

LISTEN.  
THINK.  
SOLVE.®

## Pump Optimization using FactoryTalk VantagePoint Plug-in

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Grantek Systems Integration Inc.

# Agenda

- Session introduction
- Grantek intro
- Brief overview of FactoryTalk VantagePoint
- Pump optimization
  - Benefits
  - How to get them
  - Where do I start
- How do we do it ?
- Conclusions



# Session Introduction

## Introduction

- Energy savings are very topical
- Rockwell's FTVP and Grantek's Pump Optimization plug-in module
  - Quickly benchmark how optimized your pumping assets are
  - Benefit from continuous optimization
  - Reports through FTVP
  - Once installed, reports are accessible in FTVP.
  - Samples of real-time reports and trends



# Granttek Systems Integration Inc.

- Manufacturing automation and information integration since 1980
  - ~130 employees
- Locations:
  - Chicago IL
  - Allentown PA
  - Moline IL
  - Jacksonville FL
  - Burlington ON Canada
  - Barrie ON Canada
  - Montreal QC Canada



Process

Control

Information

Enterprise

# Grantek Systems Integration Inc.

## Background

- Focus on the manufacturing automation space, specializing in food/bev processing, pharmaceutical, and CPG
- Expanding our Business Intelligence practice; helping decision makers access and extract value from their operational data
- Water / Wastewater industry is one key practice area



# Granttek AF Booth

- **Visit us at RA booth # 5 - Information Software**
  - See how we integrate FTVantagePoint, SAP Mii & SharePoint to display real-time financial data
  - Visualize production, performance and other actionable data.



# Pump Optimization

- Real-time and historical analysis of pumping systems
- Extends FTVantagePoint's base functionalities, providing value-added capabilities that leverage underlying Operational Intelligence
- Assess /analyze /visualize performance of your Pumping System assets.



# Pump Optimization

- Grantek and Rockwell FTVP
  - Plug-in to FTVP – genesis is DOE/PSAT
  - Continuous calculations
  - Historize results
  - Any FTVP user can access via portal
  - Reporting/workflow inherent



*FactoryTalk*<sup>®</sup> VantagePoint

# Pump Optimization

## Sample Pump #15

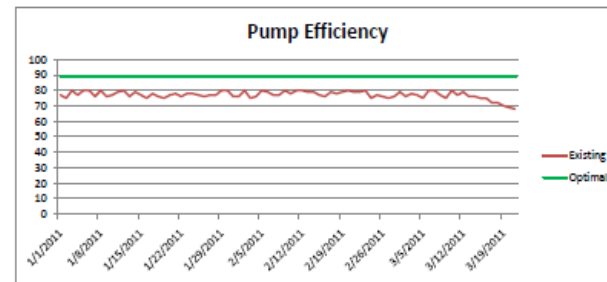
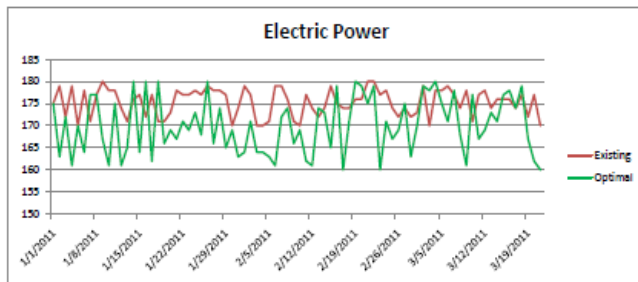
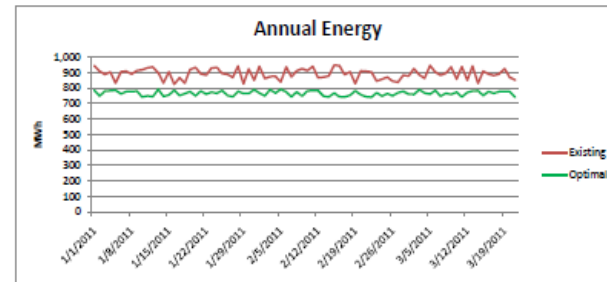
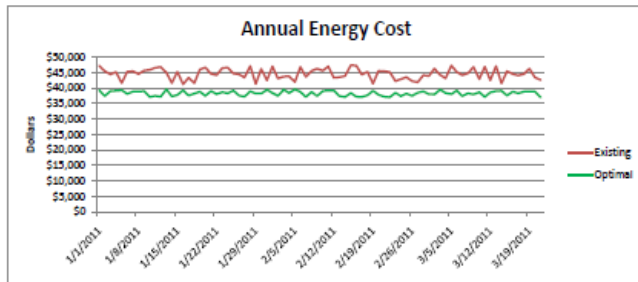
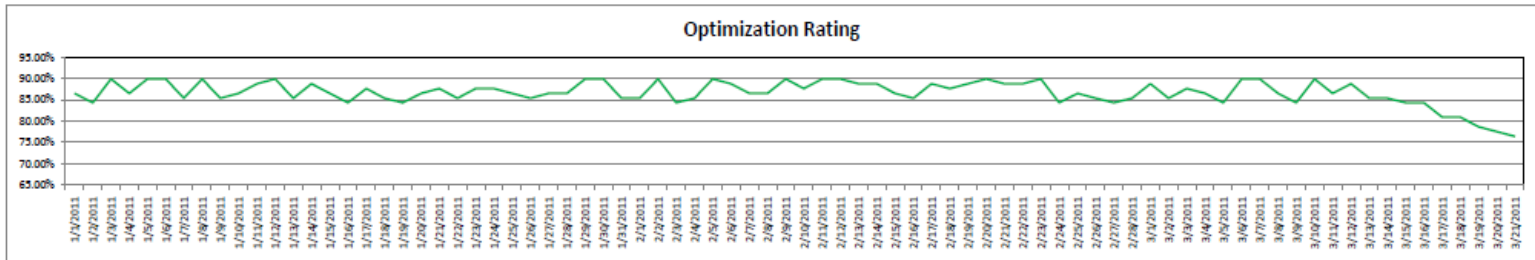
Niagra Region/District 2/South Street Plant/Low Lift Works/Pumps/Sample Pump #15

