge together with a comprehensive understanding of market demands keeps us consistently at the leading edge of technical development. Our global network of modern manufacturing and packaging facilities together with sales offices, service centers and representatives located close to major markets provide fast responses to customer needs.



Sulzer Pumps is active serving business partners in the following industries:

- Oil & Gas
- Hydrocarbon Processing
- Pulp & Paper
- Power Generation
- Food, Metals & Fertilizers
- Water & Wastewater

Extensive Services and Product Range

Oil and Gas

The oil and gas industry utilizes Sulzer's highly engineered pumps which can be customized for individual applications as diverse as seawater injection, condensate extraction, fire fighting, seawater lift and oil export. Pumping solutions are provided for arduous platform environments and for transportation through intercontinental pipeline systems.

Hydrocarbon Processing

Refineries, petrochemical plants and gas plants run sophisticated production processes requiring reliable pumping solutions to meet stringent industry specifications.

Sulzer Pumps, with its high-quality product line, is known for being able to consistently meet these specifications.

Power Generation

Sulzer Pumps offers the power industry an extensive range of innovative products and services. Whatever the type of power plant – nuclear reactor, fossil-fired, combined cycle, smaller industrial power plants – we deliver boiler feed, condensate extraction, cooling water and auxiliary pumps, as well as specialized safety pumps for nuclear power plants.

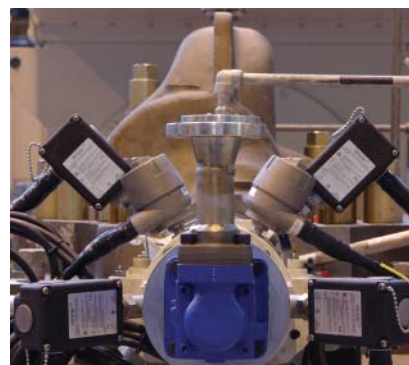


Engineered Solutions

The oil and gas industry turns to Sulzer Pumps for innovative pumping solutions set apart by outstanding engineering.

- Direct drive solutions – with standardized performances at 50hz and 60hz, 2 and 4 pole, motor drive, turbine drive
- Variable speed drive solutions – including variable frequency drives, steam turbine drives and gas turbine drives
- High speed solutions – motor with gear, steam turbine, gas turbine

- Low, medium and high capacity solutions – 45 to 2,700 m³/hr (200 usgpm to 12,000 usgpm)
- High pressure solutions – to 300 bar (4,500 psi) MAWP
- Low specific gravities – proven application experience as low as 0.28 SG
- Product temperatures – 30°C to +200°C (-20°F to +400°F)



MSD Technology

Sulzer leads the field in designing, developing, and engineering MSD pumping technology.

Customized Applications and Standardized Materials

Our standardized product range can be configured on a custom-fit basis to match the hydraulic fit and mechanical requirements of the most exacting customer application.

Types of Custom Configurations

- Controlling of head rise to meet system limits in series and parallel operation
- Controlling of the location of best efficiency to optimize energy efficiencies and performance reliability
- Single-suction impellers with both high and low suction specific speed characteristics in addition to double-suction impellers for low NPSHA
- Low-pressure and high-pressure intermediate take-off connections for secondary process services

- Single, dual-pressurized and dual-unpressurized mechanical seals, including dry gas seals to the latest API 682 2nd edition seal standard
- Ball/ball, ball/sleeve, sleeve/pivot shoe bearings as best fit the application

Standardized Materials

- API 610 material classes
- S-5, S-6, S-8, A-8, D-1, D-2
- Low temperature materials
- Sour service materials for compliance with NACE MR 01-75)
- Non-metallic wear parts
- PEEK and Graphalloy™ allowing operation with reduced internal clearances, low product gravity, low viscosity, low lubricity



MSD Design Features and Benefits

Impellers

Precision cast.
Dynamically balanced.
Individually secured.
Optional integral wear ring.
Opposed impeller design.

Single piece interstage bushing and flow straightener

Tongued registration.
Pinned for anti-rotation at split line.

Lower NPSH performance available

Double suction impeller option.

Ball/ball bearings standard

Sleeve/ball bearings optional (shown).
Sleeve/pivot shoe bearings optional.

Optional sleeve/ball bearing arrangement

Larger size multistage pumps.
Horsepower applications beyond ball/ball bearing limits.

Optional sleeve/pivot shoe bearing arrangement

High speed pumps.
High horsepower pumps (2500kw).

