16th STS-AIChE Southwest Process Technology Conference

- Various Approaches for Identifying Energy Efficiency Opportunities in Pumping Systems
- Bryan White, Tyler Thomas
- Flowserve – Energy Advantage Program

Sept 22-23, 2025, University of Houston

Speaker Bios

Bryan White is a Field Engineer for Energy Advantage at Flowserve Corporation in Houston, Tx. He has 10 years of experience in designing pumping systems and creating pumping system solutions through data driven flow loop analysis. Bryan received his Bachelor of Science in Mechanical Engineering from Lafayette College, in Easton, Pennsylvania.

Tyler Thomas is a Field Engineer for Energy Advantage at Flowserve Corporation in Houston, Tx. He has 10 years of experience in creating pumping system solutions through field hydraulic and vibration troubleshooting analysis of pumps and pumping systems. Tyler received his Bachelor of Science in Mechanical Engineering from West Texas A&M University.

Overview - Industry Challenge

Today's industry challenge is to keep the focus on these basics while, committing to ambitious GHG reduction plans.

- To ensure safe plant operation

- To increase plant uptime/output

- To increase plant reliability

- While meeting quality standards

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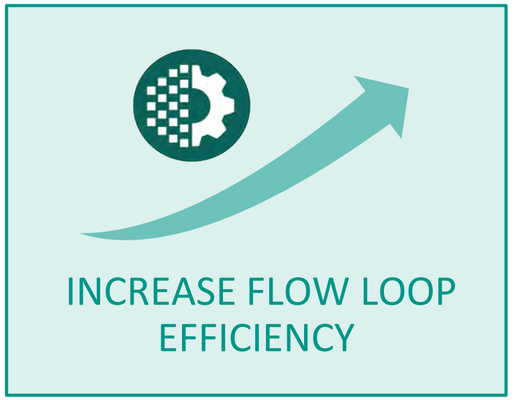
Overview – Short Term Solutions

FLOWSERVE ENERGY ADVANTAGE PROGRAM
DECARBONIZE BY DESIGN

Increase efficiency of current operation



- Proven technology
- Prevent carbon emissions
- Reduce cost effectively
- Prepare your current operation for the long-term future

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- Power Recovery Devices
- Cooling Water Optimization
- OH1 Efficiency Scan
- Digital Twin Modeling

Overview – Energy Advantage Program

FLOWSERVE ENERGY ADVANTAGE PROGRAM
DECARBONIZE BY DESIGN

Operational Efficiency

Efficiency gains and significant operational savings from optimization of pump and valve energy consumption

Carbon Reduction

Reduce environmental impact and achieve sustainability goals by minimizing emissions and carbon footprint

Cost Advantage

Optimize operational expenses by increasing equipment reliability and reducing maintenance spend

Overview – Why Are There Savings Opportunities?

Many of these systems are operated inefficiently because of:

