Pumps and Piping; Design, Performance and Commissioning Issues

Introduction

Presented By:
David Sellers
Senior Engineer, Facility Dynamics Engineering

Class Material Location

The slides and other supporting information for the class can be found at:

- https://www.av8rdas.com/pacific-energy-center-design-performance-and-commissioning-issues-classes.html#Current
- They will be there until the next class, at which time they will be relocated to a location further down the page

Additional information can be found on our commissioning resources web site

- www.Av8rDAS.com

About using my spreadsheets and other resources:

- They are my tools vs. tools I developed to be used by others
- Use at your own risk; I provide them as a resource for you to use as a starting point
- You still need to understand how it works and fix it if it doesn't work for you

Disclaimer

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Learning Objectives

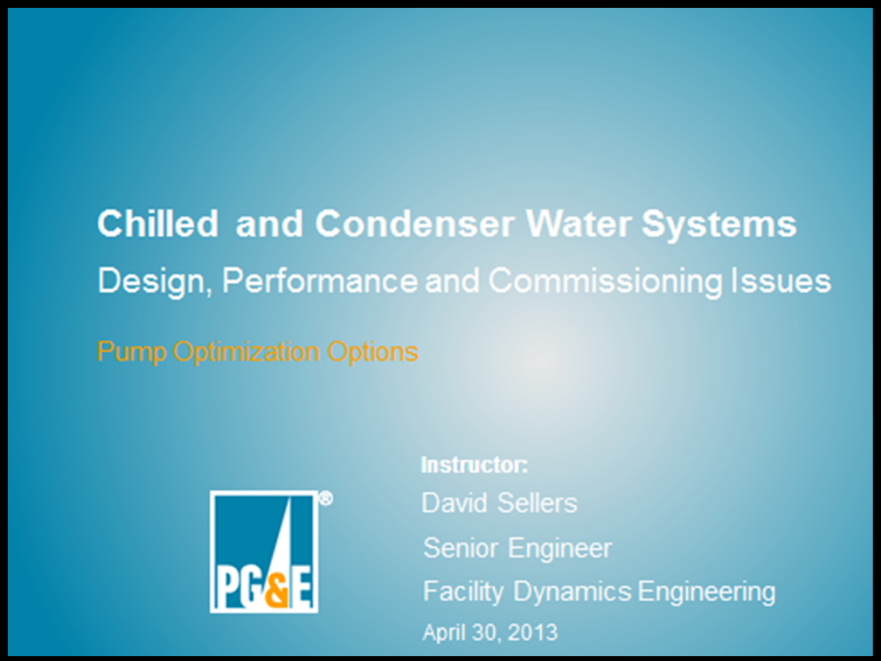
After completing this course you should be able to:

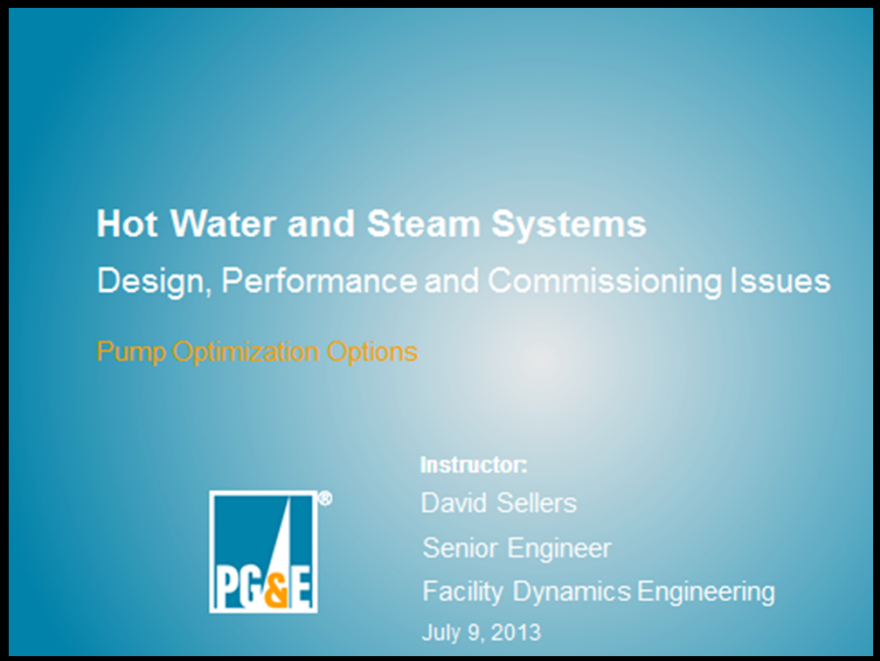
1. Recognize that pumps and pumping systems frequently represent low hanging fruit in terms of opportunities to improve performance and efficiency
2. Understand how pumps work
3. Understand how pumps interact with the systems they serve
4. Understand a number of methods for optimizing a pump to the system it serves and recognize that pump optimization is not a “one size fits all” situation
5. Have a basic understanding of the steps required to commission pumps and the piping networks associated with them