Double volute construction

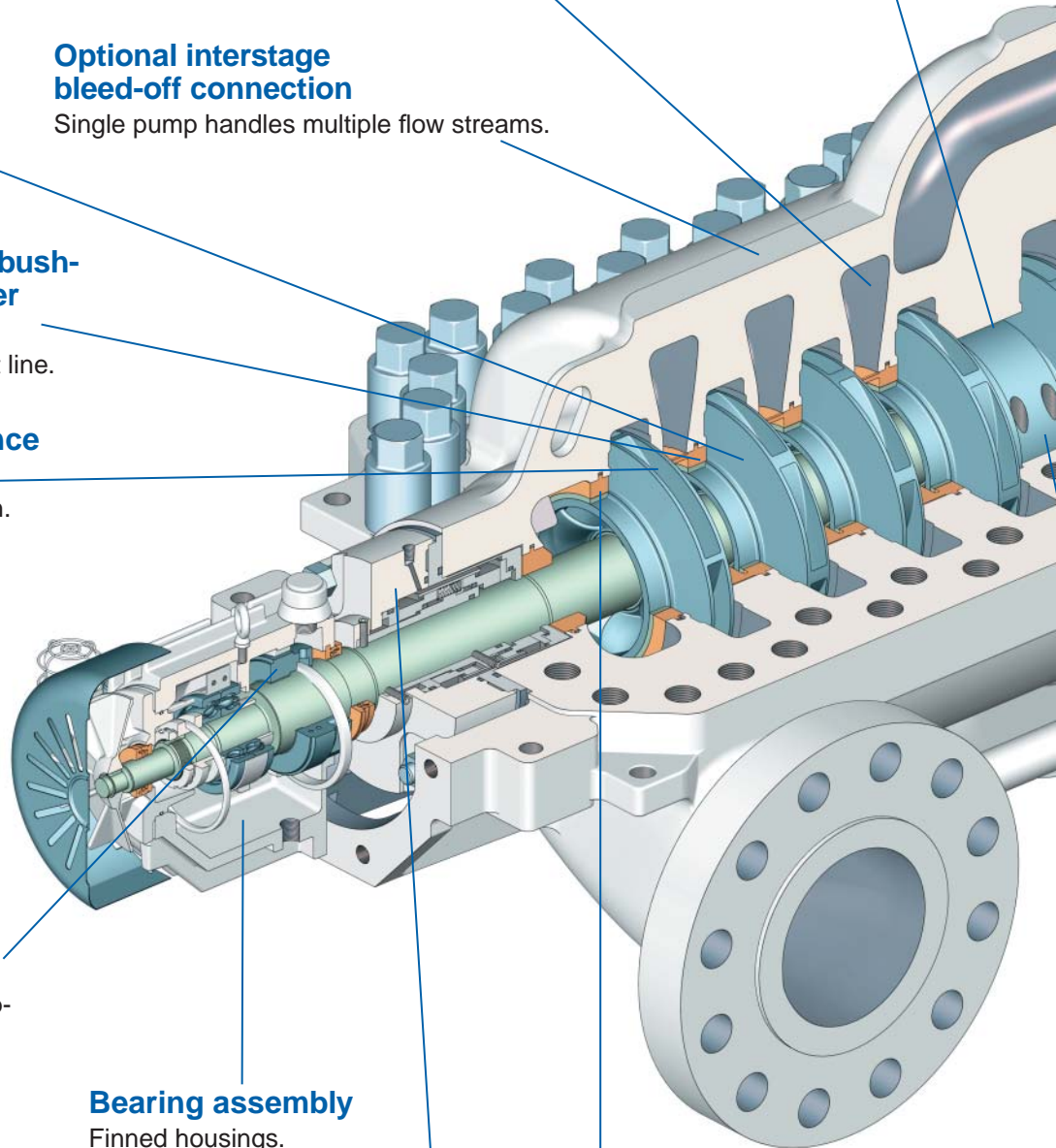
Precision cast hydraulic passageways.
Minimum radial thrust for less shaft deflection and less bearing loading.

Optional interstage bleed-off connection

Single pump handles multiple flow streams.

Large case bore

Accommodates optional non-metallic wear parts without modification.



Bearing assembly

Finned housings.
High capacity fan - optional.
Ring oil lubrication.
Pure or purge mist lubrication.

Seal chamber

Compliance with API 682 dimensions.
Space for tandem and double mechanical seals.
Easy access for maintenance.

Case wear rings

Tongued registration.
Pinned for anti-rotation at split line.

Single piece throttle bushing

Designed for pressure breakdown.
Sized to balance axial thrust.

Large diameter shaft

Stepped for ease of assembly.
Sized to satisfy rotor dynamics and power transmission.
Optimized for hydraulic performance.

