

**Reliability Program**

Typically, 90% of the total Life Cycle Cost (LCC) of a flow management system is accumulated after the equipment is purchased and installed. In today’s economy, process plants are focusing on lowering their total cost of ownership, but limited budgets usually equate to improvements being put on hold while lean operation exercises become more common.

Most plant challenges are related to persistent bad acting equipment in addition to operational issues such as high energy costs and availability losses. Finding the root causes of these issues and formulating a precise action plan to realize the available cost savings can be a difficult process.

The true value of the Reliability Program is our dedication as a reliability partner for the client. Flowserve reliability experts assess the current condition of a client’s rotating equipment, reliability program and knowledge base of their maintenance personnel, identify the gaps of each, train their personnel and implement the necessary improvements for instant reliability gains and reduction in overall LCC.

Flowserve condition-based monitoring methodology is founded on reliability-centered maintenance (RCM) and failure mode and effects analysis (FMEA) fundamentals, and managed by experienced reliability and rotating equipment engineers.

**Objectives**

- Complete a comprehensive assessment of equipment and its performance by gathering essential sensor data to evaluate where the equipment is operating compared to the design point
- Perform a sustainability, assessment of engineering, maintenance and operations along with reliability metrics benchmarking to evaluate the client’s current condition
- Create a tailored training plan that addresses resource competencies that require development
- Review the recommended equipment and system improvements and upgrades; launch the strategic implementation plan

**Value**

**Improve safety**

By ensuring industry best practices are in place, plants use a ‘Safety First’ approach committed to operating in a responsible manner that prevents accidents and protects the safety and health of employees, customers, the public and the environment.

**Improve efficiency of operations**

By evaluating the condition and performance of rotating equipment and establishing clearly defined operational procedures, plant equipment runs at its best efficiency point (BEP) and contributing to overall efficiency of operations.

**Reduce downtime and improve reliability**

By ensuring proper PM/PdM practices are in place, plant equipment availability is improved, which in turn leads to increased productivity and profit.

**Lower cost of ownership**

By improving equipment reliability, maintenance costs decrease and equipment life span increases, which results in a reduced total cost of ownership.

Flowserve performs Reliability Services for the following industries and on all the applicable machinery types listed below, regardless of the OEM:

**Industries served:** Chemical Processing • Oil & Gas • Power Generation • Refining • Mining

**Machinery types:**
- API 610 Pumps
- API 611 General Purpose Steam Turbines
- API 612 Special Purpose Steam Turbines
- API 614 Lubrication Shaft Sealing and Controlled Oil Systems
- API 675 Positive Displacement – Controlled Volume Pumps
- API 676 Positive Displacement – Rotary Pumps
- API 677 General Purpose Couplings
- API 682 Shaft Sealing Systems for Centrifugal and Rotary Pumps
- API 685 Sealless Pumps

Experience In Motion
### Reliability Services Offering Matrix

<table>
<thead>
<tr>
<th>Reliability Service Actions</th>
<th>Audit</th>
<th>Assessment</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment Database Data Collection</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Field Walk-down of Asset(s)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Progress Review Meeting</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Visual Observation Recommendations</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Vibration Data Collection</td>
<td>✓</td>
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<tr>
<td>Flow Measurements</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Failure History Review</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>FMEA Analysis</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Define Operating Control Limits (Operating Road Map)</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Pump Performance Test</td>
<td>✓</td>
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<tr>
<td>Energy/Reliability Review</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Preventative and Predictive Maintenance Program Reviews</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Gap Strategy Review (per Scope)</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Final Recommendations Report With Applicable ROI</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Sustainability Program and Training Recommendations</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Management (ERP/CMMS) Extraction and Flowstar Upload</td>
<td>✓</td>
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<tr>
<td>Industry Reliability Metrics Benchmarking Through Flowstar.net</td>
<td>✓</td>
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<tr>
<td>Implementation Plan Workshop</td>
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<td>✓</td>
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### Reliability Partnership

#### Flowserve
- Review equipment condition, system performance and failure history
  - Perform visual audit, noting corrective actions to be taken concerning the equipment and system auxiliaries
  - Collect incomplete equipment data
  - Perform equipment performance testing
- Perform an FMEA for targeted equipment population
- Review PM/PdM programs
- Supply a detailed report, including:
  - Opportunities to improve equipment condition and performance
  - Gaps in existing PM/PdM programs
  - Solutions for chronically problematic equipment and systems using Return on Investment (ROI) projections
- Data management (ERP/CMMS) extraction
  - Flowstar equipment and repair history upload
  - Reliability reporting through Flowstar.net
- Sustainability program and training recommendations
  - Recommend the specific training courses to support sustainability development by utilizing Flowserv Learning Resource Centers
- Implementation workshop
  - Review equipment upgrade and re-rate proposals
  - Deliver strategic plan for implementation of recommendations
  - Provide IPS Wireless Monitoring support when applicable

#### Customer
- Supply Flowserv access to available detailed information to review and understand current equipment performance (failure history, P&IDs, IOMs, data sheets, pump curves, start-up/shutdown procedures, etc.)
- Support with appropriate permits and access to site equipment
- Make necessary changes to equipment and system for performance testing, including; insulation removal, operation of pump at different points, installation of gauges and scaffolding
- Provide Flowserv access to cost details in order to calculate Return on Investment analysis

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**To find your local Flowserve representative:**

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**flowserv.com**