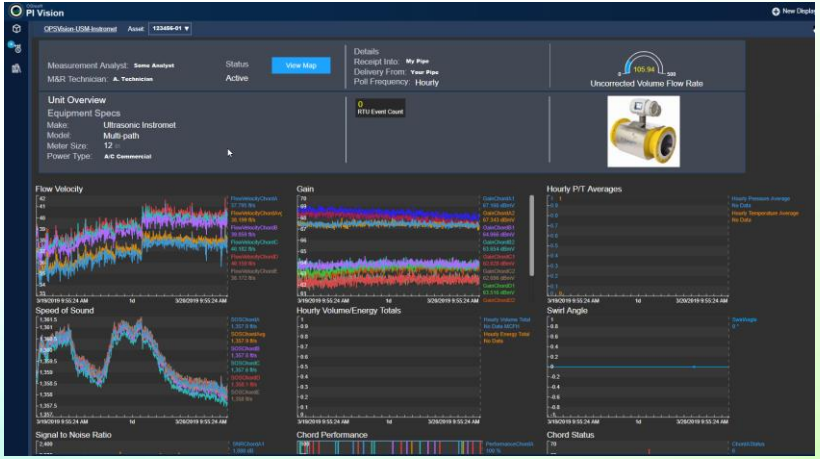
Realtime Ultrasonic Meter Testing

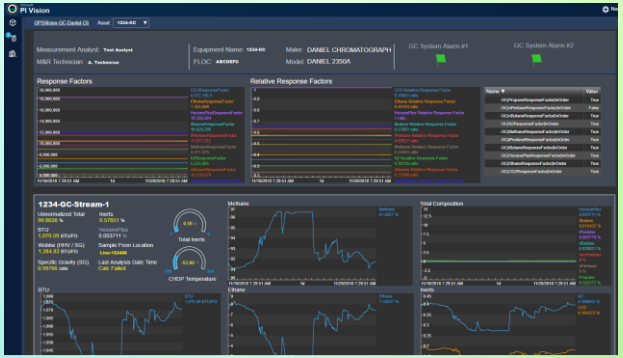
Brad Barker
Gas Measurement Technology Consultant

TransCanada

Agenda

- Summary
- Ultrasonic Testing 101
- How we Accomplished our goals
- Examples of Real Results
- Perspectives on Best Practices





Forward-Looking Information and Non-GAAP Measures

This presentation includes certain forward looking information, including future oriented financial information or financial outlook, which is intended to help current and potential investors understand management's assessment of our future plans and financial outlook, and our future prospects overall. Statements that are forward-looking are based on certain assumptions and on what we know and expect today and generally include words like anticipate, expect, believe, may, will, should, estimate or other similar words.

Forward-looking statements do not guarantee future performance. Actual events and results could be significantly different because of assumptions, risks or uncertainties related to our business or events that happen after the date of this presentation. Our forward-looking information in this presentation includes statements related to: future dividend growth and the future growth of our core businesses.

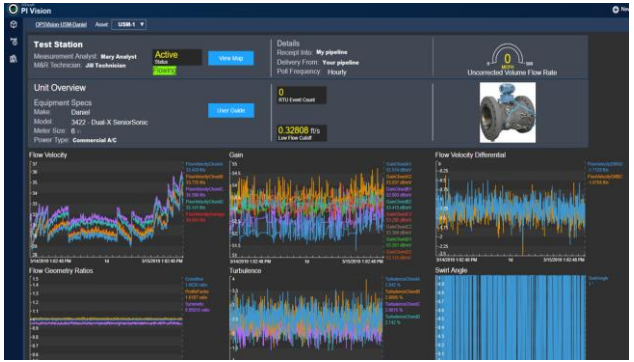
Our forward looking information is based on certain key assumptions and is subject to risks and uncertainties, including but not limited to: our ability to successfully implement our strategic initiatives and whether they will yield the expected benefits, the operating performance of our pipeline and energy assets, economic and competitive conditions in North America and globally, the availability, demand for and price of energy commodities and changes in market commodity prices, the amount of capacity sold and rates achieved in our pipeline businesses, the amount of capacity payments and revenues we receive from our energy business, regulatory decisions and outcomes, outcomes of legal proceedings, including arbitration and insurance claims, performance and credit risk of our counterparties, changes in the political environment, changes in environmental and other laws and regulations, construction and completion of capital projects, labour, equipment and material costs, access to capital markets, interest, inflation, tax and foreign exchange rates, weather, cyber security and technological developments. You can read more about these risks and others in our November 8, 2017 Quarterly Report to Shareholders and 2016 Annual Report filed with Canadian securities regulators and the SEC and available at www.transcanada.com.

