SULZER

Cutting-Edge Pumping Solutions for the Oil and Gas Industry


SULZER

The Sulzer Advantage

Taking on your challenges

Sulzer, with 180 years of experience and expertise, is a world leader in the oil and gas industry. We provide state-of-the art pumping solutions for oil and gas production, transportation, refining, and petrochemical processing.

Expertise

- Our success in oil and gas is based on our unique ability to push back technical barriers
- Sulzer provides reliable high quality equipment from the concept phase through to design, manufacture, testing, installation and dependable operational support
- We are at the forefront delivering ground-breaking designs that stay ahead of oil and gas production developments
- Recent challenges include 3 to 6 MW subsea hybrid and multiphase pressure boosting systems

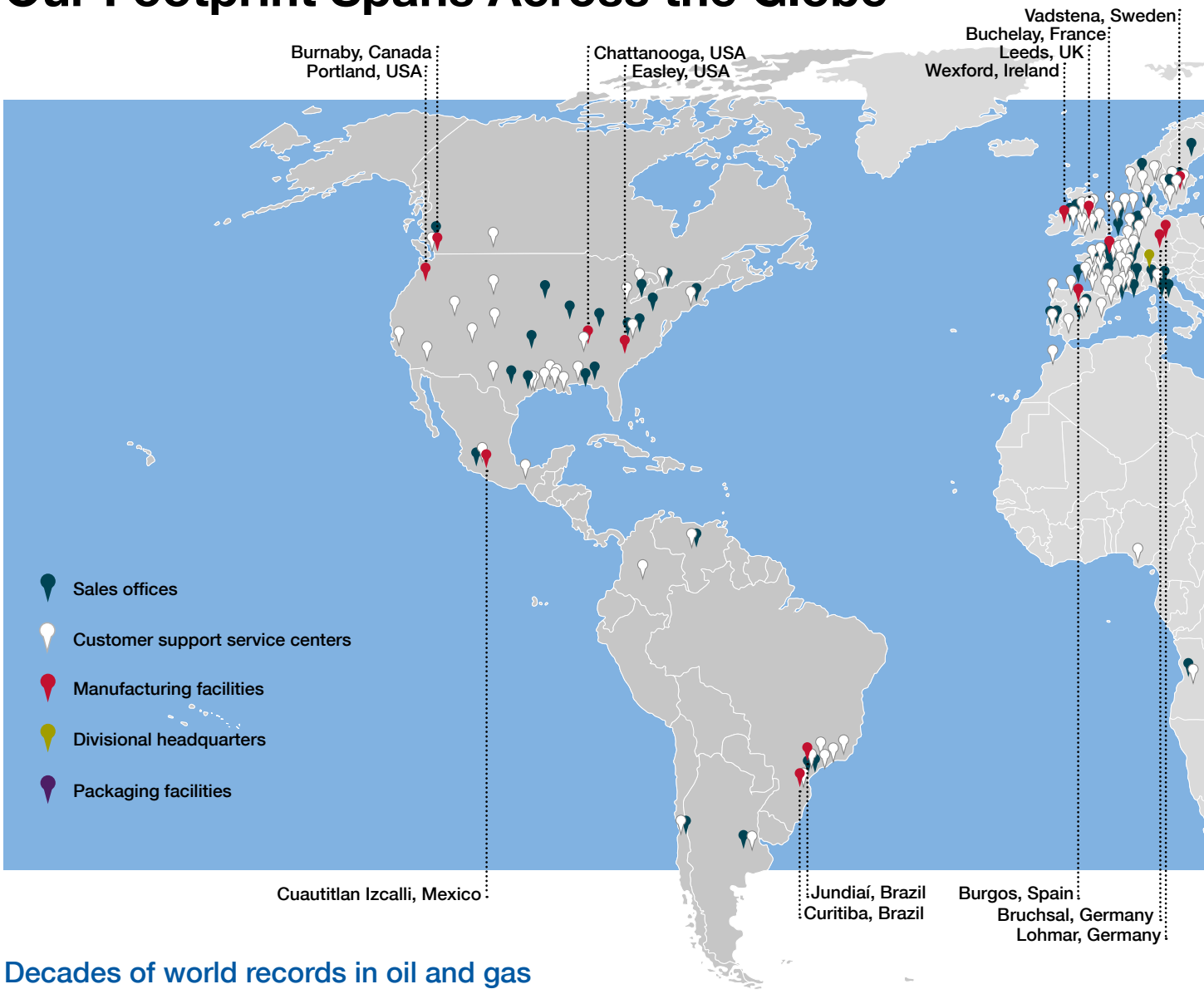
Reliability

- Sulzer products have earned a reputation for first time start-ups, availability, reliability and ease-of-maintenance
- Our cutting-edge technology led to the world's first 40,000 hour impeller life guarantee on a high energy injection pump
- With over 1,000,000 kW installed power and more than 1,000,000 operating hours, Sulzer HPcp injection pumps have delivered over 99% availability for our customers

Research and innovation

- Sulzer continues to establish world records in the oil and gas business and our list of firsts is unequaled
- Having produced the most powerful water injection pumps in 1980's, we later broke our own record by 50% up to 27 MW
- We also were first to deliver injection pumps with discharge pressure > 600 bar (designs now > 800 bar), as well as the world's largest multiphase and LNG sendout pumps
- Thanks to innovation and state-of-the-art technology, Sulzer develops customized solutions, to meet the most stringent specifications