## Historical View

### History

January 1st 2011 - March 21 2011

### Summary



# Optimization Possibilities

- Efficiency testing and analysis indicate that a 300-horsepower centrifugal pump has an operating efficiency of 55%.
- Pump curve indicates that it should operate at 78% efficiency.
- The pump draws 235 kW and operates 6,000 hours per year.
- Assuming that the pump can be restored to its original or design performance conditions, estimated energy savings are as follows:
- Savings =  $235 \text{ kW} \times 6,000 \text{ hrs/yr} \times [1 - (0.55/0.78)] = 415,769 \text{ kWh/yr}$ .

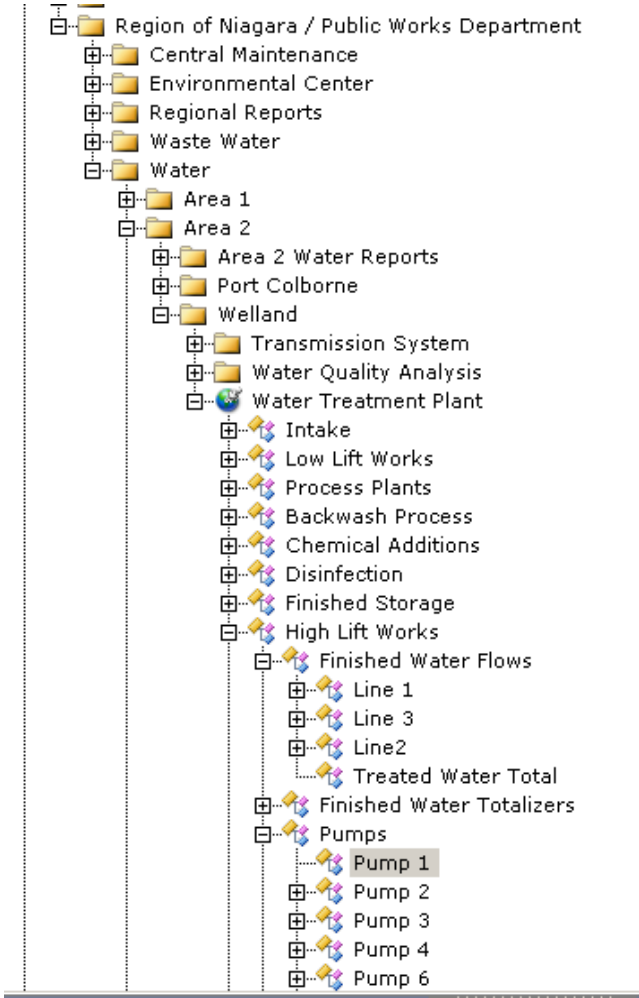
At an energy cost of 8 ¢ per kWh, the estimated savings would be **\$33,261** annually.

# FactoryTalk VantagePoint

- What is FTVP ?
  - FactoryTalk VantagePoint is an integration platform
  - access to all manufacturing/plant data sources
  - web-based reports, dashboards, trends, X-Y plots
  - combines current and legacy systems
  - virtual data source for plant-wide reporting and information visibility
  - excels at combining and correlating data from all data sources
  - Yellow pages for your data !

*FactoryTalk*<sup>®</sup> VantagePoint

# FTVP Logical Model



# FTVP Trending

Home Reports Tools Help

 **FactoryTalk** VantagePoint

Portal > Reports > MyEnterprise

Report Name:  [Refresh](#)

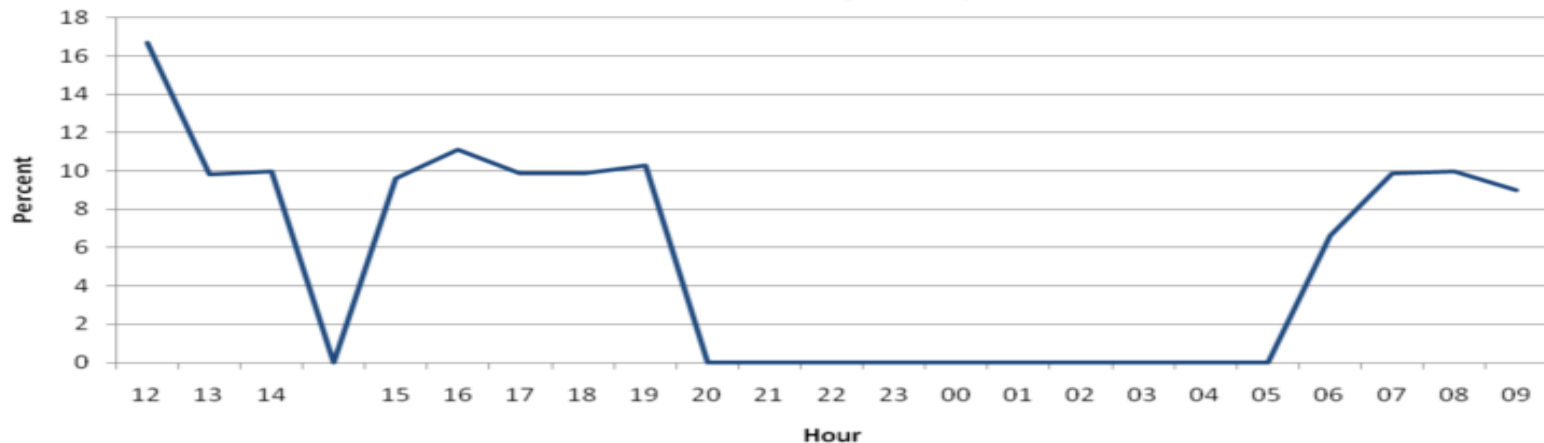
Quality Report For: 11Cap  
My Company.Site A.Filling\_A.Line 1