- Conservatism in design phase
- Changes in duty condition

} DESIGN

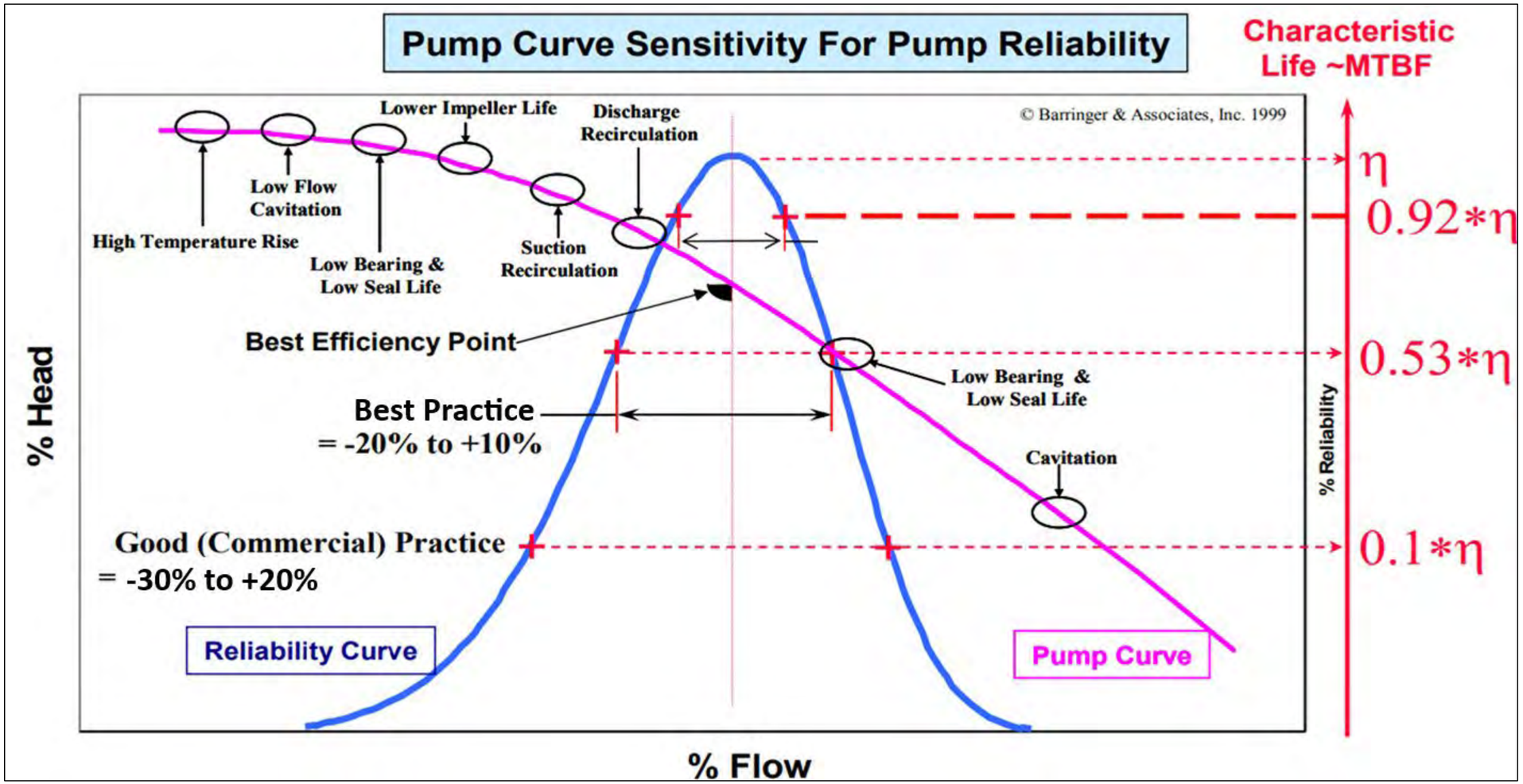
- Inefficient means of flow control
- Inefficient operation of assets

