



Integrated Solutions Group

## *Field Services*



## ***Global Service and Technical Support\****

The mission of Flowserve Field Services is to increase the availability and reliability of pumping systems – regardless of type or OEM – through expert on-site installation, maintenance and repair services. Field Services technicians provide customers with uncompromising service and support, wherever and whenever needed. A worldwide network of highly skilled technicians is available around the clock, seven days a week, to respond to customer needs, troubleshoot complicated problems and deliver reliable solutions.

## ***On-Site Services for the Total Equipment Life Cycle***

Unique in its world-class expertise in pumps, valves and mechanical seals, Flowserve is able to help customers manage the performance and cost of an entire fluid system – not just the pump. From full-service installation and commissioning services to field machining and scheduled maintenance, Field Services is dedicated to providing on-site support for all aspects of the equipment life cycle.

- Installation, start-up and removal
- Maintenance and repair services
  - Preventative and scheduled maintenance
  - Field machining
  - Repair welding
  - Piping system analysis
- Turnkey services
- Parts and components



## ***Strength of Experience***

Flowserve has long served industries requiring superior equipment performance and service life.

- Oil and gas – downstream, upstream and pipeline
- Chemical processing
- Power generation – fossil, nuclear and renewable
- Water resources
- Primary metals
- Mining
- Pulp and paper
- General industry



\* Some services may not be available at all global Flowserve locations. Please contact your local Flowserve representative to verify the services offered in your region.

## **Installation, Start-up and Removal**

Customers are under increasing pressure to complete projects cheaper, smarter and faster. Flowserve can provide the resources to manage even the most complex project from start to finish.

### **Installation and Start-up Services**

Installing and starting up rotating equipment can be problematic if careful attention is not paid to following the correct procedures. In fact, more pump failures occur at start-up than at any other time in the equipment life cycle.

To ensure new equipment yields the specified performance and provides long, reliable service, Flowserve Field Services teams adhere to the industry's most rigorous standards for installation and start-up. Whether for mission critical assets or for ancillary support systems, best practices are followed and all details are fastidiously managed.

- Foundation preparation and baseplate grouting
- Pipe and pump bolt-up, alignment and inspection
- Flush and lubrication system installation and testing
- Control systems and electronics function verification
- Pump and motor pre-rotation checks
- Laser alignment
- Safety inspections
- Start-up and operating procedure development



### **Push-Pull Services**

Removing an installed pump is no easy task. Maintaining equipment integrity without compromising personnel safety can be a hard balance to strike. With vast equipment knowledge and a large fleet of support vehicles, Flowserve Field Services is well fitted to handle equipment removal, dismantling and decontamination services while protecting plant personnel from physical and environmental hazards.

### **Baseplates and Grouting**

Industry statistics indicate about 60% of rotating equipment foundations are designed insufficiently or of sub-standard construction. A poorly designed foundation can lead to unreliable performance and reduced availability due to vibration, shaft misalignment or mechanical stresses.

Field Services technicians can help customers solve the most troublesome foundation issues through redesigns, rebuilds and repairs. Their particular expertise extends to solving problems related to baseplate mounting, leveling and grouting, including:

- Twisting
- Diaphragming
- Poor bonding and density of grout
- Coplanar flatness
- Soft foot conditions



## Maintenance and Repair

Flowserve Field Services technicians have the experience and capability to properly repair and maintain critical process equipment, regardless of type or OEM. Through Flowserve Field Services, customers have access to one of the largest on-site service and repair fleets in the industry, including fully equipped service vehicles, mobile machine shops and highly qualified field engineers and technicians. Customers can rely on Flowserve to provide the manpower, tools and expertise necessary to reduce their operating costs, optimize their equipment performance and improve safety.

## Preventative and Scheduled Maintenance

Strict adherence to maintenance and repair best practices extends mean time between repair (MTBR). Flowserve Field Services provide the expert on-site manpower and services needed to keep operations running smoothly and profitably. Common services include:

- Rebuilding or replacing mechanical seals
- Replenishing bearing grease or oil lubrication
- Replacing bearings
- Cleaning, resizing or replacing suction strainers
- Clearing discharge valves and bypass to prevent run-dry conditions
- Confirming piping loads are within specified limits
- Aligning shafts and inspecting foundations to eliminate sources of vibration
- Inspecting packing or mechanical seal integrity to protect against bearing contamination
- Replacing packing, O-rings, gland studs
- Inspecting for intermittent or prolonged off-design operating conditions



## Field Machining

It is often costly and impractical, if not impossible, to move complex, heavy or cumbersome machinery to an on-site plant maintenance facility for repair. And the logistical support required to transport it to an off-site repair center is even more formidable.

For these reasons, Flowserve Field Services has developed extensive field machining capabilities. Its network of highly skilled machinists, fleet of mobile machine shops and 24-hour emergency service provide customers with access to unparalleled machining capabilities when and where needed.

