



Pump Division



***HWM  
HWM2***

***API OH3  
Pump Bearing  
Frame***

***WM  
WM2***

***API OH5  
Close Coupled***

***One- and Two-Stage,  
Low Flow High Head  
Vertical In-Line  
Process Pumps***

## **Pump Supplier To The World**

*Flowserve is the driving force in the global industrial pump marketplace. No other pump company in the world has the depth or breadth of expertise in the successful application of pre-engineered, engineered and special purpose pumps and systems.*

### **Pumping Solutions**

Flowserve is providing pumping solutions which permit customers to continuously improve productivity, profitability and pumping system reliability.

### **Market Focused Customer Support**

Product and industry specialists develop effective proposals and solutions directed toward market and customer preferences. They offer technical advice and assistance throughout each stage of the product life cycle, beginning with the inquiry.



### **Dynamic Technologies**

Flowserve is without peer in the development and application of pump technology, including:

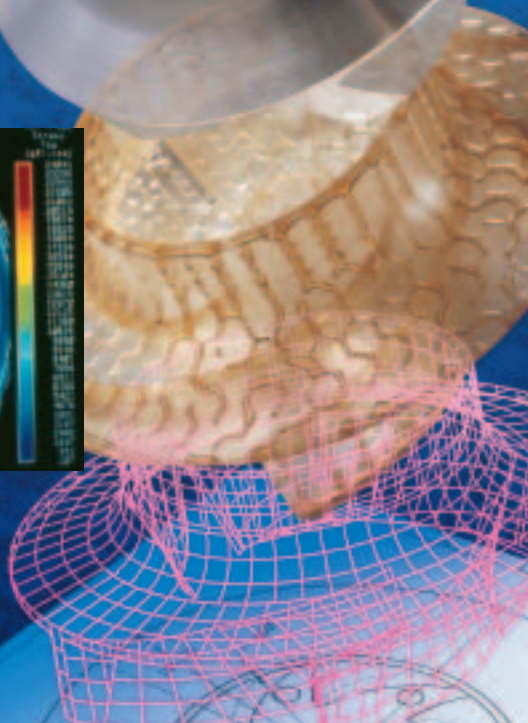
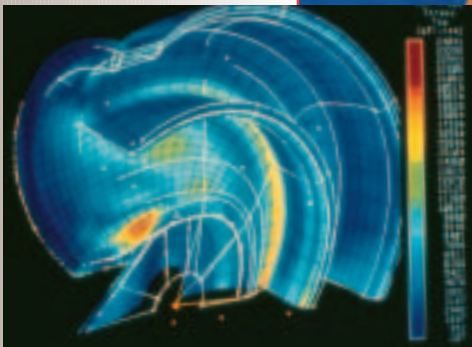
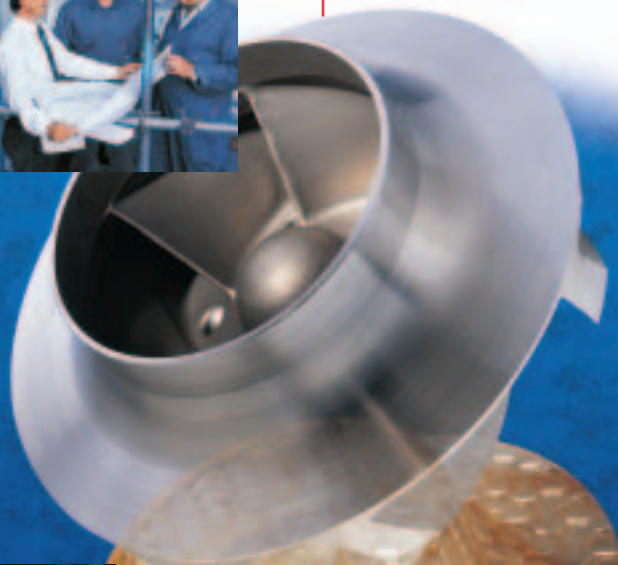
- Hydraulic engineering
- Mechanical design
- Materials science
- Intelligent pumping
- Manufacturing technology

### **Broad Product Lines**

Flowserve offers a wide range of complementary pump types, from pre-engineered process pumps, to highly engineered and special purpose pumps and systems. Pumps are built to recognized global standards and customer specifications.