NEMA shaft taper

For ease of coupling removal.

INPRO™ bearing isolators

Minimizes lubricant contamination.

Integral balance line

Seal cavities operate at same pressure.
No auxiliary customer connections.

Axially split casing

Rotating element balancing, inspection and installation.
Case hydraulic passageway inspection and modification.
Spare rotating element retrofit.
Near centerline mount.
Full range of design pressures.

Replaceable wear rings

Secured by pressed fit and axial pin.
Integral impeller ring option.

Split center bushing

Facilitates inspection.
Facilitates removal and replacement.
Sized to balance axial thrust.
Maximum rotating element support and dampening.

Additional features

Baseplate

- Optional job specific baseplates.
- Nozzles in case bottom half.
- Casing stays connected to inlet/outlet piping during rotating element maintenance.

Established hydraulics

- Optimum hydraulic match for application.
- Predictable hydraulic performance.

Benefits

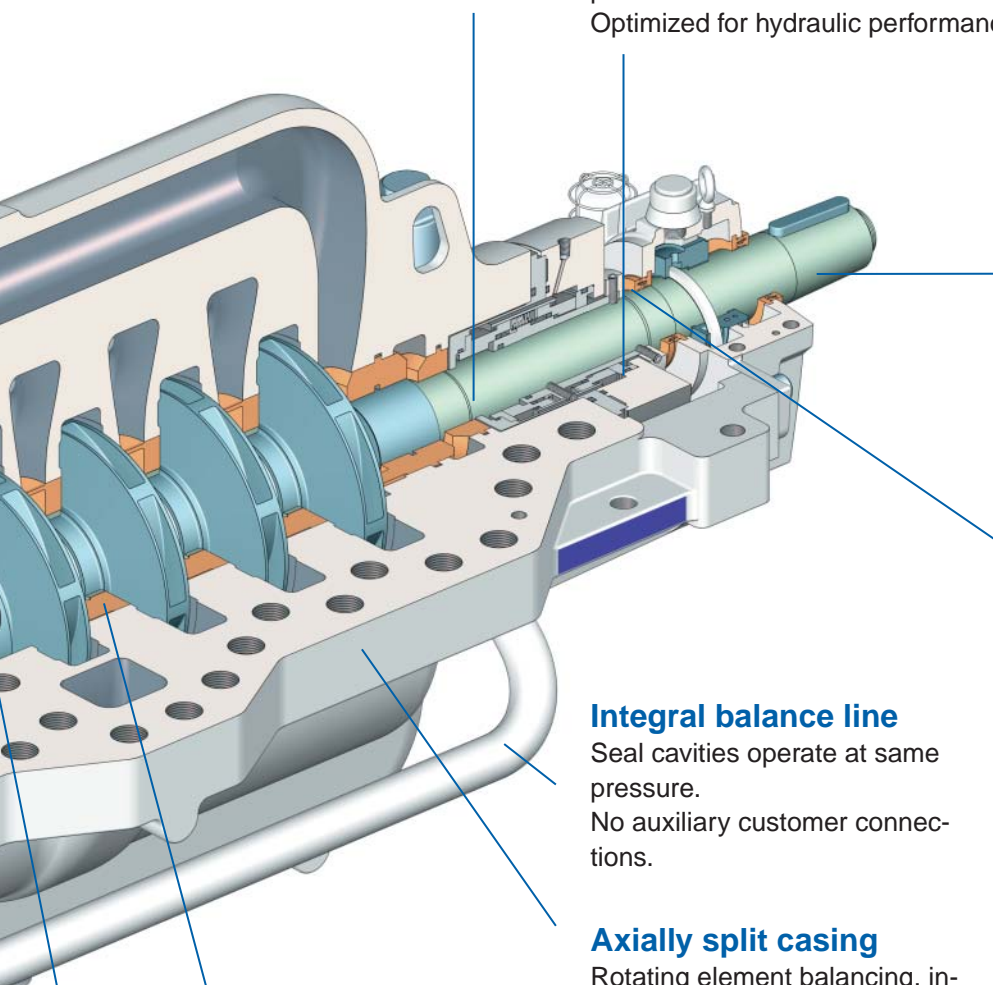
Optimum bearing type for specific application:

Three bearing arrangements – ball/ball, sleeve/ball, sleeve/pivot shoe

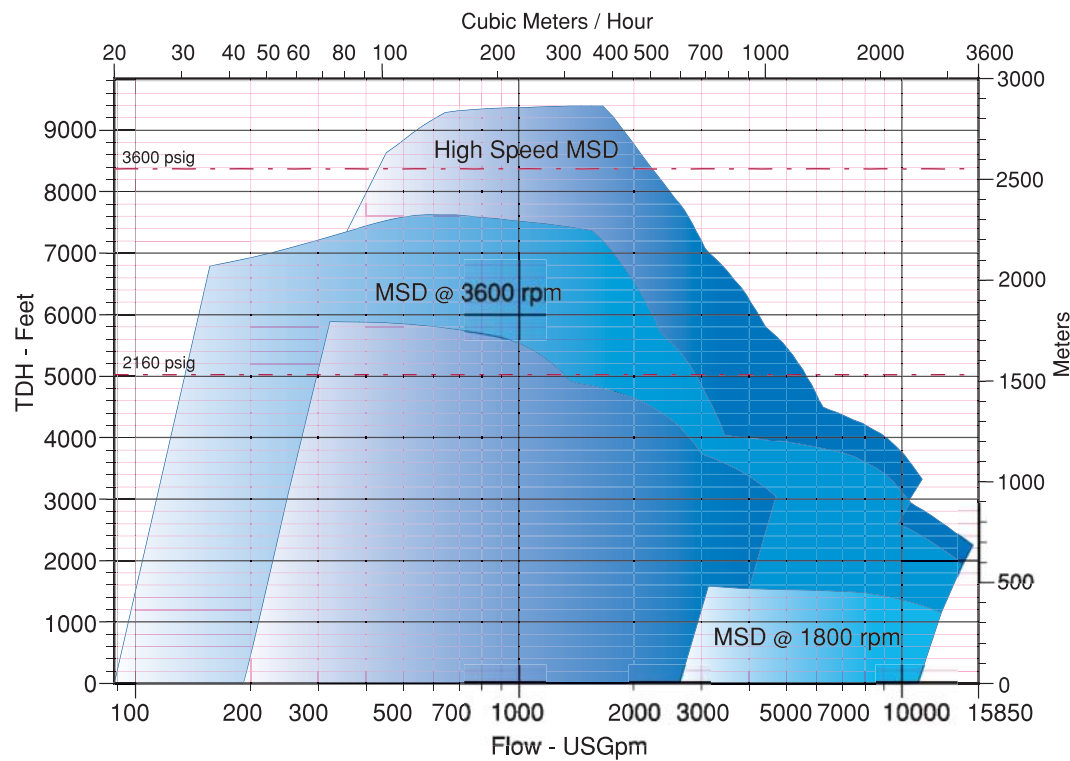
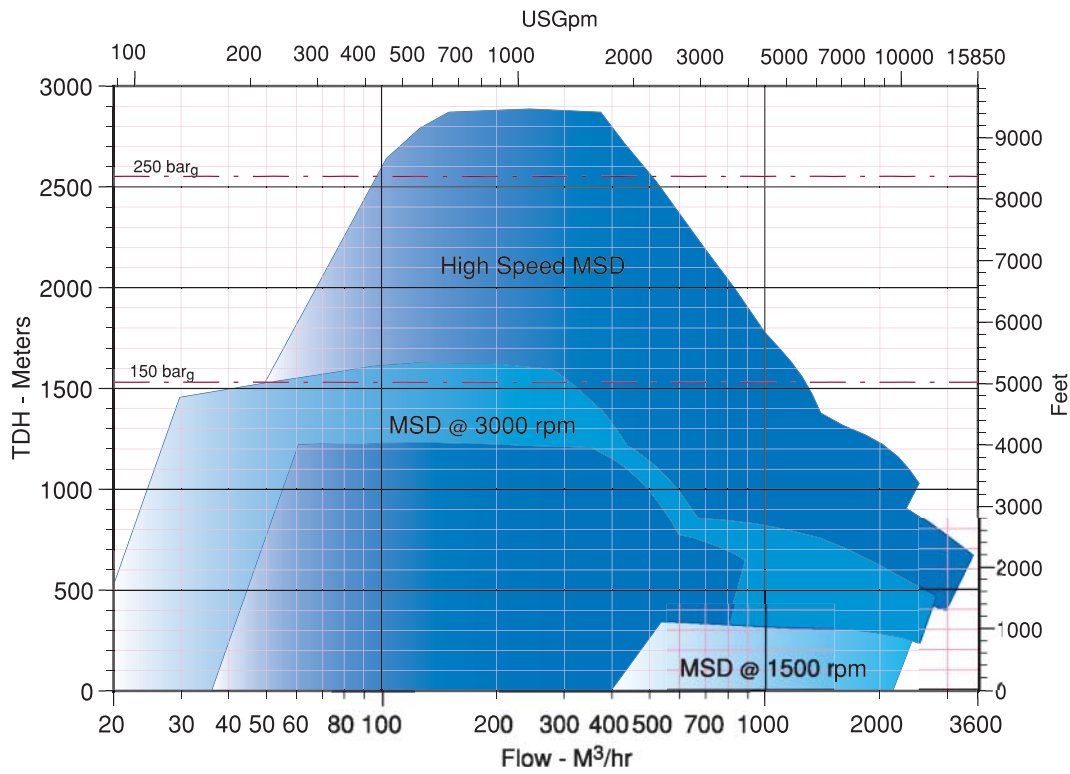
- Minimize cost of bearings and support systems.
- Maximize rotating element support.