} OPERATION

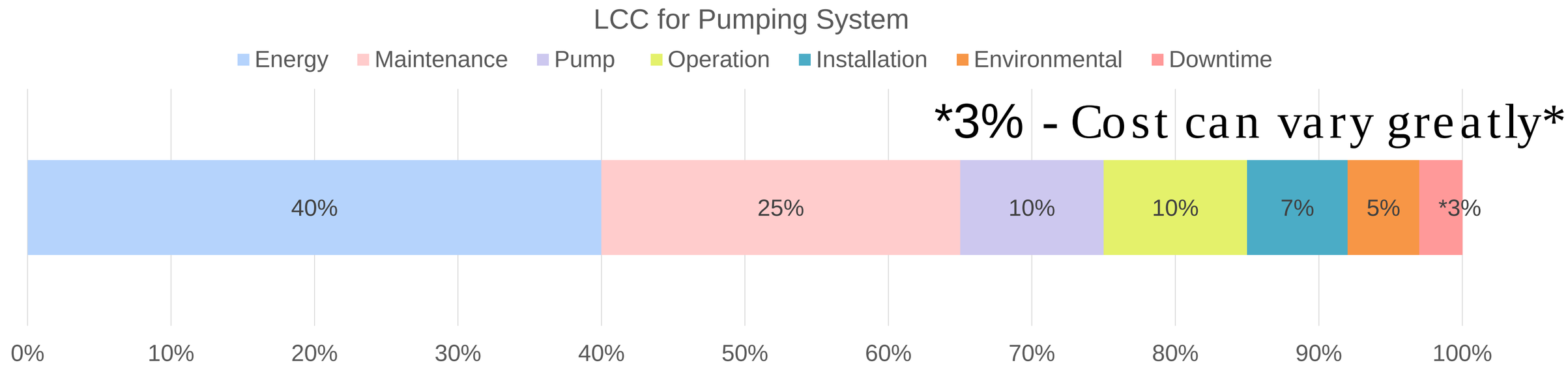
- Wear of flow control equipment

} MAINTENANCE

Technical Risk



Commercial Risk



3% - Cost can vary greatly

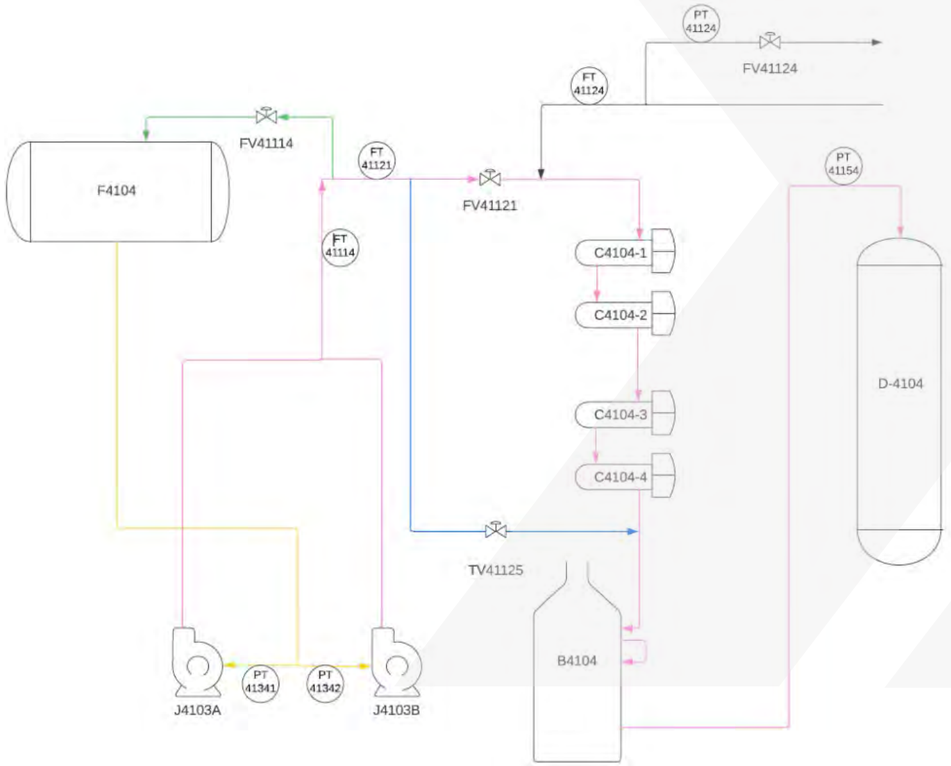
$$Average\ Annual\ Operating\ Cost = (BHP)\left(\frac{.7457\ kW}{1\ hp}\right)(Operating\ Hours)(Electricity\ Cost)$$

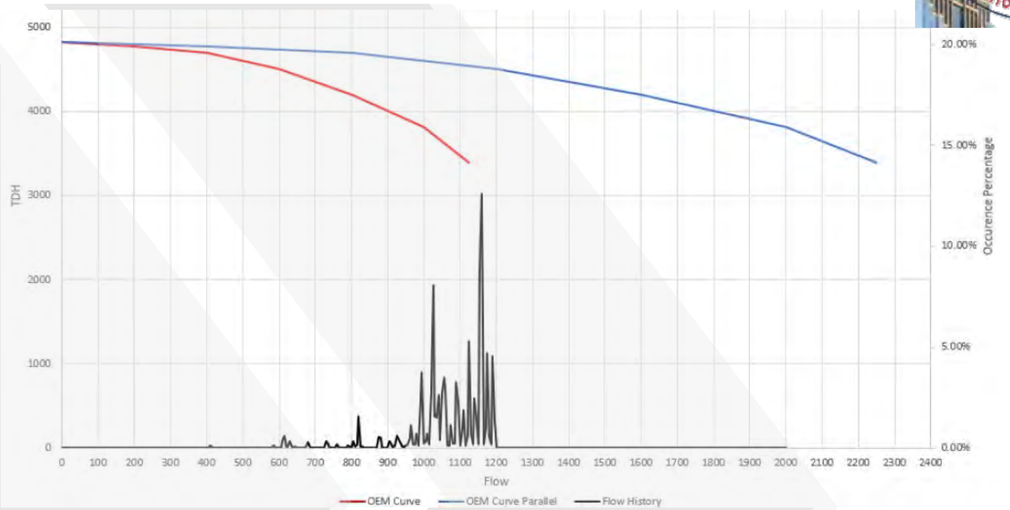
$$BHP = \left(\frac{Q\ x\ TDH\ x\ S.G.}{3960\ x\ Pump_{Eff}\ x\ Motor_{Eff}}\right)$$