Pump designs include:

- Single stage process
- Between bearing single stage
- Between bearing multistage
- Vertical
- Submersible motor
- Rotary
- Reciprocating
- Nuclear
- Specialty



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API OH3  
Pump Bearing Frame**

**WM, WM2  
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**One- and Two-Stage,  
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Vertical In-Line  
Process Pumps**

**The Choice for Modular  
Low-Flow Vertical  
In-line Pumping**

The single-stage HWM and the two-stage HWM2 are the OH3 bearing housing designs to the latest edition of API 610. They are space-saving, low-flow alternatives for many overhung process pumps in upstream and downstream services.

The single-stage WM and the two-stage WM2 are the OH5, direct coupled versions to the latest edition of API 610. These offer the same space-savings benefits of all Flowserve in-line models.

As part of Flowserve's HWX family of in-line pumps these four models provide the most comprehensive hydraulic range of low flows and medium to high heads available to the industry. The patented modular design provides more than 100 BEP fits in one pump size, thereby permitting precise selection for best operating efficiency. All models are available with an optional inducer for reduced NPSHR.

The most stringent emissions containment is achieved as the API 682 seal chambers accommodate all conventional single and dual mechanical seal styles.



The WM, HWM, WM2 and HWM2 pumps are the industry leaders for these reasons:

- Hydraulic superiority for low flow applications
- Robust construction to meet or exceed API 610, latest edition criteria
- Increased MTBF and best life cycle cost by operating pump at customized BEP
- No need to select pump far back on curve or use orifice for low flow services
- Replaceable volute inserts to accommodate future system changes
- Complete back pull-out OH3 design
- Simple two-stage design for high heads without need for gearbox
- Engineered and built for reliable and safe performance in cryogenic and high temperature services

**Broad Application**

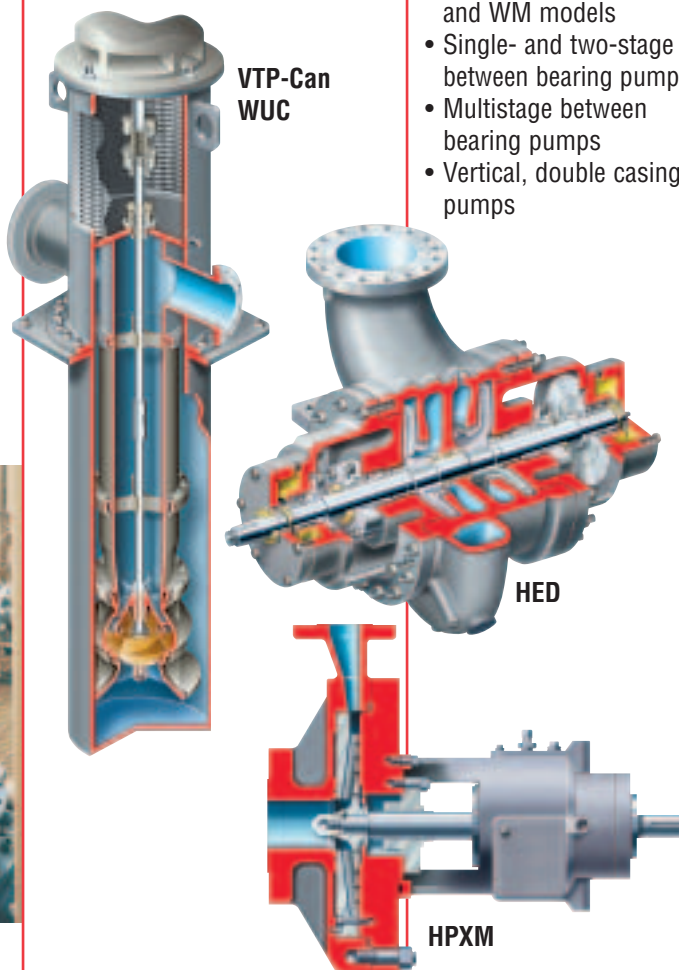
- Petroleum refining, production and distribution
- Petrochemical and heavy-duty chemical processing
- Gas industry services
- Boiler circulation and other high temperature services
- Water and general industrial pump

**Complementary Pump Designs**

HWM and WM one- and two-stage pumps may be used with other Flowserve models of API design.