Opposed impeller layout

- Minimum axial thrust for less bearing loading.
- Consistent axial thrust for minimum axial thrust change as wear parts wear.



Hydraulic Range Maps





Your Global Partner

Sulzer operates over 20 test facilities worldwide. Our facilities are suitable for horizontal or vertical, open pit, high flow rate/high energy and multiphase testing. We have the ability to perform tests at 50 & 60Hz and, depending on the site, are able to operate using diesel engines, gas engines and gas turbines in addition to conventional electric motors.

A specialty of Sulzer is the ability to fully string test large high-energy pumps to prove the pump package as a whole to our customers. This ability is particularly important for critical offshore applications where on site correction is both expensive and time consuming.

Customer Support Service

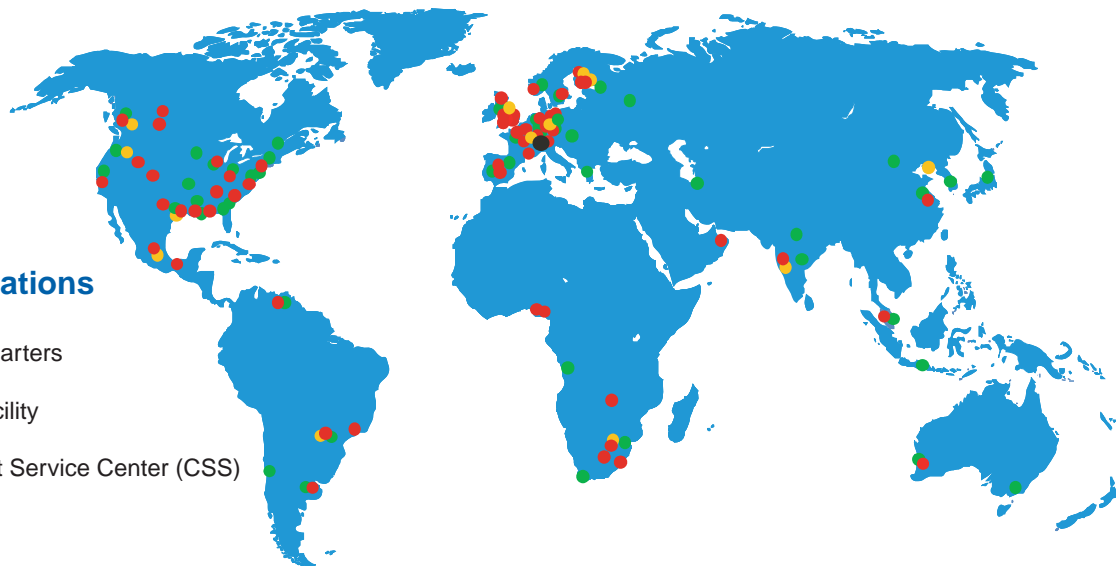
Through our worldwide network of over 50 service centers we provide our customers with a full range of services for pumps and other associated equipment. Local 24 hours a day, 7 days a week customer service backed up by our service groups' global solutions, concept development and support team. Applying our unique combination of experience and expertise, we are consistently able to deliver high quality, value added rotating equipment support. Furthermore, we can also design, deliver and fit high integrity components for non-Sulzer machinery using our in-house reengineering specialists.

Sulzer Customer Alliances

Sulzer Pumps' business strategy is simply to work closely with our partners to gain an understanding of their requirements and expectations, and provide products and services which meet those expectations better than anyone else. We can look back on 10 years of alliance experience. Our customer alliance agreements are key to our strategy and represent a mutual long term commitment for the purpose of achieving world class pumping system life cycle cost by maximizing the effectiveness of our partner's and Sulzer's resources. Sulzer currently has agreements with many of the major oil companies focusing on solving problems and simplifying work processes.

Network of Locations

- Divisional Headquarters
- Manufacturing Facility
- Customer Support Service Center (CSS)
- Sales Office





Check our worldwide offices at
www.sulzerpumps.com