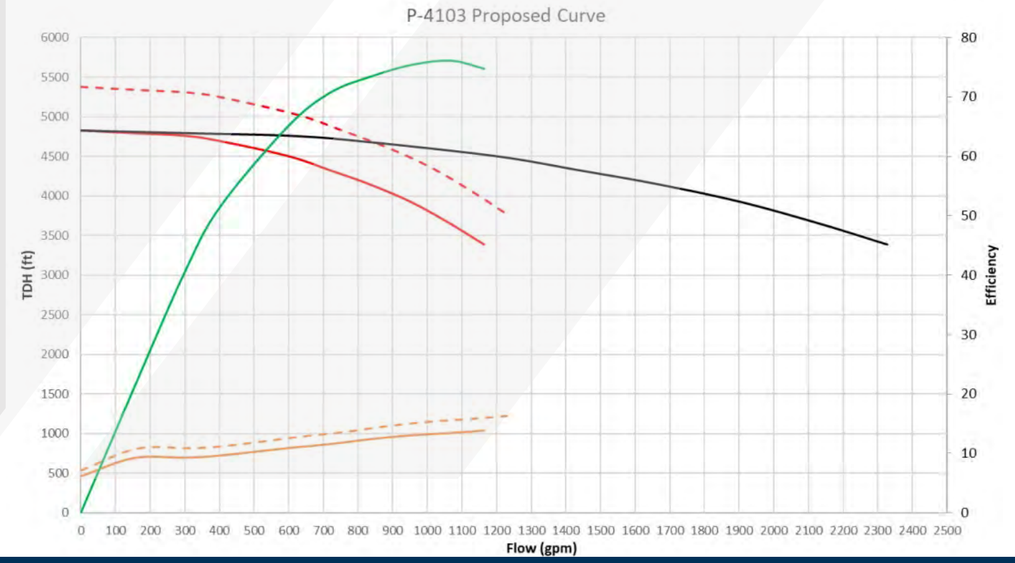
Case Study

Removing Parallel Pumping

- Pumps run in parallel due to end-of-curve operation
- Solution: Upgraded pump hydraulic and valve replacement