Our Footprint Spans Across the Globe



Decades of world records in oil and gas

1975 WORLD'S FIRST DUPLEX INJECTION PUMPS.
Algeria — 13 units

1977 WORLD'S LARGEST INJECTION PUMPS.
15.7 MW — 2 units

1978 WORLD'S LARGEST CRUDE OIL PIPELINE.
Saudi Arabia — 33 units

1978 WORLD'S LARGEST OIL PIPELINE PUMPS.
Saudi Arabia 11.2 MW — 33 units

1981 WORLD'S LARGEST INJECTION PUMPS.
Alaska — 18.8 MW — 2 units

1984 WORLD'S LARGEST OFFSHORE INJECTION PUMP.
Abu Dhabi — 14.2 MW — 1 units

1985 WORLD'S LONGEST PIPELINE.
Canada — 100 units

1992 WORLD'S LARGEST VERTICAL INJECTION PUMPS.
Norway — 6.7 MW — 2 units

1994 WORLD'S LARGEST LNG SEND OUT PUMPS.
Turkey — 2,121 m — 5 units

1999 WORLD'S LARGEST OFFSHORE MULTIPHASE PUMPS.
North Sea — 4.5 MW — 2 units

2000 WORLD'S LARGEST MULTIPHASE PUMPS.
Siberia — 6.0 MW — 4 units

2001 WORLD'S HIGHEST PRESSURE INJECTION PUMPS.
Gulf of Mexico — 605 Bar — 4 units

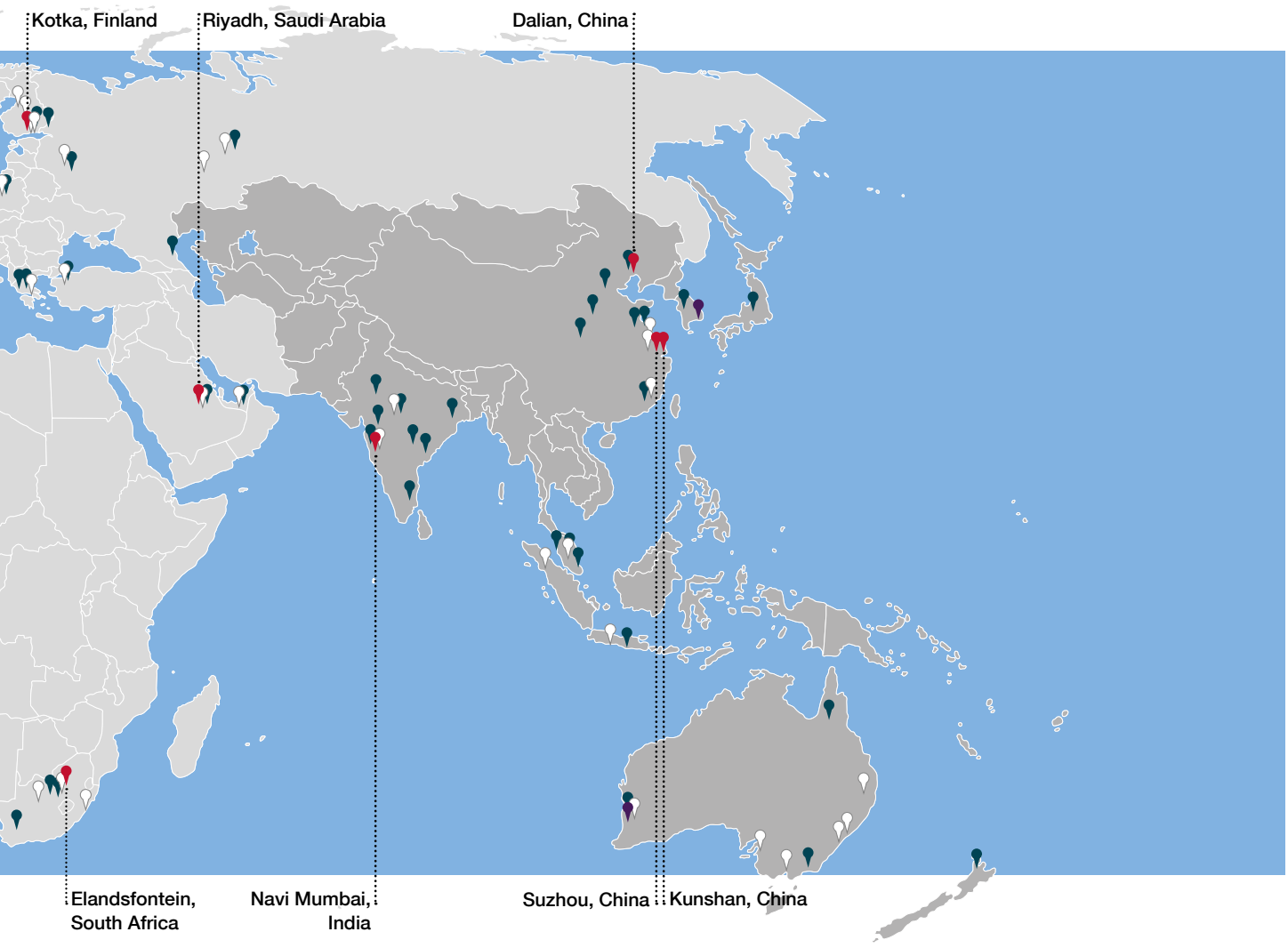
2002 WORLD'S LARGEST INJECTION PUMPS.
Caspian Sea — 27 MW — 4 units

2007 WORLD'S LARGEST LNG SEND OUT PUMPS.
Netherlands — 1.43 MW — 3 units

2008 WORLD'S LARGEST OIL PIPELINE PUMPS.
Russia — 14.5 MW — 24 units

2011 WORLD'S HIGHEST PRESSURE INJECTION PUMP.
Gulf of Mexico — 2 units

2012 WORLD'S HIGHEST POWER SUBSEA MULTIPHASE PUMP.
3.2 MW — 1 unit



State-of-the-art testing capabilities

All Sulzer manufacturing plants have advanced testing facilities, capable of demonstrating pump performance and proving the ancillary equipment to ensure smooth commissioning and start-up.