These include:

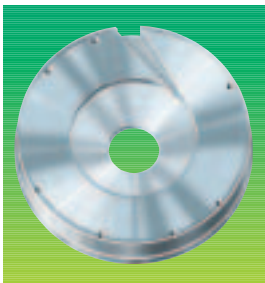
- Single-stage, horizontal overhung pumps, including the centerline mounted HPXM, which features hydraulics identical to the HWM and WM models
- Single- and two-stage between bearing pumps
- Multistage between bearing pumps
- Vertical, double casing pumps



**HWM, HWM2  
API OH3  
Pump Bearing Frame**

**WM, WM2  
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Close Coupled**

**One- and Two-Stage,  
Low Flow High Head  
Vertical In-Line  
Process Pumps**



**Volute Inserts**, replaceable for future hydraulic customizing, are individually engineered and machined for specified head-flow requirements. The volute inserts for the two-stage designs have cutwaters 180° apart for equalized radial thrust.



**Optional Inducers** are available for low NPSH requirements.

**Modular Pump Hydraulic Features**

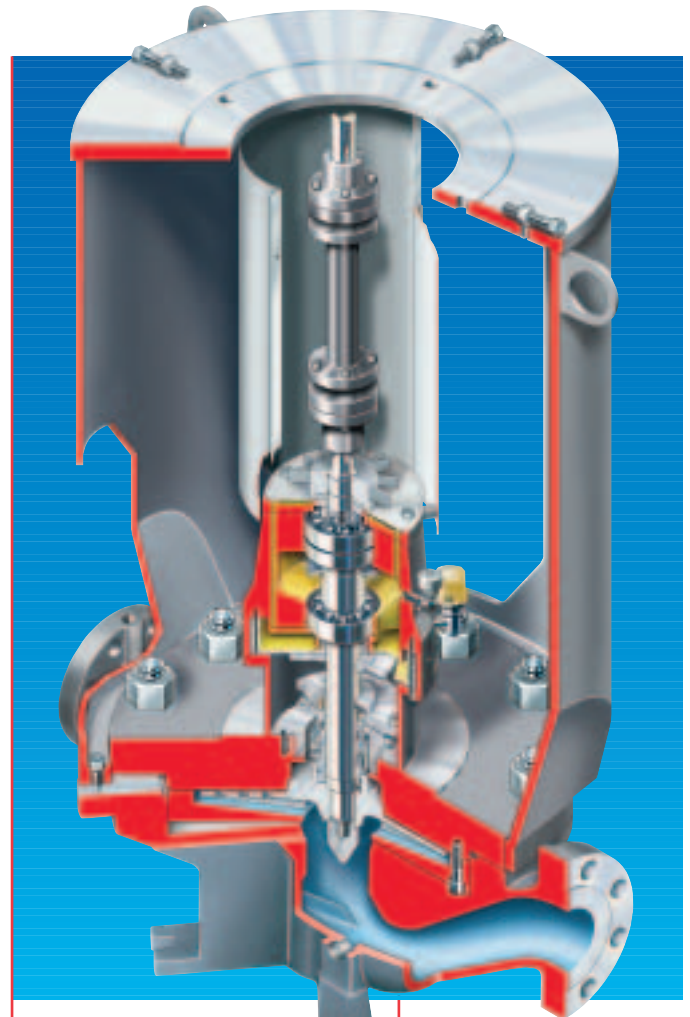
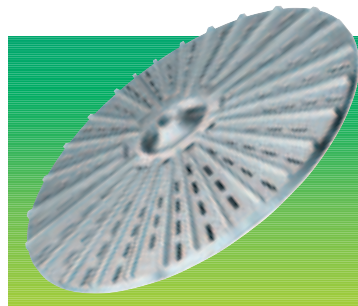
Flowserve's WM, WM2, HWM and HWM2 in-line pumps, designed to API 610, latest edition requirements, answer industry's need for stable and efficient low flow pumping. The rated flow is at least 80% of the pump's BEP even at extremely low flows. Over 100 precision machined impeller and volute insert combinations are contained within one pump size for:

- Optimal hydraulic performance
- Reduced power consumption
- Low flow stability

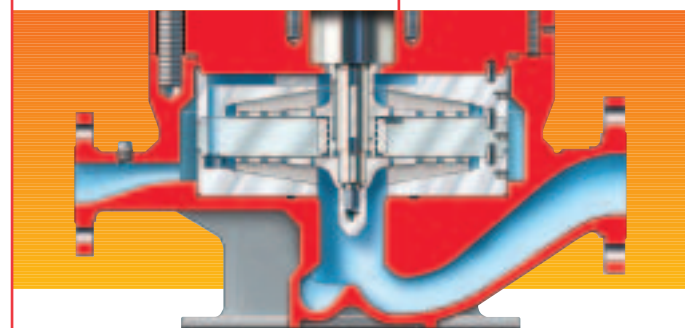
The end result is a lower total cost of ownership than enclosed impeller designs, which operate far back on the curve, or those relying on flow-restriction orifices. The modular design extends MTBPM, with low maintenance costs.