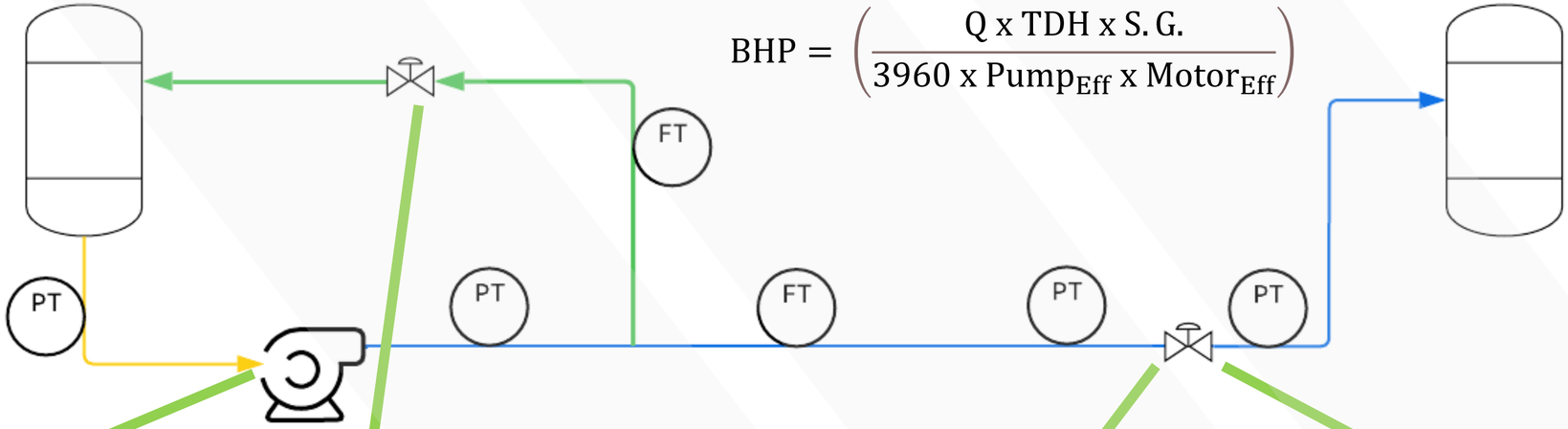


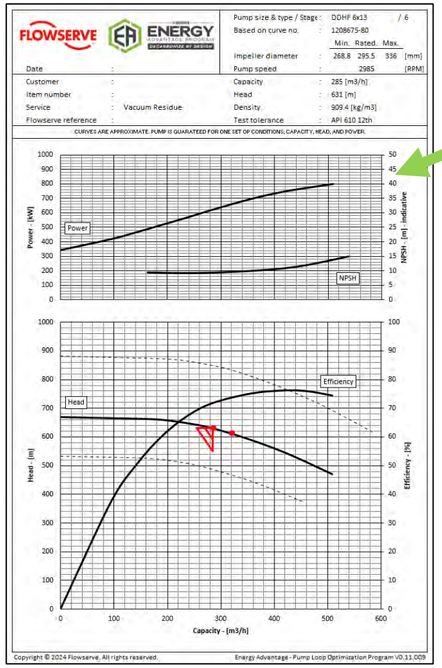


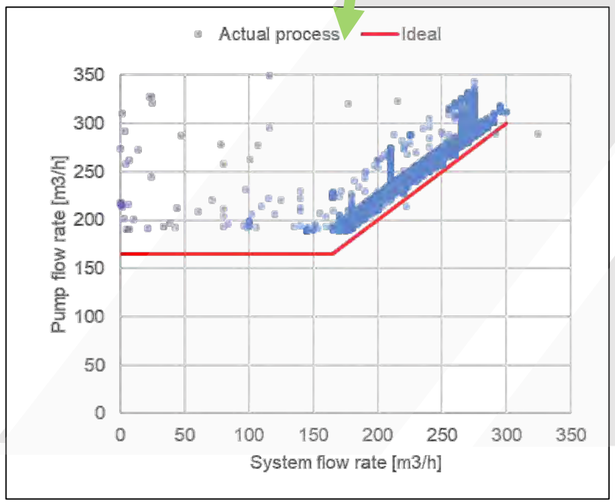
Model Development

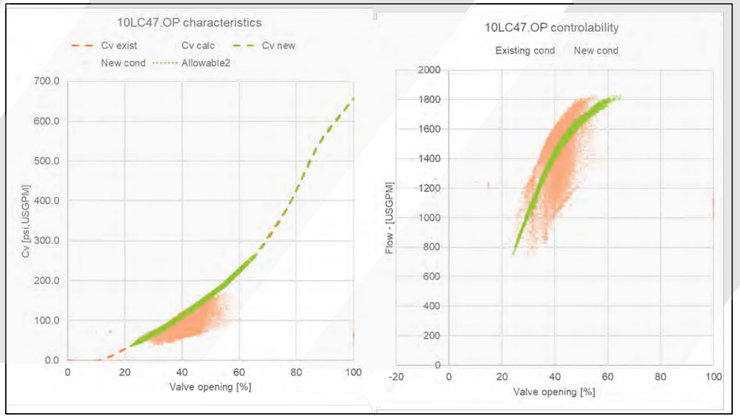
INCREASE FLOW LOOP EFFICIENCY

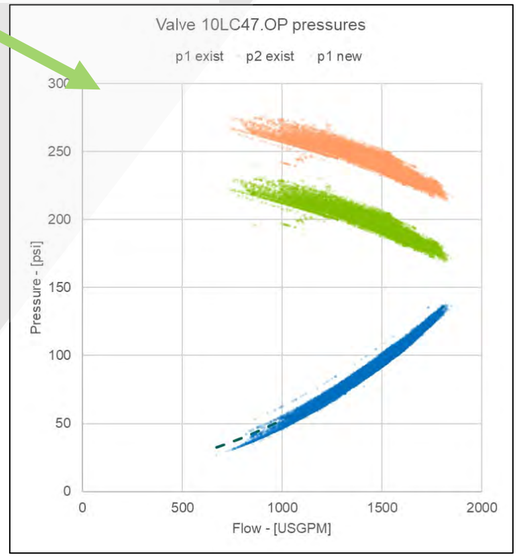
$$BHP = \left(\frac{Q \times TDH \times S.G.}{3960 \times Pump_{Eff} \times Motor_{Eff}} \right)$$