Gas turbine string testing

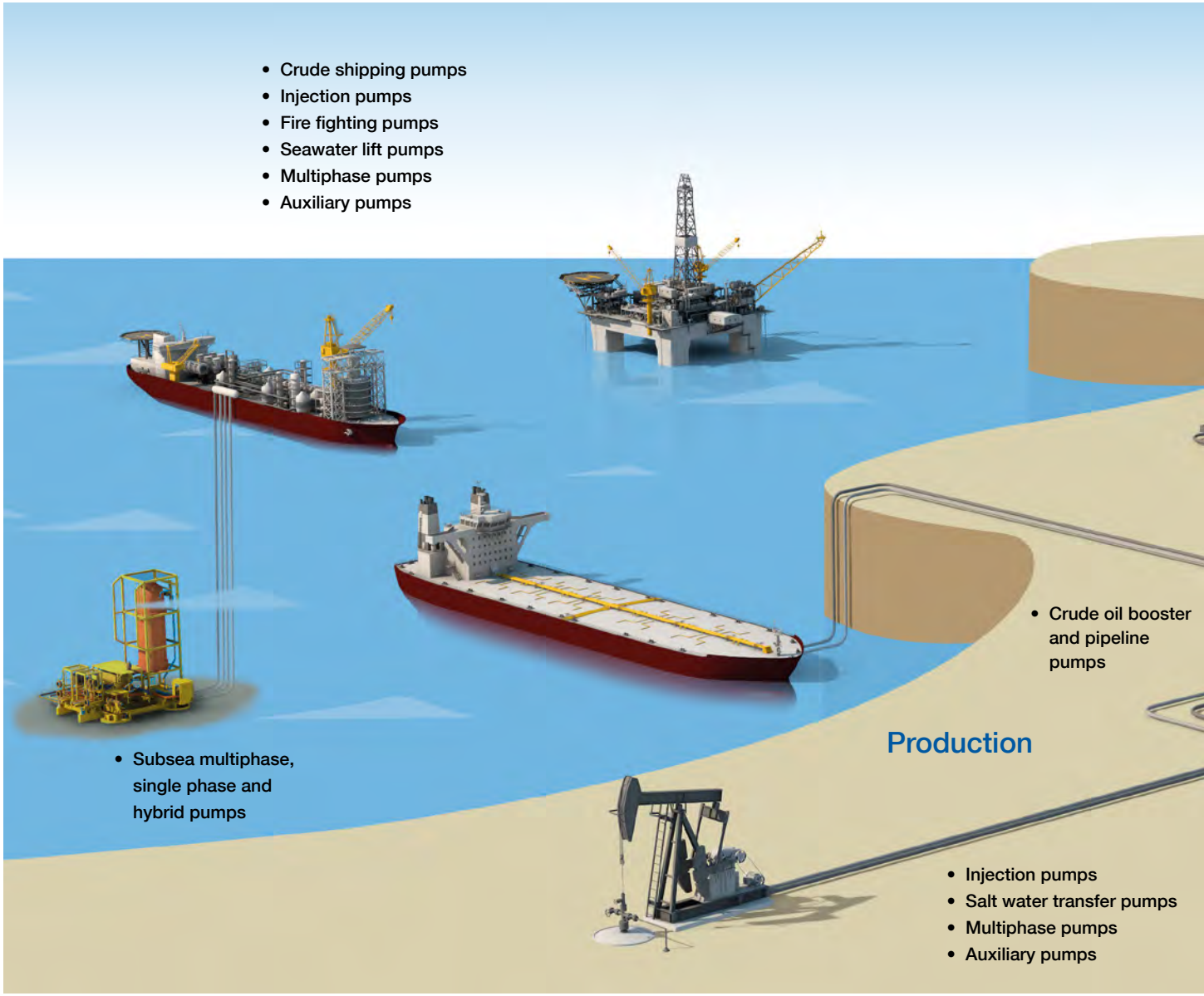
One of the Sulzer differences is our unique in-house gas turbine string test facility in Leeds, UK. Having supplied hundreds of gas turbine driven pumps, we are aware of the need to run the full train prior to shipment. The GT test facility in Leeds can string test with gas turbines up to 30 MW. The other test loops in Leeds can test to even higher MW using motors and Variable Frequency Drive (VFD). Our other facilities have similar variety of test facilities to test pumps they build.