Current Shift

Report Generated: 2010-12-23 09:10:55

[Drill To Dashboard WorkCell](#)

### Last 24 Hours Scrap % by Hour



Part Id	Total Parts	Good Parts	Scrap Parts	Scrap Parts %
128 oz	349	314	35	10.03%
328 oz	249	225	24	9.64%

<< >> Quality

# The Challenge

- Pumping intensive businesses
  - Energy cost control
  - Window in to consumption
  - Sustainability
  - Capital preservation



# FactoryTalk VantagePoint

- Objective
  - Integrate Pump Analysis capability into the Client's BI tool
  - Canned reporting for Optimization snapshot and history
  - Pump efficiency and related measurements look and can be treated just like any other property for analysis and reporting purposes
  - Current value / point in time value
  - Historical value and trending over time
  - Comparison or correlation with other properties or pumps
  - Cost of operation calculated over rate changes or time of day rate variances etc

*FactoryTalk*<sup>®</sup> VantagePoint

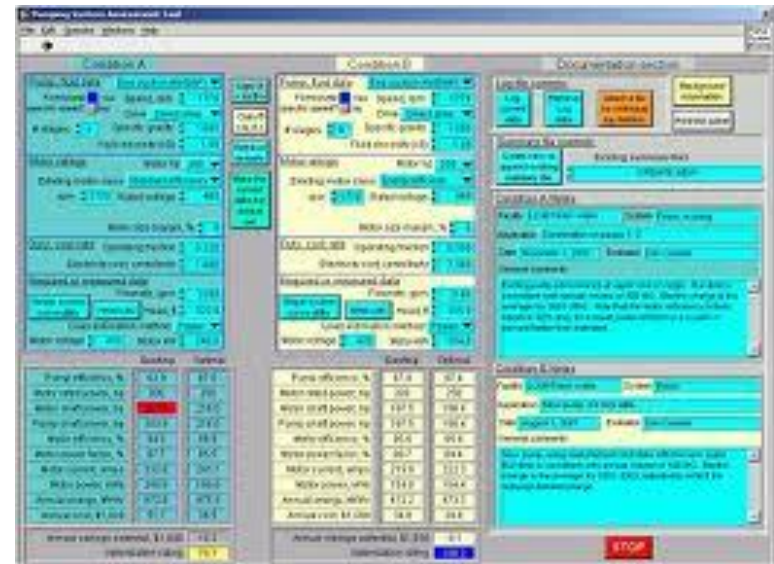
# FTVP Pump Optimization

- Real-Time and historical analysis of pumping systems
- Extends FTVantagePoint's base functionalities, providing value-added capabilities that leverage underlying Operational Intelligence
- allows users to assess /analyze performance of their Pumping System assets.
  
- The plug-in
  - Calculates current energy consumption and cost
  - Derives an Optimization Rating
  - Potential energy and cost savings based on comparison of performance versus typical characteristics of commercially available pump and motor combinations for the same application.

*FactoryTalk*<sup>®</sup> VantagePoint

# Pump Optimization

- PSAT tool
  - DOE's Industrial Technologies Program
  - Point in time calculation
  - Complicated, manually run every time
  - Consultant uses this tool and charges you



# Pump Optimization

- Consultant vs FTVP Plug-in
  - Consultant provides a current snapshot
  - Snapshot = no history, point in time calculation
  - Snapshot = no seasonal interpretation or correction
  - Snapshot = no correlation capabilities



*FactoryTalk*<sup>®</sup> VantagePoint

# Optimization Example

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At an energy cost of 8 ¢ per kWh, the estimated savings would be **\$33,261** annually.