**Patented Multiple Radial Blade Impeller Design**

provides a continuously rising performance curve with low flow stability. Investment pattern produces highest quality castings for precise, repeatable hydraulic performances. Dynamically balanced for low vibration over a wide flow range, the impeller is secured by an anti-rotation impeller nut with threads unexposed to the pumped fluid. This ringless design impeller operates with 1.27 mm (0.050 in) axial clearance per side. Impellers for the two-stage designs are arranged back-to-back for equalized axial thrust.



**API Type OH3  
with Patented Oil Cascade  
Lube Bearing Housing Design**



**Two-Stage OH3 and OH5 Design**

**Operating Parameters\***

- Flows to 30 m<sup>3</sup>/h (130 gpm)
- Heads to:  
220 m (725 ft) one-stage;  
330 m (1450 ft) two-stage
- Pressures to:  
50 bar (750 psi) one-stage;  
60 bar (850 psi) two-stage

- WM, WM2 temperatures from -46°C (-50°F) to 260°C (500°F)
- HWM, HWM2 temperatures from -185°C (-300°F) to 400°C (750°F)

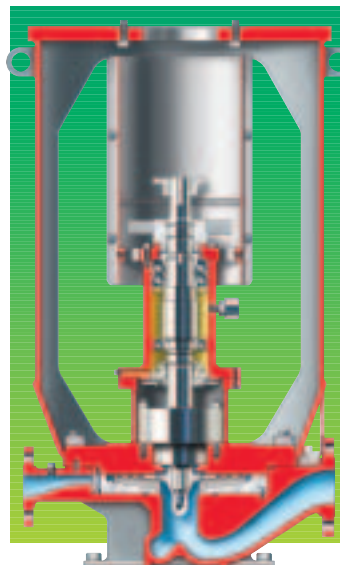
\* Increased flow and head is possible by using VFD (variable frequency drive) at 4000 rpm or high flow volute designs

**Special HWM OH3 Mechanical Design Features**

- Choice of bearing lubrication type
  - Oil cascade lube design for temperatures to 400°C (750°F)
  - Oil mist design for temperatures to 400°C (750°F)
  - Grease lube design for temperatures to 285°C (550°F)
- Only one bearing housing frame and bearing set, identical to the housing used on the majority of HWX OH3 type pumps
- Standard top bearing isolator, optional Inpro
- Flexible disc spacer coupling design
- Standard fan air cooling for extreme operating temperatures (not applicable or needed for oil mist designs)
- Adjustable axial screws for easy driver mount positioning and provided where dowelling of driver is not possible or practical
- Coupling guard to enclose coupling, pump shaft and motor shaft areas
- Optional field extraction tool for easy removal of complete rotor



**Two-Stage HWM2 Pumps with Oil and Grease Bearing Housings**



**Oil Mist or Grease OH3 Design**

**Pump Casing and Cover** feature metal to metal fit with fully confined, controlled compression gasket to ensure proper sealing and alignment.

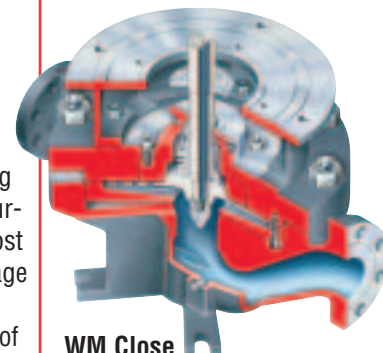
**API 682 Seal Chamber** accommodates a wide variety of seal configurations including dual pressurized and unpressurized cartridge types for the most severe services. In the two-stage design, first-stage discharge pressure assures suppression of light hydrocarbon vapor in the seal chamber.

**Stiff Shaft Design** limits maximum deflection at seal faces to 0.05 mm (0.002 in). Vibration levels for one- and two-stage machines meet and exceed API 610 requirements.

**High Head Hydraulics** in the two-stage design are achieved with conventional 2-pole motors and without traditionally used high speed gear boxes for reduced maintenance cost and improved reliability. Variable frequency drive option to 4000 rpm provides increased hydraulic coverage.