Subsea testing

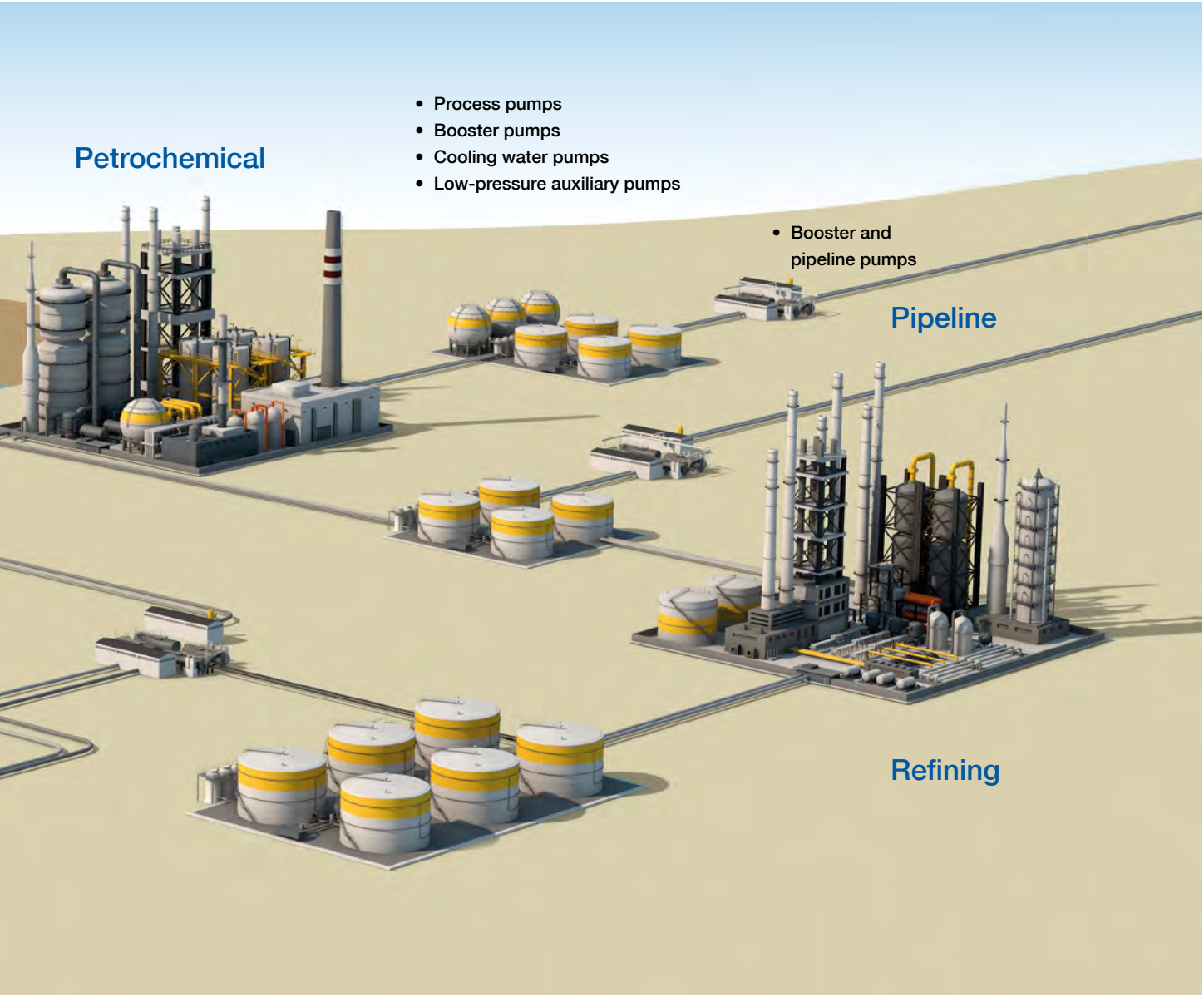
Sulzer, together with FMC Technologies, a leading provider of subsea production and processing systems, have developed a powerful new subsea multiphase pressure boosting system. These systems combine field proven pump hydraulics from Sulzer and both permanent magnet motor technology and world leading subsea processing system integration from FMC Technologies.

Whatever the Process, We Have the Pumping Solutions

You set out the challenge, we present the solutions.

