

*The objective of Flowserve Technical Services is to reduce the total life cycle costs of pumps operating in the oil and gas, chemical, power and water industries. It accomplishes this by proactively identifying and implementing pump and pump system modifications that significantly impact operational performance. These modifications improve pump reliability, increase plant availability, reduce energy usage and lower maintenance and environmental costs.*

### **Proactively Targeting Life Cycle Cost Reductions**

Backed by a worldwide network of more than 130 design and application engineers and boasting unrivaled technologies and capabilities, Flowserve Technical Services is focused exclusively on equipment life cycle cost reduction. But what makes Technical Services unique is its willingness to share in the risk and reward of its proposed solutions.

### **Metrics-Based Performance**

With operating expenses accounting for as much as 90% of a pump's total life cycle costs, it is critical to correctly calculate these costs to establish meaningful metrics and goals. Flowserve Technical Services has such confidence in its ability to identify life cycle cost savings that it is willing to base its compensation on performance-based contracts and programs. Technical Services and its customers jointly establish key performance indicators. Compensation is based upon attainment of these metric goals.



Customers can choose from several contracts types, all with metrics-based performance indicators:

- **Life Cycle Cost Performance Contract**  
A long-term contract wherein the economic justification is based upon life cycle cost calculations.
- **Life Cycle Cost Transactional Contract**  
Similar to a Performance Contract but shorter in term and more narrowly focused to address a specific problem.
- **Upgrade Programs and Retrofits**  
Equipment upgrades and retrofits offered as an ongoing program or on a case-by-case basis.



### **TECHNICAL SERVICES**

LifeCycle Advantage™

Educational Services

Consulting

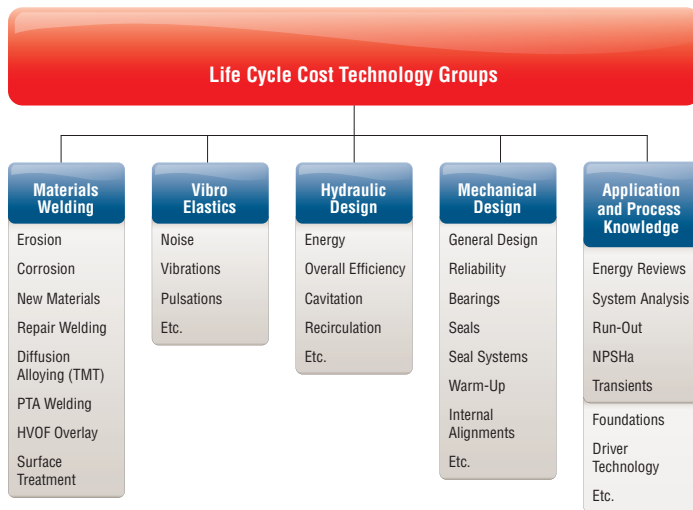
Technology Advantage™



**Identifying Life Cycle Costs Savings**

To identify life cycle cost reduction opportunities, Technical Services leverages a powerful battery of tools and a worldwide network of Flowserve design engineers with expertise in five technology groups:

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



**Energy Upgrades**

Of total equipment life cycle costs, pump energy usage is almost always the single largest cost category. As such, it offers the opportunity for significant and immediate cost reduction.

Technical Services' energy usage assessments include evaluations of hydraulic and mechanical design, driver and operating controls, auxiliary services and sealing systems. They are especially valuable in plants where process parameters have changed over time or where system degradation has occurred due to pump operation far from original design conditions.

**Performance Upgrades**

In many cases, pump upgrades and re-rates are attractive economic alternatives to new equipment. Technical Services has developed and implemented countless hydraulic, mechanical and metallurgical upgrades. These upgrades utilize advanced and proprietary design and diagnostic technologies to provide solutions that optimize performance.

**Re-Rate Results for Nine-Stage Barrel Pump in Hydrocracking Unit**

\$	RE-RATING	NEW PUMPS
CAPEX	1,750,000	4,900,000
OPEX		
Energy	23,842,350	25,154,850
Maintenance	900,000	+1,350,000
Inventory	+ 300,000	+ 550,000
LCC	26,792,350	31,954,850

**Reliability Upgrades**

Regardless of OEM or pump type, Technical Services personnel can diagnose the root cause(s) of pump failure and recommend solutions to improve reliability, reduce emissions and increase plant uptime. Among the programs offered are:

- API latest edition upgrade program which converts old process pumps to current API standards.
- ANSI and ISO power end exchange for quick, cost-effective replacement of worn power ends.

As many of these projects are deemed sensitive or even proprietary, Flowserve invites inquiries for confidential consultation.

**Turnkey Engineering**

The Technical Services team has engineered resources and capabilities to perform turnkey job engineering.

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**To find your local Flowserve representative:**

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