**Motor Support Head** is a heavy-duty design with a registered fit motor mount, and no spacer plates. It accommodates NEMA, IEC and existing C-face and P-base field drivers. Generous size open compartments in the HWM design allow easy access to all bolting and removal of the complete pumping assembly, including mechanical seal, without removal of casing or driver.

**Raised Face Flanges** are to ASME B16.5, Class 300 for one-stage and Class 600 for two-stage models.



**WM Close Coupled OH5**



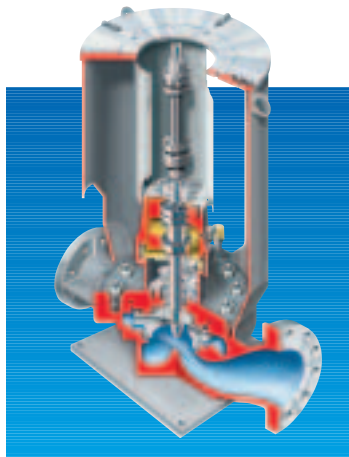
**Two-Stage Model WM2 Closed Coupled OH5**

**Options and Technical Data**

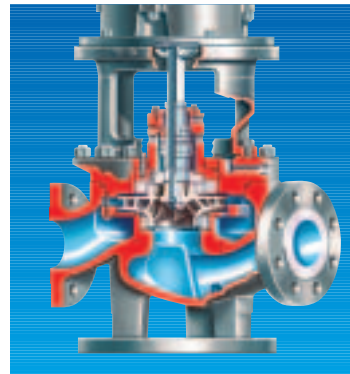
Flowserve offers vertical in-line pumps in all configurations and sizes to meet all service conditions, preferences and budgets. Each model is fully compliant with API 610, latest edition.

Options include customized hydraulics, using volute inserts/diffusers, radial blade impellers, inducers and double suction impellers.

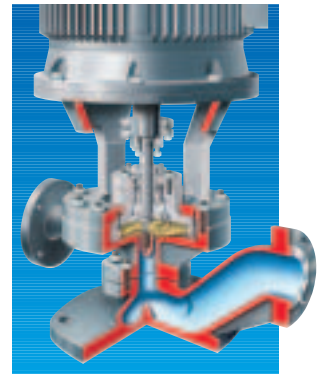
API Code	Design Type	Single Stage	Two Stage
<b>OH 3</b>	Flexible Coupled with Pump Bearing Housing	HWX	
	Flexible Coupled with Pump Bearing Housing, Low Flow Impeller, Volute Insert	HWM	HWM2
<b>OH 4</b>	Rigid Coupled Fixed Speed	W	
	Rigid Coupled Variable Speed Low Flow/High Head with VFD	MSP	MSP
	Rigid Coupled Double Suction Impeller	DSVP	
<b>OH 5</b>	Extended Motor Shaft with Low Flow Impeller, Volute Insert	WM	WM2
	Extended Motor Shaft Diffuser Casing	PVML	
<b>API 685</b>	Magnetic Drive with Diffuser Casing	PVML-MAG	