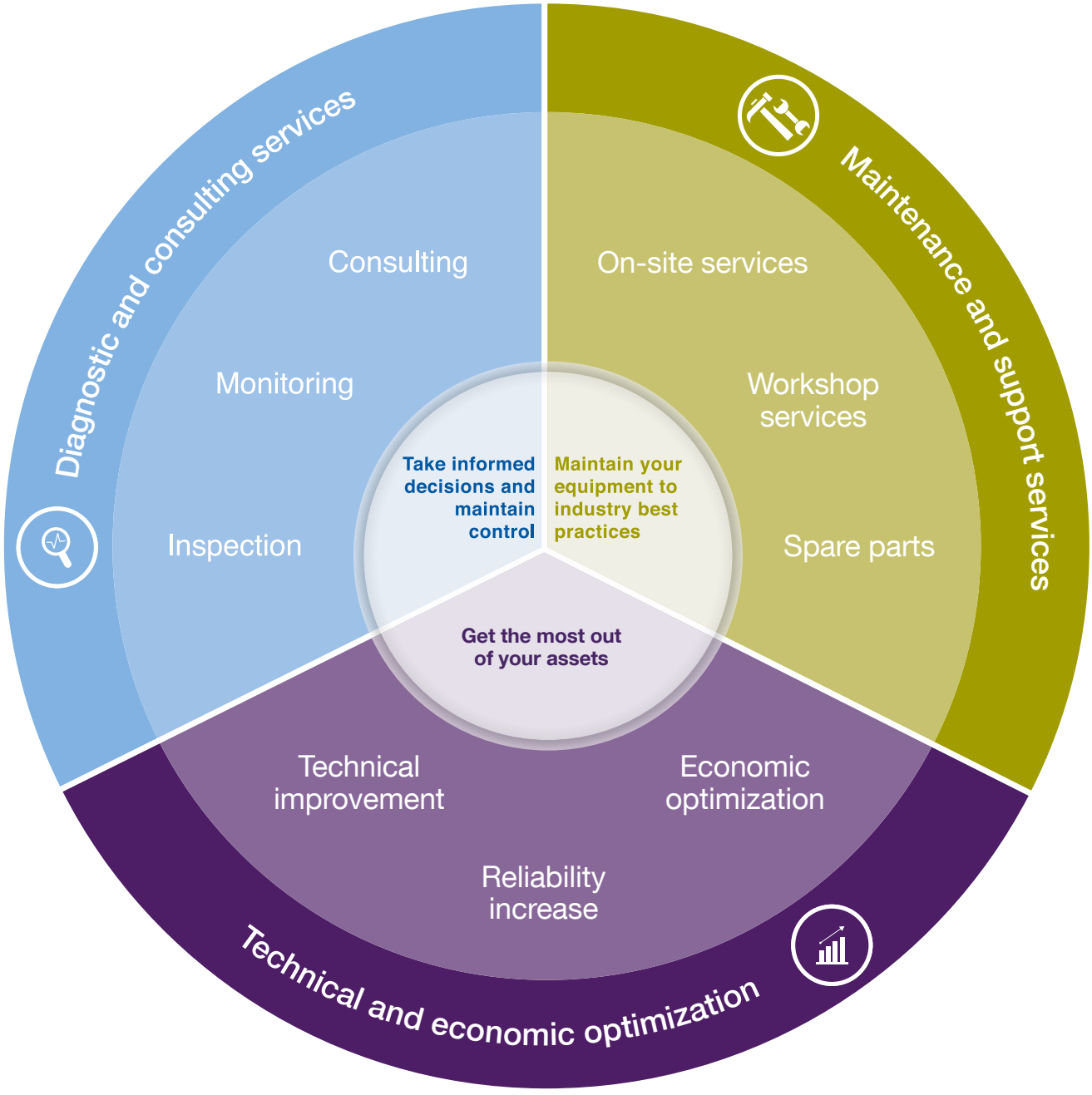


- **Oil production:** pumps for injection, main oil line, seawater lift, fire-fighting, subsea and associated auxiliary applications
- **Floating Production, Storage and Offloading (FPSO):** pumps for injection, firewater, seawater lift, offloading, process and auxiliary
- **Pipelines:** booster pumps and main line pipeline pumps for upstream and mid-stream applications: crude oil, diluted bitumen, diluent, Natural Gas Liquids (NGL), refinery products and petro-chemicals (gasoline, diesel, Liquefied Petroleum Gas (LPG), super critical ethylene, etc.)
- **Gas (LNG):** ultra-high pressure send out pumps for the latest generation of LNG terminals
- **CO_2:** CO_2 pipeline transportation and high pressure injection pumps
- **Pump services:** diagnostic and consulting, maintenance and support, technical and economic optimization through retrofits



Your Ideal Service Partner

Our expertise and commitment always deliver reliability, responsiveness, rapid turn-around and innovative solutions.

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Our Comprehensive Product Portfolio

Applications	Production		Pipeline / transport	API 610 classification									
	Offshore	Onshore		OH1	OH2	OH3	BB1	BB2	BB3	BB5	VS1	VS4	VS6
Subsea multiphase, single phase and hybrid pumps	✓									MPP* ▲			
Multiphase (helico axial)	✓	✓								MPP*			
Water injection, high pressure liquid transport	✓	✓	✓		OHH	OHV	HSB HPDM		MSD MSD2	HPcp HPcpV* GSG CP			
Firewater	✓					OHV	SMN* SMH/ SMHV				SJT JTS* SJS		
Seawater lift	✓						SMN* SMH/ SMHV				SJT JTS* SJS		
Crude oil Shipping and Transport	✓	✓	✓		OHH	OHV	SMN* SMH/ SMHV HSB HPDM	BBS BBT-D	MSD MSD2	HPcp GSG CP			JVCR SJD-API
Flow assurance (dead oil / hot oil)	✓								MSD	GSG CP			
Auxiliary systems	✓	✓	✓	AHLSTAR* CPT*	OHH	OHV	SMH/ SMHV	BBS / CD BBT-D			SJT JTS*	CVT	SJD-API

*Mechanical design according to API with hydraulic/mechanical concept driven exceptions
▲ Customized designs available

Product Overview

OH1

AHLSTAR END SUCTION SINGLE STAGE LONG COUPLED CENTRIFUGAL PUMP
ISO 2858/5199 OH1

FEATURES AND BENEFITS

- Exceeds standard requirements of international ISO 5199 and ISO 2858 standards
- Suitable for the most demanding industrial applications
- Unique, patented and superior design features minimize life-cycle costs
- Quick and easy installation, safe operation, easy maintenance and service

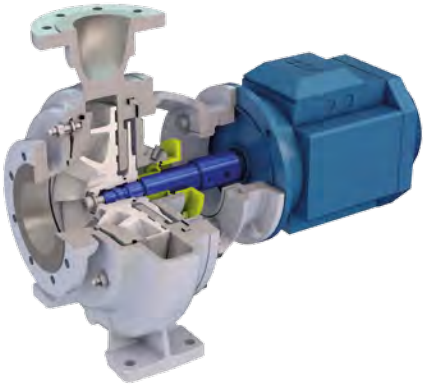
KEY CHARACTERISTICS

Capacities	up to 11,000 m³/h / 48,400 USgpm
Heads	up to 160 m / 525 ft
Pressures	up to 16/25 bar / 230/360 psi
Temperatures	up to 180°C / 355°F

APPLICATIONS

- Arduous process and auxiliary applications

AHLSTAR END SUCTION SINGLE STAGE CLOSE COUPLED CENTRIFUGAL PUMP
ISO 2858/5199 OH1



FEATURES AND BENEFITS

- Exceeds standard requirements of international ISO 5199 and ISO 2858 standards
- Suitable for the most demanding industrial applications
- Unique, patented and superior design features minimize life-cycle costs
- Quick and easy installation, safe operation, easy maintenance and service

KEY CHARACTERISTICS

Capacities	up to 600 m³/h / 2,600 USgpm
Heads	up to 160 m / 525 ft
Pressures	up to 16/25 bar / 230/360 psi
Temperatures	up to 130°C / 266°F