# The Challenge

- Energy consumption facts
  - > 60% of industrial motor systems involve fluid handling
  - Life cycle costs of 250 HP pump and motor
    - \$ 28,000 initial cost plus ~ \$ 5,000/yr maintenance
    - First year energy cost ~ \$ 69,000
    - TCO for 10 years + **\$ 778,000**
  - Likely only a few pumps account for most energy consumption
  - Help manage demand costs



# FTVP Plug-in

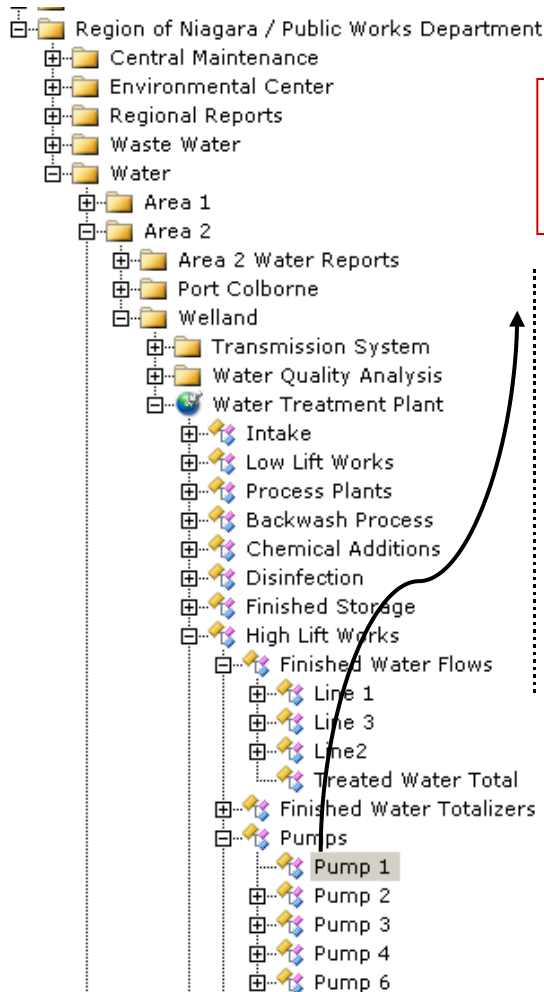
## Grantek's Pump Assessment tool

- plug-in for FTVP using industry standard calculations – DOE/PSAT
- assess the efficiency of pumping system(s)
- calculate potential energy and associated cost savings
  - pump performance data
  - Hydraulic Institute standards
  - motor performance data from the MotorMaster+ database

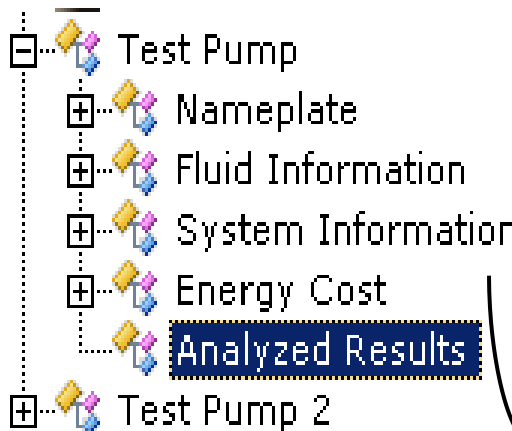


# Logical Model for Pump Optimization

## Logical model



Definition of 'Pump' updated to also carry PSAT and Efficiency related properties