Agenda

- Ryan's Introduction
- Introduction
- Pump Basics
- Pump Curves, System Curves, Pump Tests
- Interactive exercises

This Class Sets Up Other Classes






Cuisinart
4:40
Cuisinart
"Nice to meet you.
Can I see your pumps?"

The future is not in plastics, my boy, the future is in construction.

Dr. Joseph Lstiburek

The future is not in plastics, my boy, the future is in construction. Actually, the future is in fixing construction.

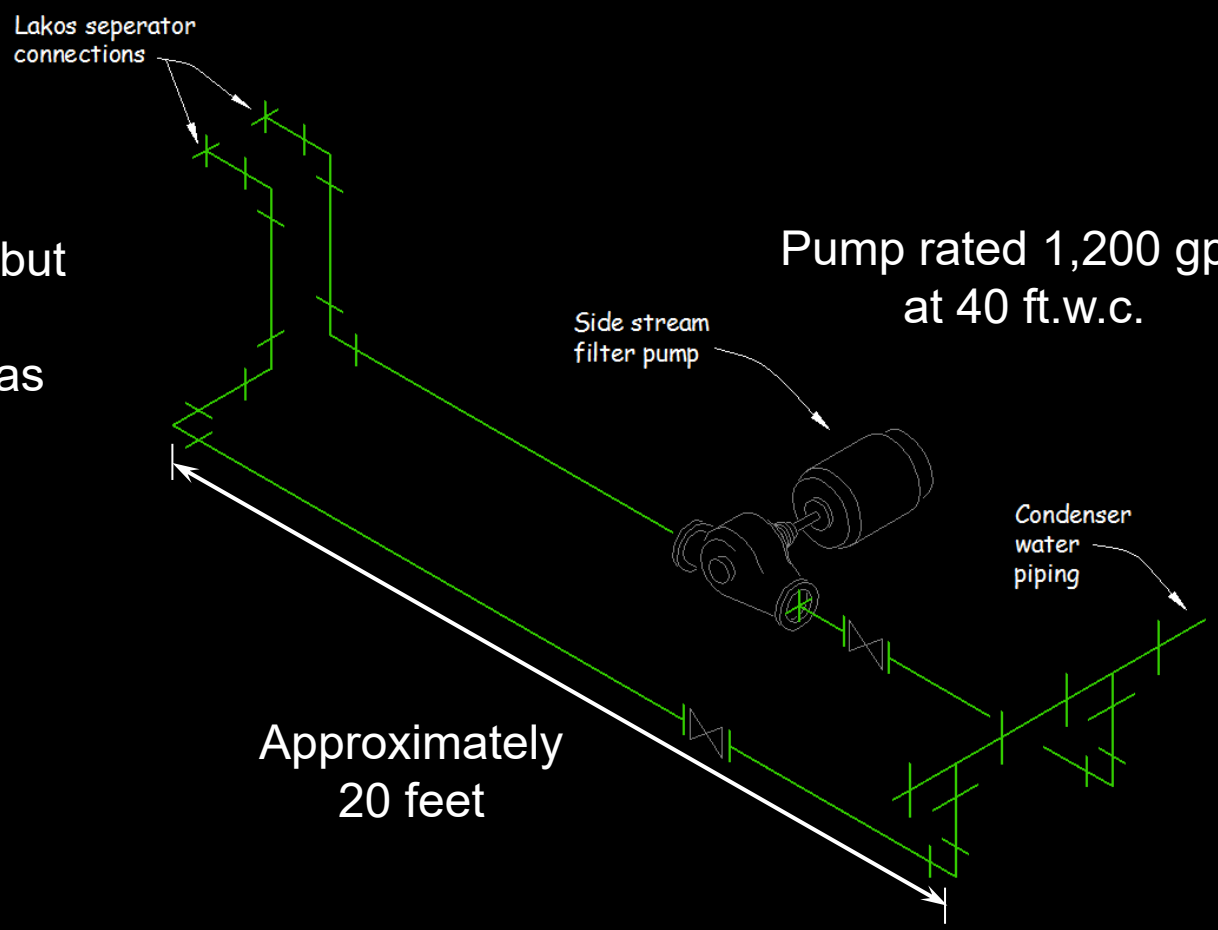
Dr. Joseph Lstiburek

Based on a manufacture's survey, 60% of all pumps are improperly applied. Of those 60%, 90% are not specified for the proper operating point.