Capabilities include:

- Milling
- Stud drilling
- Flange facing
- Line boring
- Shaft keyways
- Seal face lapping





## Repair Welding

When wear, corrosion or system modifications necessitate weld repairs, customers rely on Flowserve Field Services. Skilled at numerous techniques and processes, Field Services welders are certified to all local standards as well as national and international standards such as ASME. On-site welding services include:

- Component repairs and modifications on impellers, discharge heads, casings and internal barrels
- Pump and motor pedestal modifications
- Baseplate frame modifications
- Lube system modifications

## Piping Services

As experienced, certified welders, Field Services technicians routinely install or modify piping. But, they are also adept at troubleshooting pipe strain problems. Excessive pipe strain does more than elevate noise levels, though. Induced vibration contributes to the early failure of bearings and seals and causes poor and unreliable pump performance. According to some estimates, 80% of chronic pump failures involve pipe strain. Field Services technicians can survey system connections to determine the source of strain and then develop and implement corrective action to eliminate it.



## Field Services Vehicle Fleet – Where the Rubber Meets the Road

Flowserve has invested heavily in service vehicles to ensure timely response to customers, regardless of location. Specially equipped with the right tools for any repair or maintenance task, these trucks help Flowserve Field Services technicians quickly and reliably perform state-of-the-art repairs to critical equipment. Downtime is minimized so plants are up and running as quickly as possible.

Flowserve has designed its Field Services vehicle fleet for flexibility and quick response:

- Class 1 trucks are equipped with medium duty tooling for emergency response on a moment's notice.
- Class 2 trucks are heavier duty with a full line of tooling for field service of both small and large process equipment.

Specialty trucks have been developed to meet the specific needs of these equipment types:

- Pipeline pumps
- Hydraulic decoking systems
- Ebullated catalyst bed reactor pumps
- Azimuthing thrusters

## ***Turnkey Maintenance***

With today's lean staffs, plants often do not have sufficient in-house resources to attend to the regular maintenance necessary to keep complex pumping systems operating at their best. Flowserve is uniquely positioned to deploy its technical experts, engineering tools and analytical resources to keep equipment operating at peak performance from cradle to grave.

From installation to decommissioning, Flowserve Field Services takes full responsibility for all major activities, including:

- Outage work scope development
- Integrated planning and scheduling
- Inventory inspections
- Procedure development
- Field machining, welding and craft labor
- Hot alignment
- In-service testing and dynamic balancing



## ***Parts and Components***

Quality OEM parts for the entire range of Flowserve products are readily available from a worldwide network of parts manufacturing centers, Quick Response Centers and regional parts service offices. Parts conform to the latest design standards and material specifications so customers are ensured reliable operation and lowest equipment ownership costs.

To contain equipment repair costs, Field Services technicians are available to provide on-site evaluations of existing parts and components. Through visual, dimensional and other non-destructive examinations, they can assist plant maintenance personnel in determining if parts can be repaired or if they need to be replaced.

## ***Contract Services***

To suit varying customer requirements, Flowserve Field Services is available on a project-by-project basis or by contract. Flowserve contract maintenance programs reduce total operating and maintenance expenses while optimizing critical manpower. Tailored to meet individual customer needs, Flowserve maintenance contracts enable customers to focus on their core production activities.

To learn more about Flowserve contract maintenance programs, contact your local Flowserve representative.

## Flowserve Technical Services

For issues requiring advanced engineering tools and technologies, Flowserve Field Services calls upon the expertise of Flowserve Technical Services group. Flowserve Technical Services aims to maximize operational performance and plant profitability. It accomplishes this through exhaustive system assessments, integrated engineering technologies and unmatched process know-how. A life cycle cost (LCC) approach is used to determine the optimum cost-effective solution.

### A Systems Approach

Technical Services recognizes that no pump operates in isolation. Rather, it is part of a system with myriad components, all with crucial roles in achieving optimal plant efficiency and availability. Thus, Technical Services employs a systems approach to define and implement successful pumping solutions that:

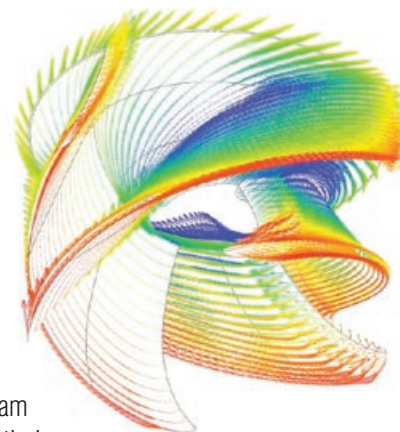
- Optimize pump system performance through hydraulic re-rates and upgrades
- Reduce energy usage and CO<sub>2</sub> emissions
- Solve vibration, pressure pulsation and noise problems for increased MTBR, reliability and availability
- Improve pump corrosion and erosion resistance
- Solve problems associated with changing process conditions, debottlenecking, etc.
- Reduce safety, health and environmental (SH&E) costs



### Unrivaled Technical Expertise

Flowserve Technical Services has the industry's largest multi-dimensional team of engineers and technicians with expertise across five key technology disciplines:

- Hydraulic design
- Vibro elastics
- Mechanical design
- Materials and welding
- Application and process knowledge



Equipped with state-of-the-art engineering tools and analytical resources, Flowserve leverages this team to provide solutions that optimize pump system performance, regardless of OEM or pump type. These combined capabilities make Technical Services particularly adept at conducting effective energy assessments, performance assessments (i.e., upgrades and re-rate projects) and reliability (bad actor) assessments such as root cause.



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