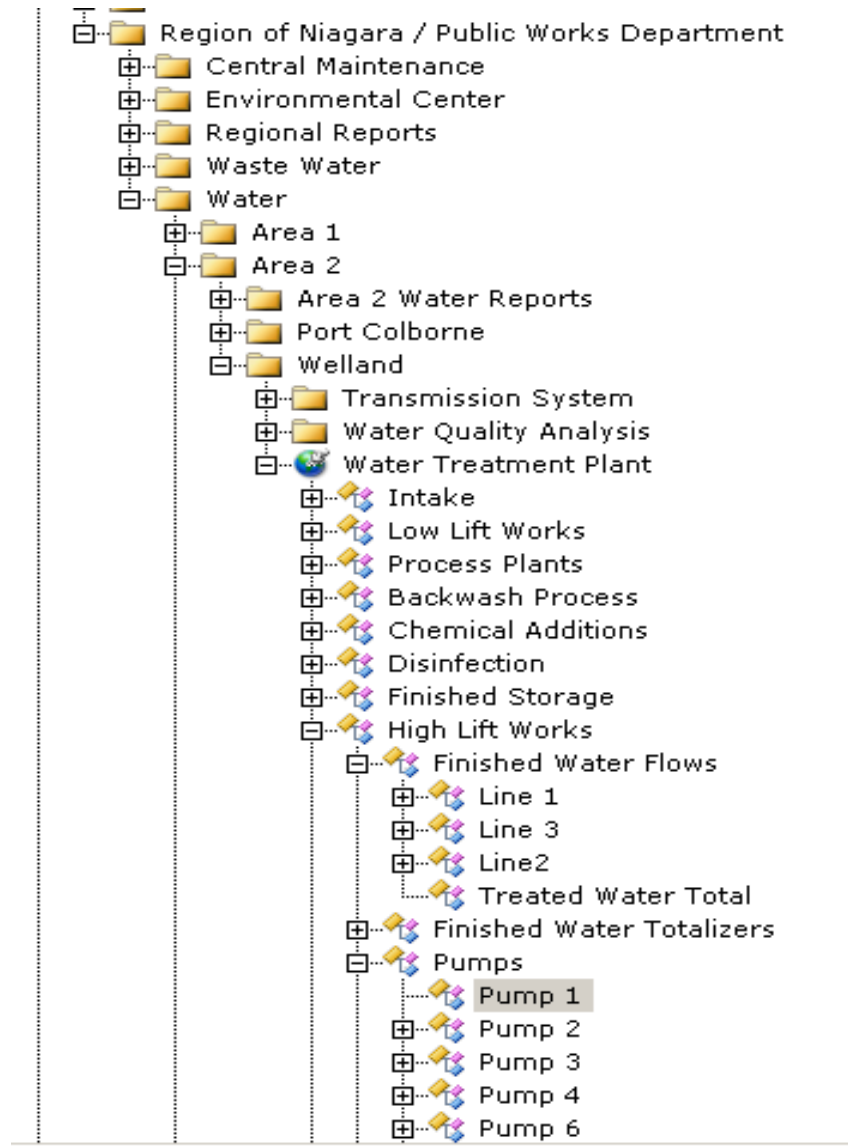


'Analyzed Results' is a collection of output properties

Item Name	De
Annual Energy Cost Savings	
Annual Energy Usage Savings	
Electric Power Savings	
Existing Annual Energy Cost	
Existing Annual Energy Usage	
Existing Electric Power	
Existing Pump Efficiency	
Optimal Annual Energy Cost	
Optimal Annual Energy Usage	
Optimal Electric Power	
Optimal Pump Efficiency	
Optimization Rating	

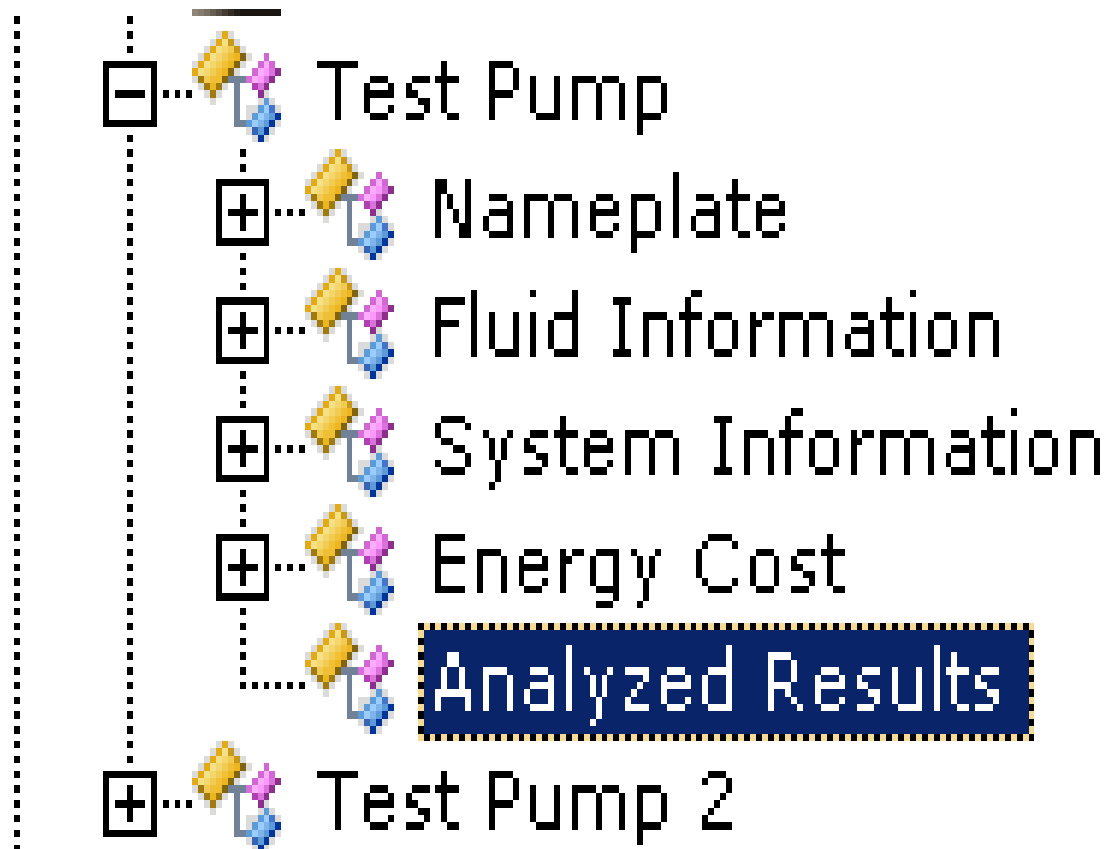
# Logical Model for Pump Optimization

- Logical model















# Logical Model for Pump Optimization

- Definition of 'Pump' updated to also carry PSAT and efficiency related properties



# Logical Model for Pump Optimization

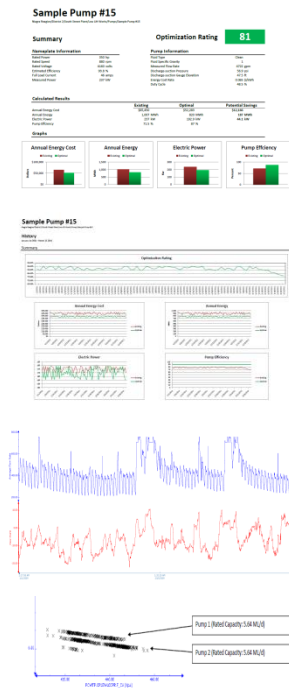
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 Optimization Rating	