Pump Systems Matter Initiative

A Common Commissioning Finding

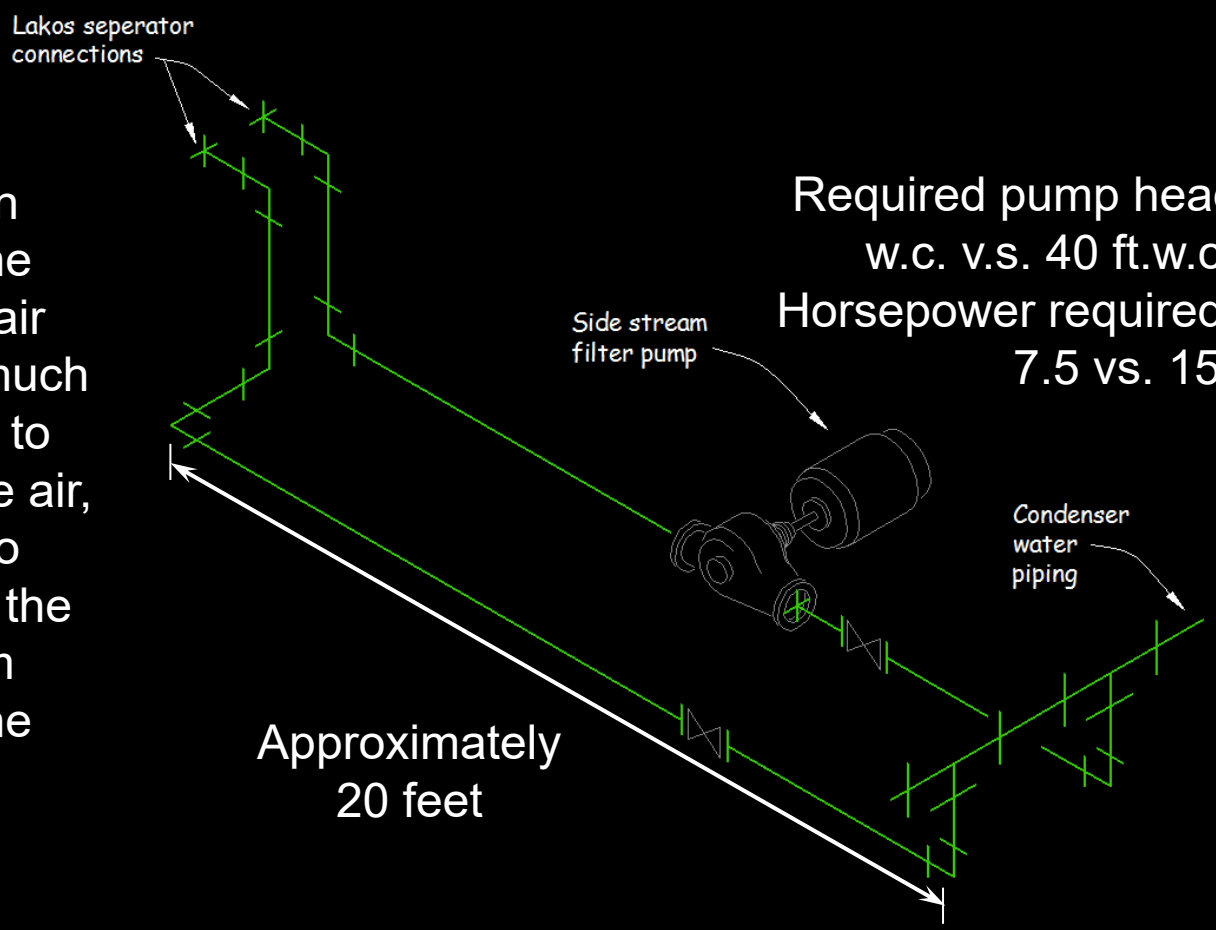
The pump operated 24/7 but the filtration requirement was seasonal



Pump rated 1,200 gpm at 40 ft.w.c.