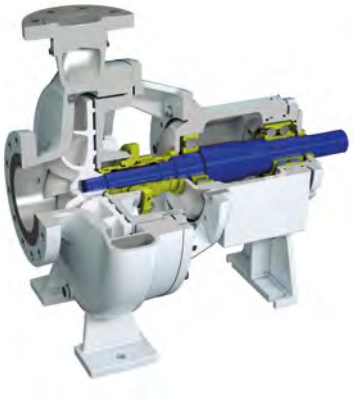
APPLICATIONS

- Arduous process and auxiliary applications

CPT END SUCTION SINGLE STAGE CENTRIFUGAL PUMP *ANSI B73.1 OH1*

FEATURES AND BENEFITS

- Exceeds standard requirements of ANSI/ASME B73.1 standards
- Suitable for the most demanding industrial applications
- Unique, patented and superior design features minimize life-cycle costs
- Quick and easy installation, safe operation, easy maintenance and service



KEY CHARACTERISTICS

Capacities	up to 1,600 m³/h / 7,000 USgpm
Heads	up to 220 m / 720 ft
Pressures	up to 26 bar / 375 psi
Temperatures	up to 260°C / 500°F

APPLICATIONS

- Arduous process and auxiliary applications

OH2

OHH/OHHL OVERHUNG SINGLE STAGE PUMP *ISO 13709 / API 610 OH2*

FEATURES AND BENEFITS

- Finned bearing housing and fan cooling for long bearing life
- Broadest range map in the industry for ISO 13709 (API 610) type OH2 pumps
- Heavy duty baseplates with 2x ISO 13709 (API 610) nozzle load option
- ISO 21049 (API 682) cartridge type mechanical seals for reduced emissions
- Electric motor, VFD, engine and steam turbine drivers

KEY CHARACTERISTICS

Capacities	up to 2,250 m³/h / 10,000 USgpm
Heads	up to 400 m / 1,500 ft
Pressures	up to 76.5 bar / 1,110 psi
Temperatures	up to 425°C / 800°F

APPLICATIONS

- Process and boosting applications

OH3

OHV/OHVL OVERHUNG VERTICAL INLINE PUMP *ISO 13709 / API 610 OH3*

FEATURES AND BENEFITS

- Finned bearing housing and fan cooling for long bearing life
- Broad range map for hydraulic coverage
- Heavy-duty pump and driver stand for reduced vibration
- ISO 21049 (API 682) cartridge type mechanical seals for reduced emissions
- OHH/OHHL shaft and bearings for reduced deflection and long seal life

KEY CHARACTERISTICS

Capacities	up to 1,150 m³/h / 5,000 USgpm
Heads	up to 400 m / 1,500 ft
Pressures	up to 51 bar / 740 psi
Temperatures	up to 343°C / 650°F

APPLICATIONS

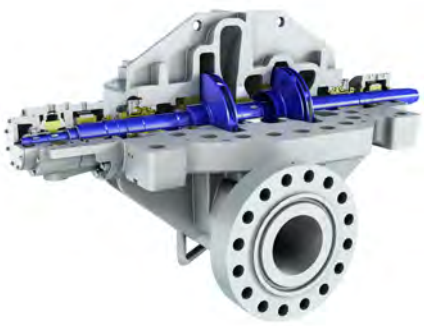
- Seawater booster
- Light hydrocarbon boosting
- Low-pressure unit charge
- Pump around services
- Tank farm boosting

BB1

HPDM AXIALLY SPLIT VOLUTE CASING PUMP *BB1*

FEATURES AND BENEFITS

- Optimum technical solution due to a tailor-made design for each application
- Wide range of proven hydraulics allows high efficiency and suction performance
- Sturdy design with generous safety margins for long life of reliable service with minimum maintenance
- Proven experience backed by extensive list of references
- Technical support provided to our customers from the early phases of the project design, allowing sound and cost-effective solutions for each application



KEY CHARACTERISTICS

Capacities	1,000 to 20,000 m³/h / 4,400 to 88,000 USgpm
Heads	up to 700 m / 2,300 ft
Pressures	up to 175 bar / 2,500 psi
Temperatures	up to 70°C / 160°F

APPLICATIONS

- Water transport
- Transport of crude oil
- Any other high flow, high head application

SMH AXIALLY-SPLIT SINGLE STAGE PUMP *ISO 13709 / API 610 BB1*

FEATURES AND BENEFITS

- Between bearing design for reliability at high flow rates
- Broad hydraulic coverage at 50 and 60 Hz speeds
- Axially split casing for ease of repair
- Vertical shaft (SMHv) for limited deck space applications

KEY CHARACTERISTICS

Capacities	up to 11,000 m³/h / 50,000 USgpm
Heads	up to 200 m / 650 ft
Pressures	15 to 26 bar / to 380 psi
Temperatures	up to 150°C / 300°F

APPLICATIONS

- Onshore cooling water
- Offshore seawater
- FPSO

SMN AXIALLY SPLIT CASING DOUBLE SUCTION PUMP *BB1*

FEATURES AND BENEFITS

- Broad hydraulic coverage through over 50 different sizes
- High efficiency
- Robust design for long service life
- Easy maintenance
- Flexible layout enabled by clockwise and counterclockwise rotation / vertical and horizontal arrangements

KEY CHARACTERISTICS

Capacities	up to 10,000 m³/h / 44,000 USgpm
Heads	up to 200 m / 650 ft
Pressures	up to 30 bar / 435 psi
Temperatures	up to 50°C / 120°F

APPLICATIONS

- Water intake, treatment and supply
- Cooling and heating systems
- Industrial water applications

HSB HORIZONTAL AXIALLY SPLIT SINGLE STAGE BETWEEN BEARING PUMP
ISO 13709 / API 610 BB1

FEATURES AND BENEFITS

- Staggered vane, double suction impeller on larger sizes for reduced vibration
- Custom hydraulics to meet both current and future requirements with a simple rotor / volute changes
- Ball-ball, sleeve-ball and sleeve-pivot shoe bearings are available
- High-speed designs available for remote gas turbine-driven applications