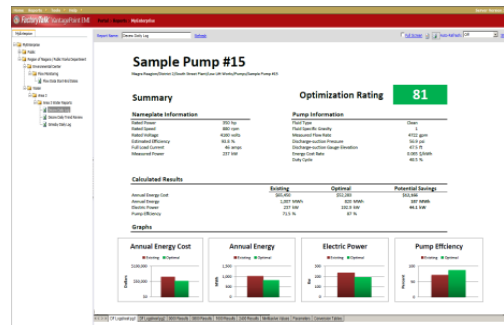
# Solution Approach

3. Allow reporting on efficiency properties

Canned and ad-hoc reporting, trending, and x-y plots



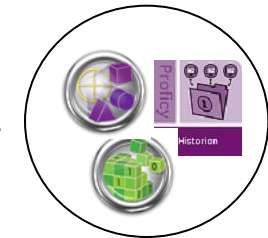
2. Invoke PSAT-Q engine to compute efficiency properties



Inventory systems, spreadsheets, other systems of record

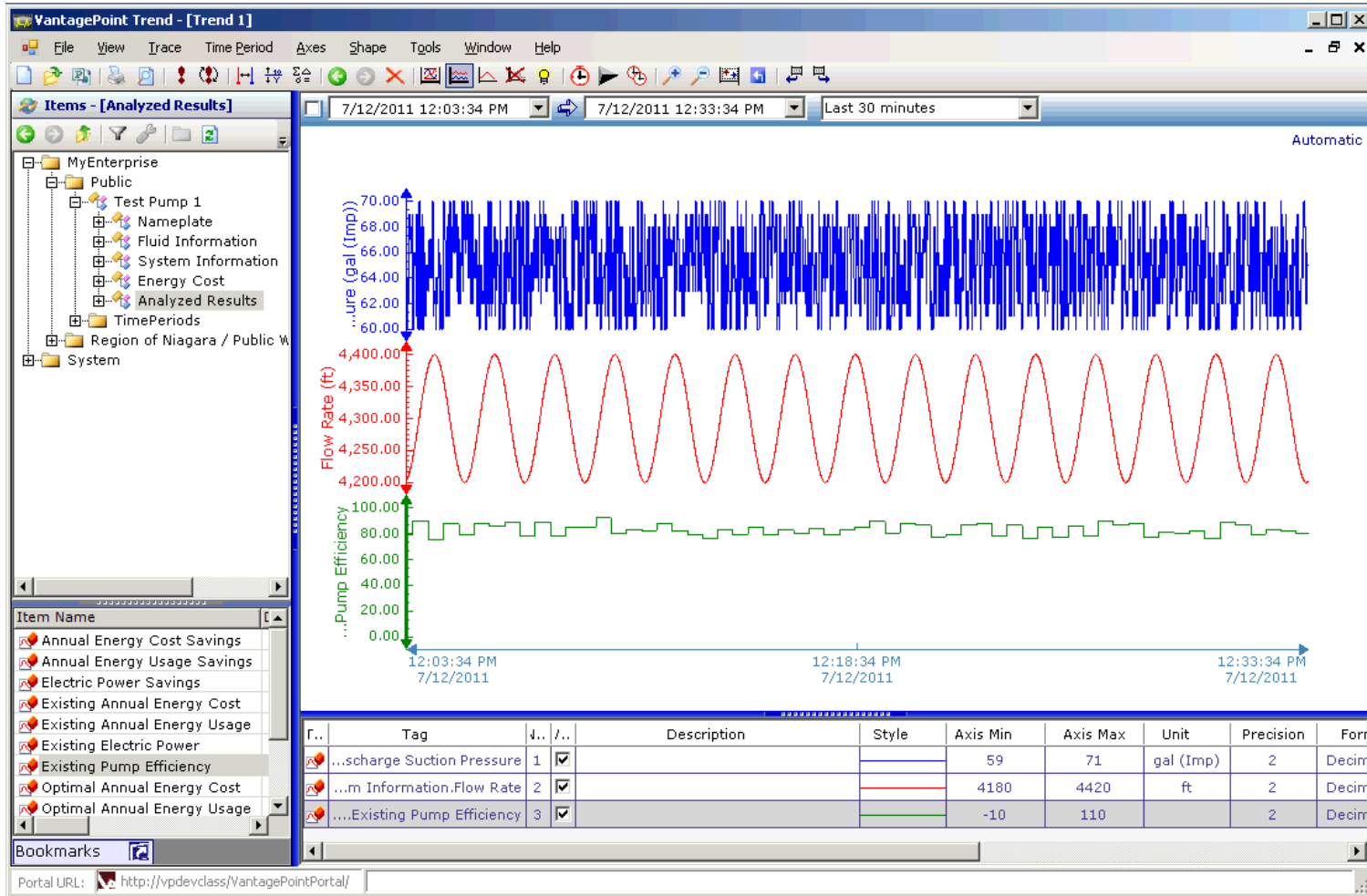


1. Collect nameplate and operational data



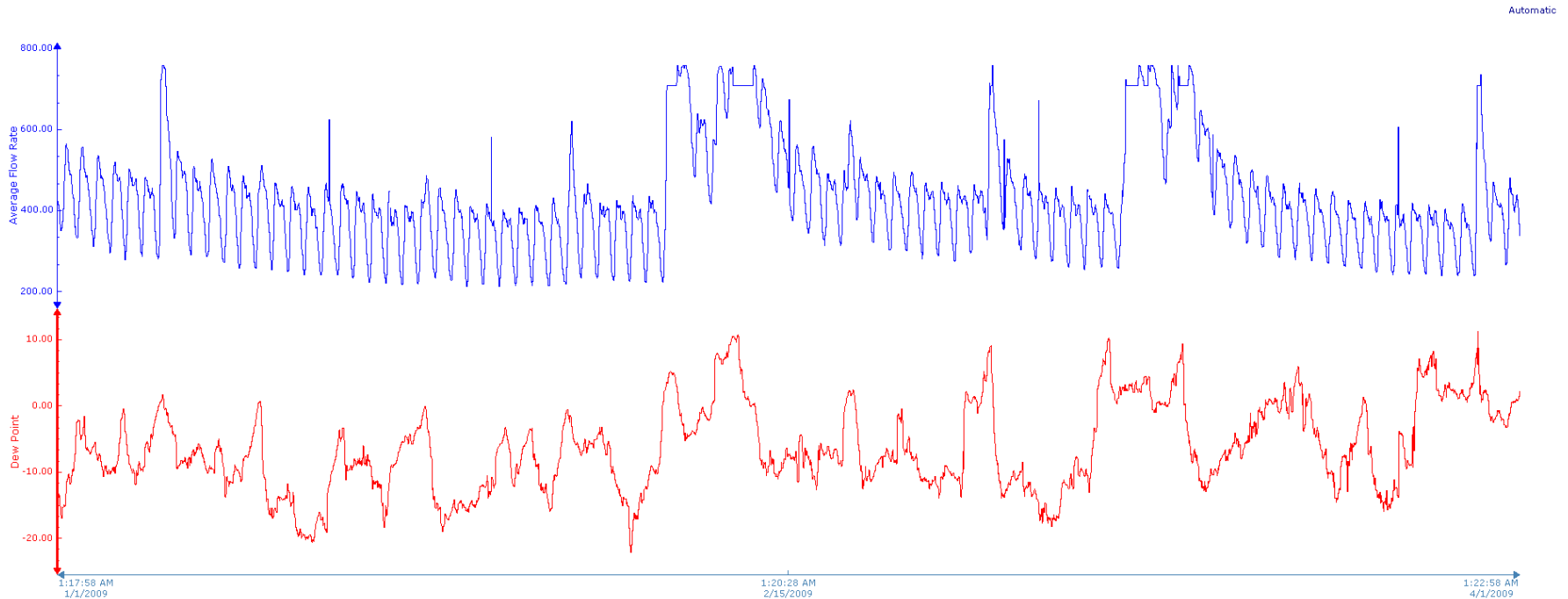
# FTVP Plug-in

- Analysis results are standard FTVantagePoint tags, and can be referenced in any reporting or analysis.



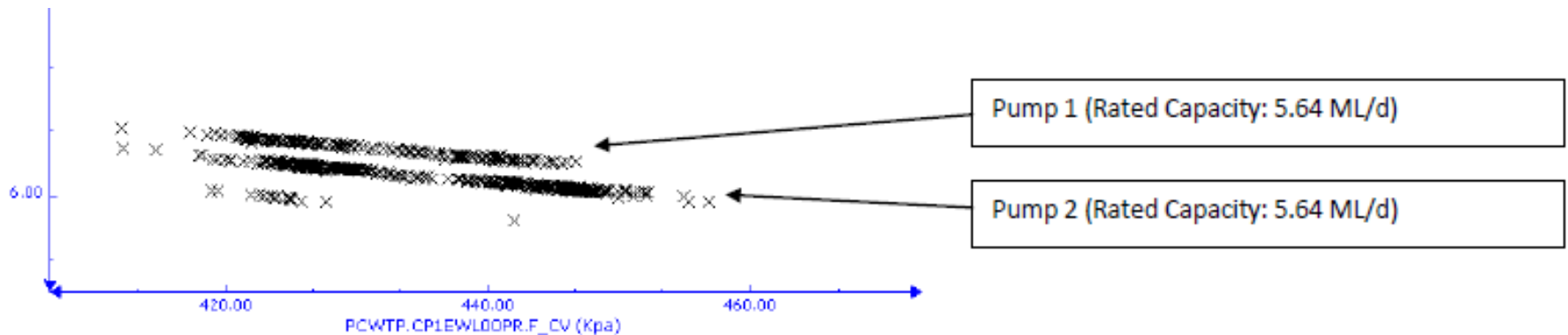
# Ad-hoc Trending

- Look at properties over time
- Examine correlations between properties
- Examine differences between pumps



# Ad-hoc Trending

- Examine correlations between properties
- Examine differences between pumps
- Two supposedly equivalent motor / pump combinations yet clearly there is a difference in behaviour at given line pressures



# Reporting

## Sample Pump #15

Niagra Region/District 2/South Street Plant/Low Lift Works/Pumps/Sample Pump #15

### Summary

### Optimization Rating

81

#### Nameplate Information

Rated Power	350 hp
Rated Speed	880 rpm
Rated Voltage	4160 volts
Estimated Efficiency	93.8 %
Full Load Current	46 amps
Measured Power	237 kW