A Common Commissioning Finding

The Oregon climate in the winter is an air washer. Not much for the tower to wash out of the air, therefore no reason to run the side stream system in the winter.



Required pump head was 11 ft. w.c. v.s. 40 ft.w.c. rating; Horsepower required = less than 7.5 vs. 15.

The Good News:

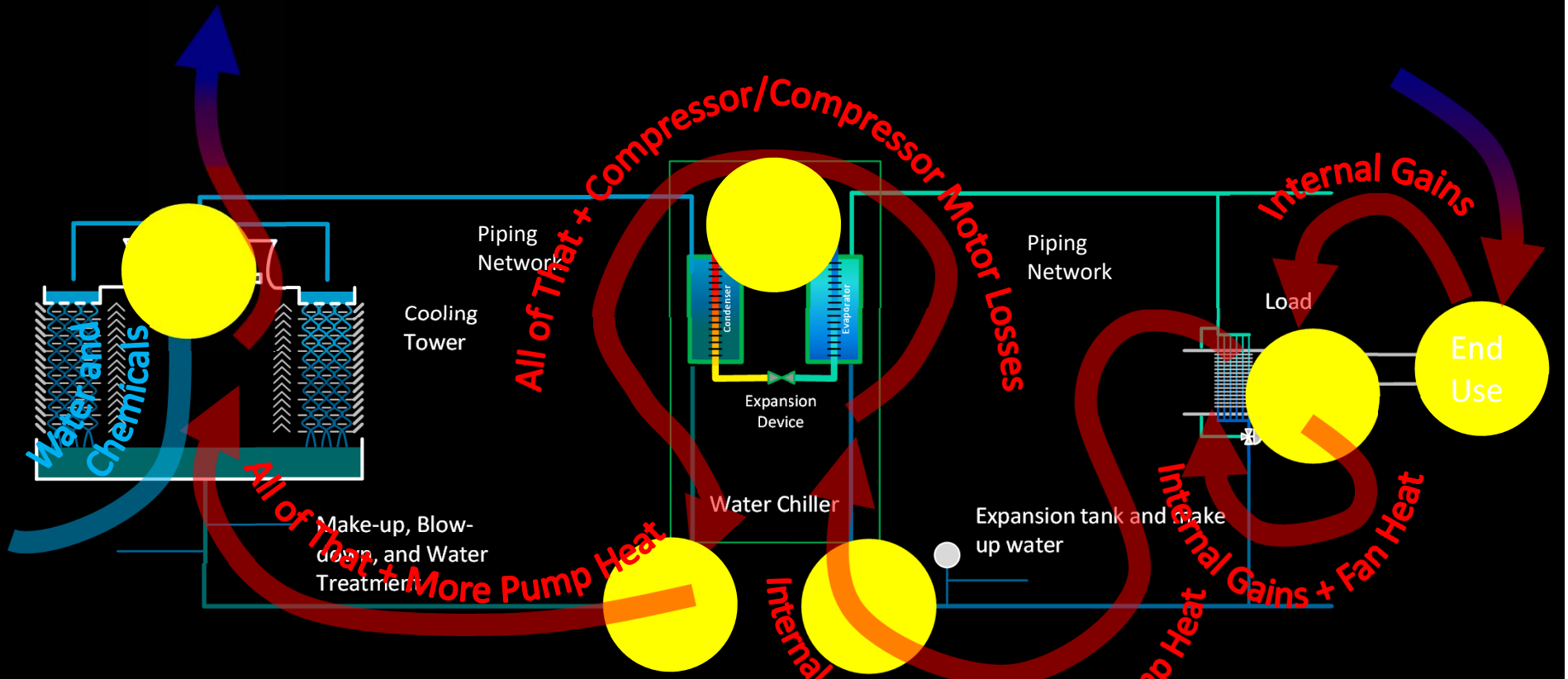
- Low cost/No cost adjustments:
  - Reduced pump head and flow
  - Reduced operating hours
  - Saved $3,600 annually in electricity

Savings based on $0.10 per kWh electrical costs

The Bad News:

- These benefits and others could have been realized by right sizing during design
  - Adjusted operating point not at peak efficiency point
  - Equipment larger than required by the load
    - Less than optimal match to the real requirements
    - First cost penalty

The Savings Ripple Out Beyond the Pump



The Savings Ripple Out Beyond the Plant