**Model HWX  
API OH3  
Flexible Coupled**

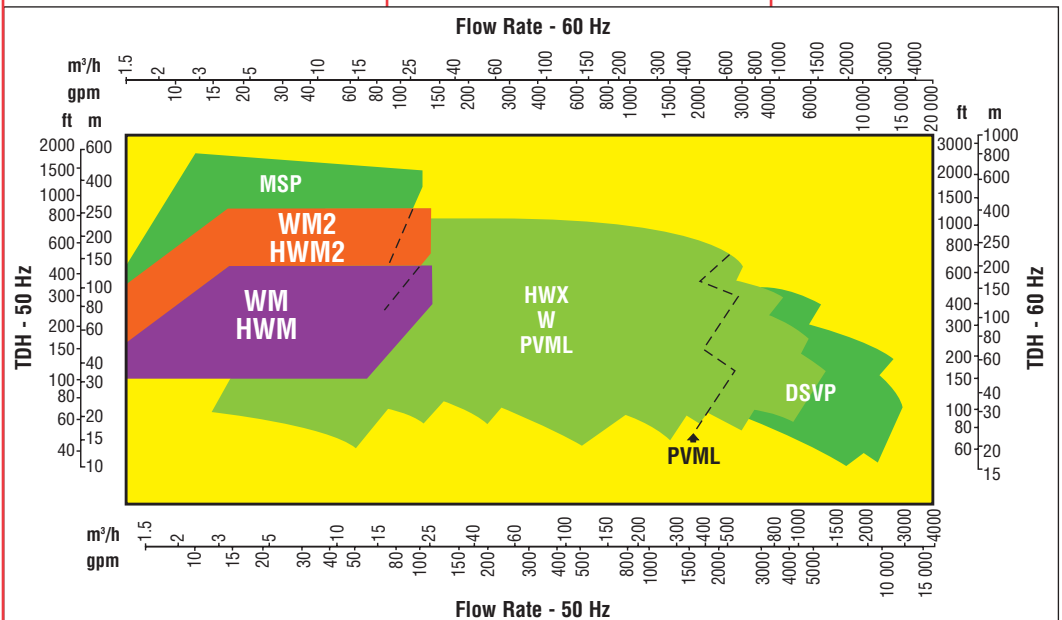


**Model PVML  
API OH5  
Extended Motor Shaft**



**Model MSP  
API OH4  
Rigid Coupled  
Variable Speed**

**WM-HWM Family Range Chart**

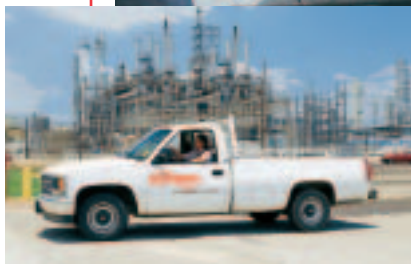
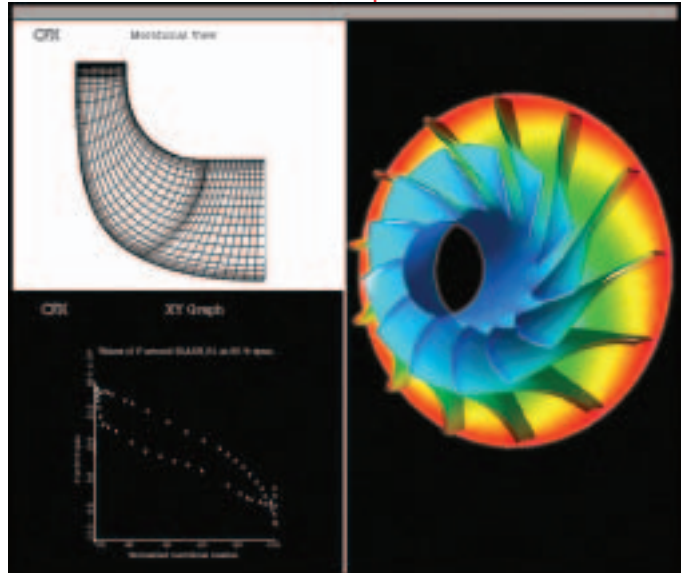
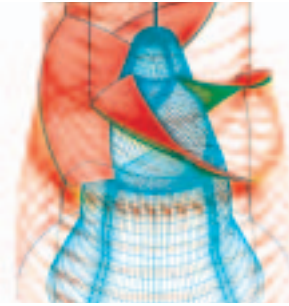


**Global Service and Technical Support**

**Advanced Technologies**

Few if any pump companies can match Flowserve's capabilities in hydraulic and mechanical design or in materials engineering. These capabilities include:

- Computational fluid dynamics
- Flow visualization
- Cavitation studies
- Efficiency optimization
- Finite element analysis
- Rapid prototyping
- Captive high nickel alloy and light reactive alloy foundries
- Non-metallic materials processing and manufacturing



**Service and Repair Group**

Flowserve's Service and Repair Group is dedicated to maximizing equipment performance and reliability-centered maintenance programs. Pump related services include:

- Startup and commissioning
- Diagnostics and prognostics
- Routine and repair maintenance
- ANSI and ISO power end exchange program
- Re-rates, upgrades and retrofits
- Spare parts inventory and management programs
- Training



**Pump Improvement Engineering Services**

Flowserve is committed to helping customers obtain the best possible return on their pump equipment investment. Engineering assistance and technological solutions for pumping problems are readily available.

These services include:

- Field performance testing
- Vibration analysis
- Design analysis and root-cause problem solving
- Material improvements
- Pump and system audit
- Advanced technology solutions
- PumpTrac™ remote pump monitoring and diagnostic services
- Instruction manual updates
- Training courses

**Flowserve... Supporting Our Customers  
With The World's Leading  
Pump Brands**



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**Pump Division**

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