KEY CHARACTERISTICS

Capacities	up to 10,000 m³/h / 45,000 USgpm
Heads	up to 550 m / 1,800 ft
Pressures	up to 150 bar / 2,200 psi
Temperatures	up to 205°C / 400°F

APPLICATIONS

- Crude oil pipelines
- Heavy duty auxiliary applications

BB2

BBS AND CD BETWEEN BEARINGS SINGLE STAGE PUMP *ISO 13709 / API 610 BB2*

FEATURES AND BENEFITS

- Centerline support for reduced thermally induced misalignment
- Double suction impeller for low NPSH3
- First critical speed is well above operating speed range for smooth operation
- Casing designed for 2 times API 610 nozzle loads for freedom from piping distortions
- Grouted or ungrouted, 1x or 2x nozzle load baseplates for reduced installation cost

KEY CHARACTERISTICS

Capacities	up to 4,200 m³/h / 22,000 USgpm
Heads	up to 350 m / 1,500 ft
Pressures	up to 51 bar / 740 psi
Temperatures	up to 425°C / 800°F

APPLICATIONS

- Booster as well as high speed crude shipping services
- Sulfate removal

BBT/BBT-D 2 STAGE RADIALLY SPLIT PUMP *ISO 13709 / API 610 BB2*

FEATURES AND BENEFITS

- Centerline support for reduced thermally induced misalignment
- BBT-D double-suction impeller for low Net Positive Suction Head (NPSH)
- First critical speed is well above operating speed range for smooth operation
- Casing designed for 2x API 610 nozzle loads for freedom from piping distortions
- Grouted or ungrouted, 1x or 2x nozzle load baseplates for reduced installation cost

KEY CHARACTERISTICS

Capacities	up to 2,300 m³/h / 10,000 USgpm
Heads	up to 760 m / 2,500 ft
Pressures	up to 100 bar / 1,440 psi
Temperatures	up to 425°C / 800°F

APPLICATIONS

- Seawater and crude oil boosting applications

BB3

MSD AND MSD2 AXIALLY SPLIT MULTISTAGE PUMP *BB3*

FEATURES AND BENEFITS

- Broadest hydraulic coverage of any BB3 type multistage pump in the market
- Axially split casing means rotor balance is not disturbed when rotor is installed
- Opposed impellers balance axial thrust, saving lube system costs on most applications
- Double suction, first-stage available on most sizes for reduced Net Positive Suction Head (NPSH)
- High speed option for gas turbine drive

KEY CHARACTERISTICS

Capacities	up to 3,200 m^3/h / 14,000 USgpm
Heads	up to 2,900 m / 9,500 ft
Pressures	up to 300 bar / 4,400 psi
Temperatures	up to 200°C / 400°F

APPLICATIONS

- Pipelines
- Water injection
- CO_2 pipeline and injection

BB5

GSG DIFFUSER STYLE BARREL PUMP *ISO 13709 / API 610 BB5*

FEATURES AND BENEFITS

- Least costly form of IS0 13709 / API 610 Type BB5 high-pressure barrel pumps
- Direct drive options to 6 MW
- Back-to-back rotor stack allows up to 16 stages on low-density fluids
- Multiple sizes cover a broad hydraulic range
- Low-pressure, high-pressure, twistlock, and high-temperature designs suit many applications

KEY CHARACTERISTICS

Capacities	up to 900 m^3/h / 4,600 USgpm
Heads	up to 2,600 m / 10,000 ft
Pressures	up to 300 bar / 4,500 psi
Temperatures	up to 425°C / 800°F

APPLICATIONS

- Onshore or offshore water injection
- Offshore crude oil shipping
- LPG pipelines

CP VOLUTE STYLE BARREL PUMP *ISO 13709 / API 610 BB5*

FEATURES AND BENEFITS

- Opposed impellers balance axial thrust, with no lube system needed on smaller pumps
- Axially split inner case means rotor balance is not disturbed when installed in the pump
- Dual volute inner case balances radial loads for longer service life
- Twist lock barrel closure reduces maintenance time on lower temperature services
- Cartridge design on larger pumps can speed up pump repair time
- Volute inner case with lower erosion wear on abrasive services

KEY CHARACTERISTICS

Capacities	up to 1,000 m^3/h / 4,400 USgpm
Heads	up to 7,000 m / 23,000 ft
Pressures	up to 425 bar / 6,250 psi
Temperatures	up to 425°C / 800°F

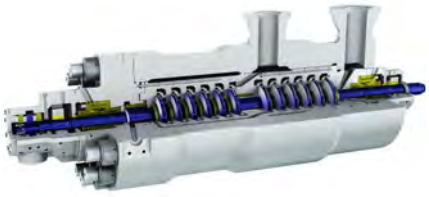
APPLICATIONS

- High pressure oil transport
- Onshore water injection
- Offshore crude oil shipping
- LPG pipelines

HPCP DIFFUSER STYLE HIGH ENERGY PUMP *ISO 13709 / API 610 BB5*

FEATURES AND BENEFITS

- Inline or back-to-back rotor stack designs for rotordynamic stability
- Forged Carbon Steel, Duplex SS, HIP'd and Overlaid barrel construction
- Twist Lock or bolted barrel closure with Superbolts™
- Sleeve, pocketed, or tilt pad bearings
- Grouted, ungrouted and offshore 3- or 4-point support baseplates



KEY CHARACTERISTICS

Capacities	up to 4,500 m³/h / 20,000 USgpm
Heads	up to 8,000 m / 26,300 ft
Pressures	up to 1,100 bar / 16,000 psi
Temperatures	up to 200°C / 400°F

APPLICATIONS

- Water injection
- Offshore crude oil shipping
- Remote pipeline services

MPP HIGH PERFORMANCE MULTIPHASE PUMP *BB5*

FEATURES AND BENEFITS

- Helicoaxial stages axially compress the effluent to avoid separation and gas binding
- Stage design changes to compensate for gas compression through the pump
- Horizontal or vertical configurations to fit the application
- Variety of sizes available from 1 to 6 MW to suit the field development, production and decline