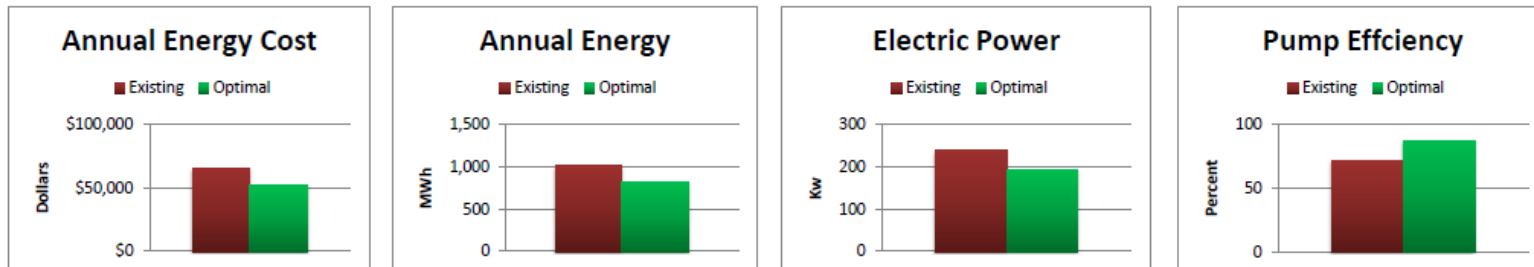
#### Pump Information

Fluid Type	Clean
Fluid Specific Gravity	1
Measured Flow Rate	4722 gpm
Discharge-suction Pressure	56.9 psi
Discharge-suction Gauge Elevation	47.5 ft
Energy Cost Rate	0.065 \$/kWh
Duty Cycle	48.5 %

#### Calculated Results

	Existing	Optimal	Potential Savings
Annual Energy Cost	\$65,450	\$52,283	\$12,166
Annual Energy	1,007 MWh	820 MWh	187 MWh
Electric Power	237 kW	192.9 kW	44.1 kW
Pump Efficiency	71.5 %	87 %	

#### Graphs



# Reporting

## Historical View

### Sample Pump #15

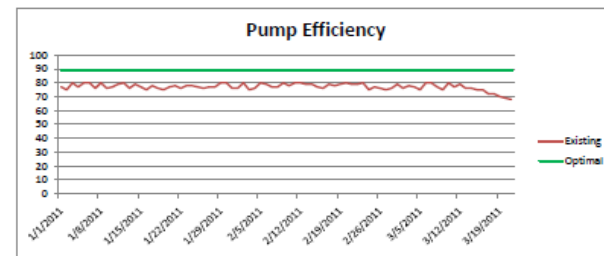
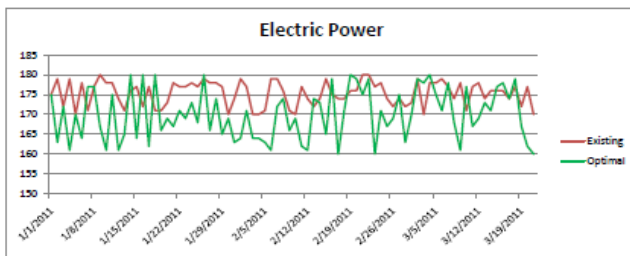
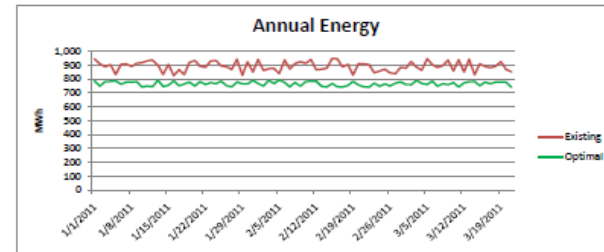
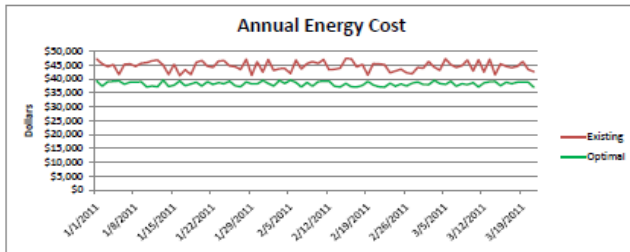
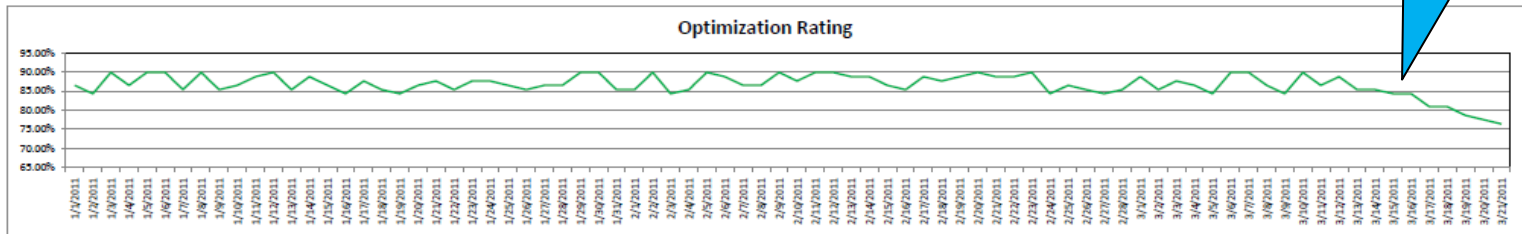
Niagra Region/District 2/South Street Plant/Low Lift Works/Pumps/Sample Pump #15

#### History

January 1st 2011 - March 21 2011

#### Summary

What changed ?



# Pump Optimization

- Conclusions
  - Opportunity to reduce cost
  - System efficiency
  - History
  - Sustainability story



# Pump Optimization

Thank you !

Contact info:

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