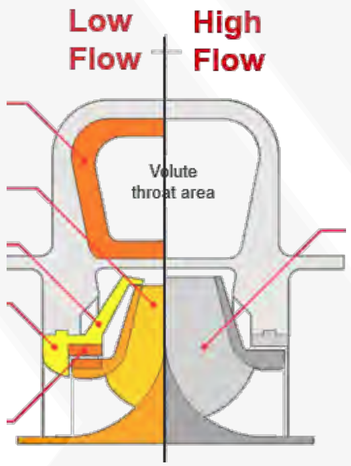


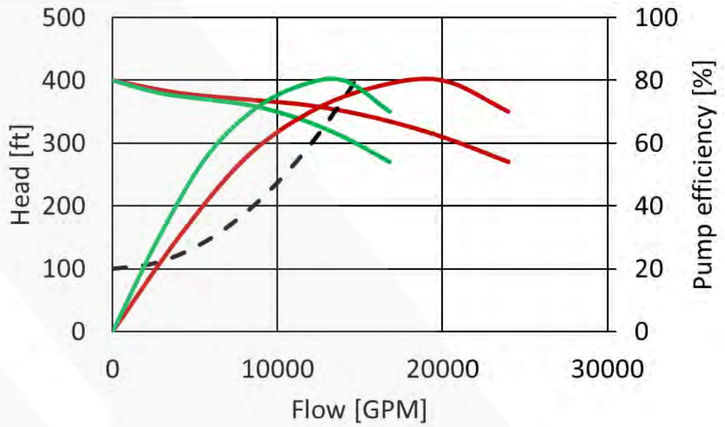


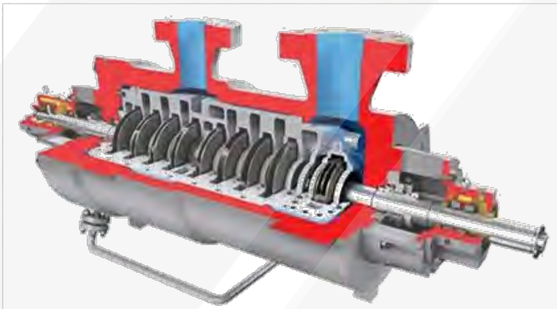


Upgrade Toolkit

- Optimize **BEP** and head
  - Trims
  - De-staging
  - Rerate pumps
  - Tailored replacement pumps
- Optimize **efficiency**
  - Maximize peak efficiency
  - Reduced clearances
  - High efficiency hydraulics
- Optimize drivetrain
- Valve modifications







Assessment - Process

Candidacy Review
Evaluate suitability for optimization

Feasibility Review
Assess viability of optimization strategies

Condition of Service Review
Evaluate current service conditions

Final Review with Site
Present findings and recommendations

Collect Asset Information
Gather essential data for analysis

P&ID Review
Examine process and instrumentation diagrams

System Analysis and Modeling
Acquire data and develop system models

Solution Development and Report
Develop and document optimization solutions

Assessment – What's a good Candidate?

Any existing re-rate opportunities

The higher the hp rating the more potential for saving ~150hp+

Parallel Pumpers designed to be single pumpers

Loops where valves operate below 50% open on average

Process units that are oversized or have been derated

Old process loops where conditions of service have changed over the years

Low pressure ultimate users (e.g. vacuum towers, flash columns, etc)

Pumps with VFDs that are just used for slow-rolling or soft starts

Assessment – Typical Milestones

Data Gather

Modeling

Optimization

New CoS

Pump / valve selections

Report

	KO	Loop Selection		Data Gathering				Analysis		COS Review		Mod. Scope & Cost			ROI	Report
Project week no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Assessment - Project Objective

Project Deliverable

Comprehensive report analyzing promising pump control loops which includes: energy saving potential, ROI and scope of modifications (Pump/Valve/Seals).

Let's Connect!

Flowserve I&T Solutions Group

- Stop by booth #*** today and tomorrow!

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