KEY CHARACTERISTICS

Capacities	up to 3,600 m³ / 500,000 BPD
Heads	up to 200 bar dP / 3,000 psi dP
Pressures	up to 1,100 bar / 16,000 psi
Temperatures	1 to 250°C / 34 to 480°F

APPLICATIONS

- Onshore topside multiphase or hybrid pressure boosting and transport
- Offshore topside multiphase or hybrid pressure boosting
- Subsea multiphase or hybrid pressure boosting, water injection and transport

VS0

SJS SUBMERSIBLE *VS0*

FEATURES AND BENEFITS

- No lineshaft couplings or bearings to maintain
- Low, medium and high voltage submersible motors available to 2 MW (2,700 hp)
- Water/glycol filled environmentally friendly motor for improved efficiency
- Variety of materials available from stainless steel to super duplex steel
- Two configurations available: standard (motor below pump) and inverted for low NPSHa applications (pump below motor)

KEY CHARACTERISTICS

Capacities	up to 10,000 m³/h / 44,000 USgpm
Heads	up to 230m / 750 ft
Pressures	up to 40 bar / 600 psi
Temperatures	up to 80°C / 180°F

APPLICATIONS

- Offshore seawater lift
- Offshore diesel genset firewater
- Offshore ballast water
- Onshore municipal pressure boosting

VS1

SJT AND JTS VERTICAL TURBINE PUMP *VS1*

FEATURES AND BENEFITS

- Optimized hydraulics for high efficiency
- Packed stuffing box for reliable sealing and simple maintenance, mechanical seal is optional
- Rubber-lined product-lubricated bearing in bowls and columns for long maintenance-free periods, other bearing materials are also available
- Spacer coupling allows servicing of the seal and thrust bearing as required
- Full pull-out design available for semi-open impellers and bowl diameter sizes > 50” to ease dismantling and maintenance

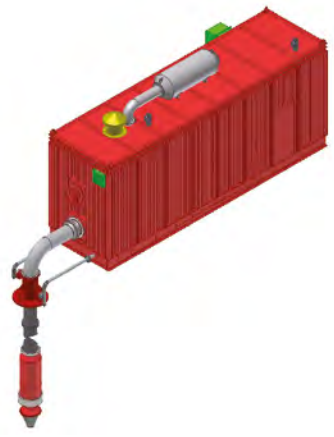
KEY CHARACTERISTICS

Capacities	up to 62,000 m³/h / 270,000 USgpm
Heads	up to 110 m per stage / 350 ft per stage
Pressures	up to 64 bar / 930 psi
Temperatures	up to 50°C / 122°F

APPLICATIONS

- Cooling water circulation
- Water supply
- Booster service
- Offshore firewater and service water

DIESEL HYDRAULIC DRIVEN PUMPING UNIT FOR FIREFIGHTING *VS1*



FEATURES AND BENEFITS

- Self-contained, containerized or skid module supports a diesel drive, booster pump, hydraulic power unit or angular gear box and lineshaft, fuel system, and all other systems required to operate the unit
- Minimum maintenance is required even during long periods on standby
- Available as container based and as open skid, and in duplex and super-duplex stainless steels
- Extremely robust

KEY CHARACTERISTICS

Capacities	500 to 3,500 m³/h / 2,200 to 15,500 USgpm
Heads	up to 200 m / 650 ft
Pressures	up to 25 bar / 360 psi
Temperatures	up to 50°C / 122°F

APPLICATIONS

- FPSO
- Production platforms
- Drill ships

VS4

CVT VERTICALLY SUSPENDED SUMP PUMP *VS4*

FEATURES AND BENEFITS

- Exceeds requirements of international ISO 5199 standard and fulfill many API 610 features
- Suitable for the most demanding industrial sump pump applications
- Unique, patented and superior design features minimize life-cycle costs
- Quick and easy installation, safe operation, easy maintenance and service

KEY CHARACTERISTICS

Capacities	up to 750 m³/h / 3,200 USgpm
Heads	up to 120 m / 550 ft
Pressures	up to 26 bar / 375 psi
Temperatures	up to 205°C / 400°F

APPLICATIONS

- All sump applications with moderate solid content

VS6

JVCR HIGH PRESSURE CANNED LNG LOADING PUMPS *ISO 13709 / API 610 VS6*

FEATURES AND BENEFITS

- Ease of maintenance
- Accessibility
- No inducer required
- High pump and motor efficiency
- Proven reliability

KEY CHARACTERISTICS

Capacities	up to 1,130 m³/h / 5,000 USgpm
Heads	up to 2,450 m / 8,000 ft
Pressures	up to 100 bar / 1,440 psi
Temperatures	up to 200°C / 400°F

APPLICATIONS

- LNG

SJD VERTICALLY SUSPENDED PROCESS PUMP *ISO 13709 / API 610 VS6*

FEATURES AND BENEFITS

- Can be built as VS 1 construction
- Reduced number of stages results in shorter, more reliable pumps
- Double suction on larger sizes can reduce pump length
- High efficiency with reduced power consumption
- Modular construction to fit project nozzle location requirements
- High head per stage means process conditions can be reached with slower speeds

KEY CHARACTERISTICS

Capacities	up to 3,800 m³/h / 20,000 USgpm
Heads	up to 700 m / 3,000 ft
Pressures	up to 75 bar / 1,100 psi
Temperatures	up to 205°C / 400°F

APPLICATIONS

- Shipping of liquefied petroleum gas (LPG)
- Crude oil pipeline booster
- Debutanizer/depropanizer services in cryogenic gas plants

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