As actual results could vary significantly from the forward-looking information, you should not put undue reliance on forward-looking information and should not use future-oriented information or financial outlooks for anything other than their intended purpose. We do not update our forward-looking statements due to new information for future events, unless we are required to by law.

This presentation contains reference to certain financial measures (non-GAAP measures) that do not have any standardized meaning as prescribed by U.S. generally accepted accounting principles (GAAP) and therefore may not be comparable to similar measures presented by other entities. These non-GAAP measures may include Comparable Earnings, Comparable Earnings per Share, Comparable Earnings Before Interest, Taxes, Depreciation and Amortization (Comparable EBITDA), Funds Generated from Operations, Comparable Funds Generated from Operations, Comparable Distributable Cash Flow (DCF) and Comparable DCF per share. Reconciliations to the most closely related GAAP measures are included in this presentation and in our November 8, 2017 Quarterly Report to Shareholders filed with Canadian securities regulators and the SEC and available at www.transcanada.com.

TransCanada

Using PI AF/EF and PI Vision to Improve Ultrasonic Meter Testing and Performance



CHALLENGE

Continue the success of TransCanada's Enterprise Analytics program by looking at Gas Measurement related assets

- 500 ultrasonic smart meters; dark data;
- Manual testing process ~ 1/month;
- Improve accuracy;
- Evolve to proactive, exception based;
- Reduce impact to customers;

SOLUTION

Use PI AF/PI Vision to Ultrasonic meters; expand to other "smart" assets; Leverage Existing EA

- Configure PI AF/PI Vision templates with SME in agile approach;
- Deploy using PI AF tag auto creation of tag; Links to metadata;
- Develop PI AF tuning processes to evolve over time
- Develop process to track business impact;

RESULTS

Moving from a reactive/manual testing process to a proactive, exception based process – generating significant business value and customer success;

- Identified 75 meter issues to date;
- Considering frequency reduction or elimination of manual testing;
- Reduction in customer satisfaction issues;
- Reducing O&M and lost opportunity costs;

Ultrasonic Testing 101

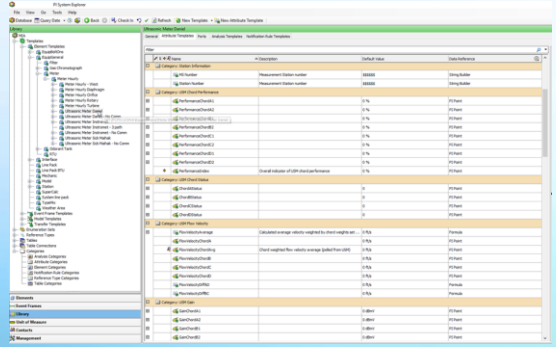
Traditional Method:

- Diagnostic data pull over a 2 minute period, at most once per month
- Often requires windshield time
- Manual interpretation of results, with varying skill levels in spotting issues
- Data can be pulled during no flow conditions or miss intermittent anomalous conditions

Possible Anomalies that can be Detected in PI AF:

- Excessive velocity
- High gain
- Chord performance
- Chord Status
- Communication failure
- Symmetry deviation
- Flow profile deviation
- High turbulence
- Speed of sound deviation
- Speed of sound measured vs theoretical

Process Highlights



Create PI AF Meter “Digital Twins”:

- Sick Maihak
- Instromet
- Daniel

Build Templates w/Initial Analysis Expressions w/SMEs

Map Tags & Metadata

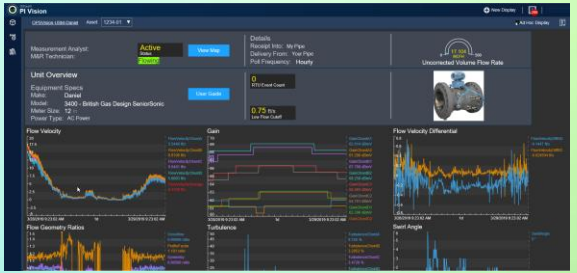
- Auto tag creation
- SQL sources
- Table Lookup

Visualize & Evaluate Anomalies

Exception Basis

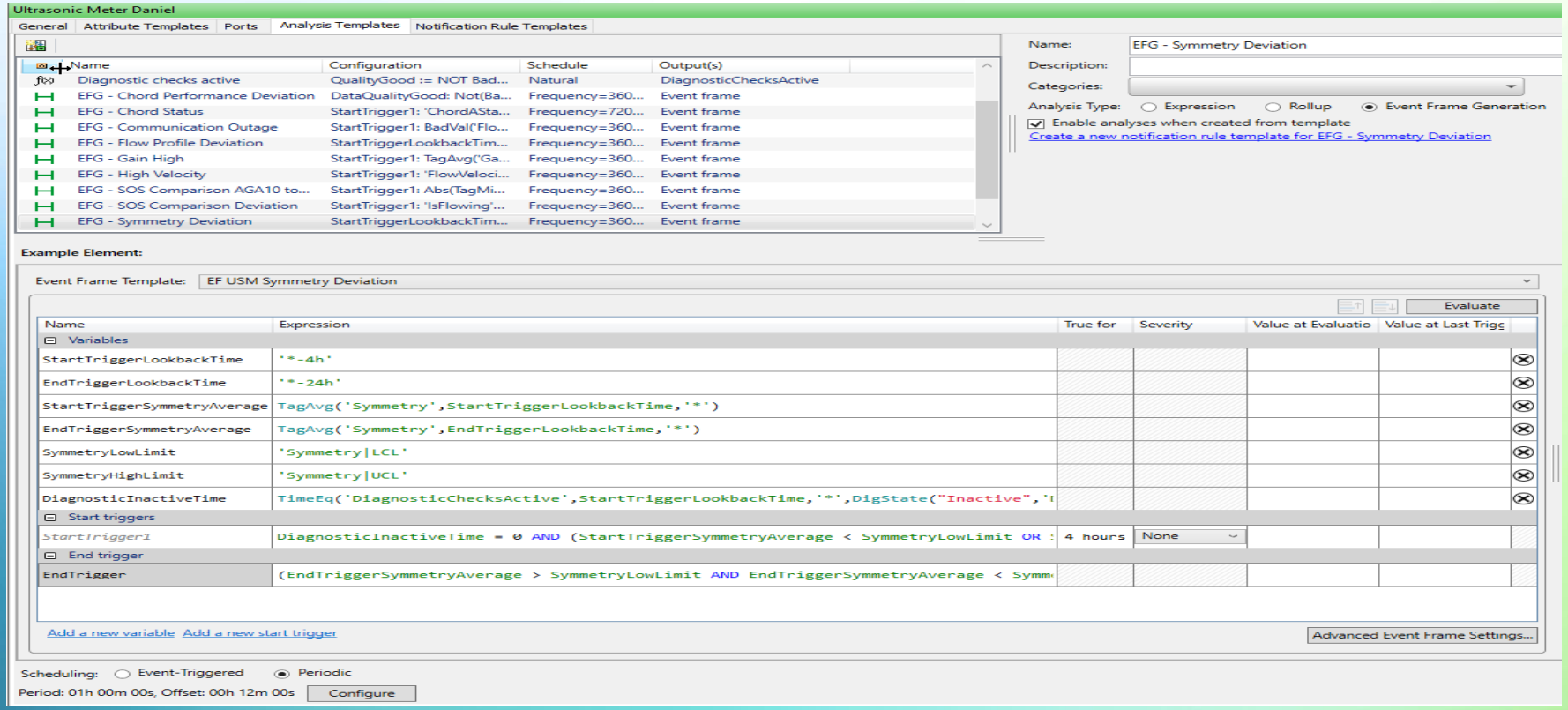
Tune Anomaly Expressions & Backfill

Track KPIs & Value Use Cases

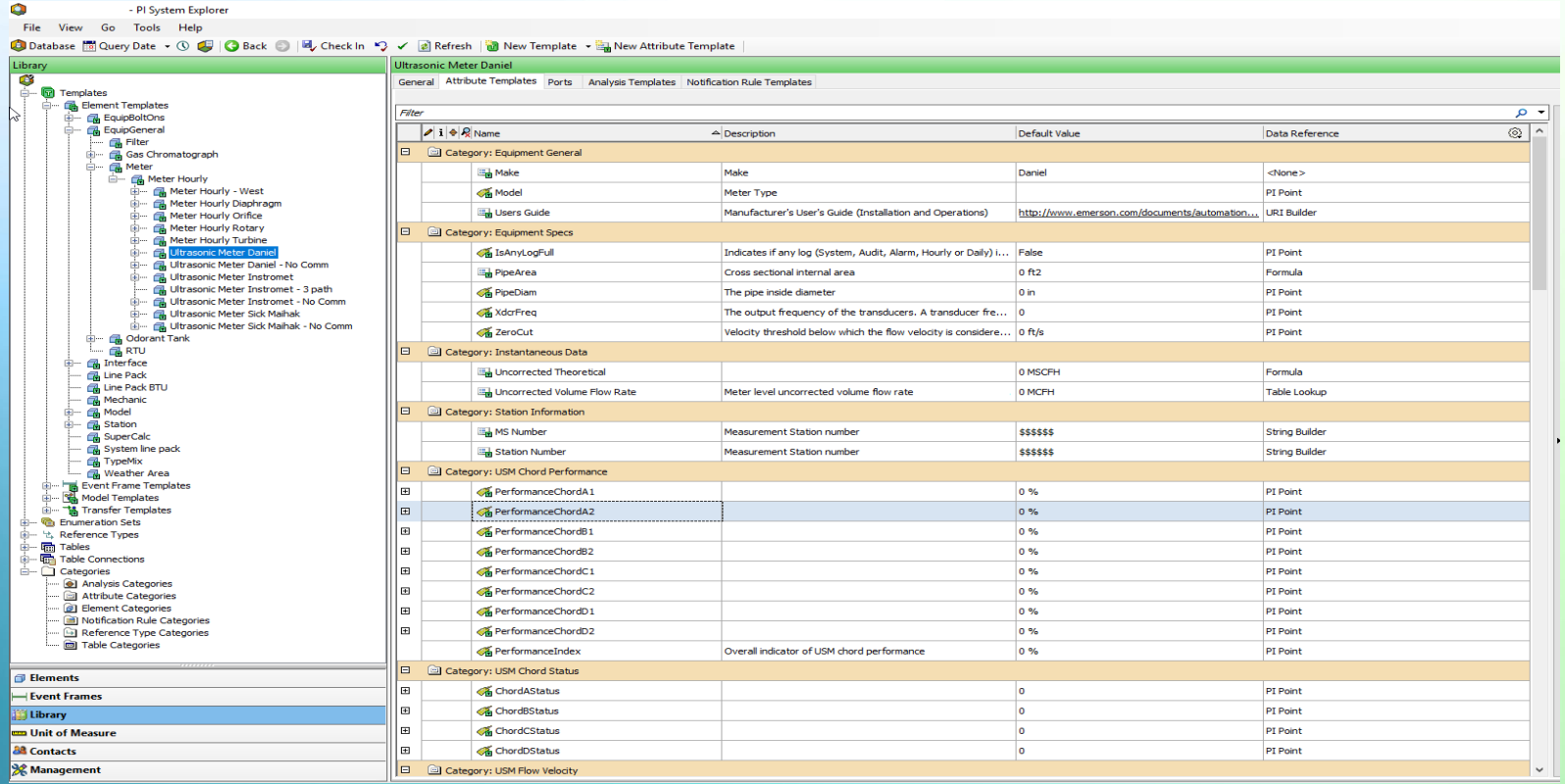


3 PI Vision Templates

Analysis Rule Example

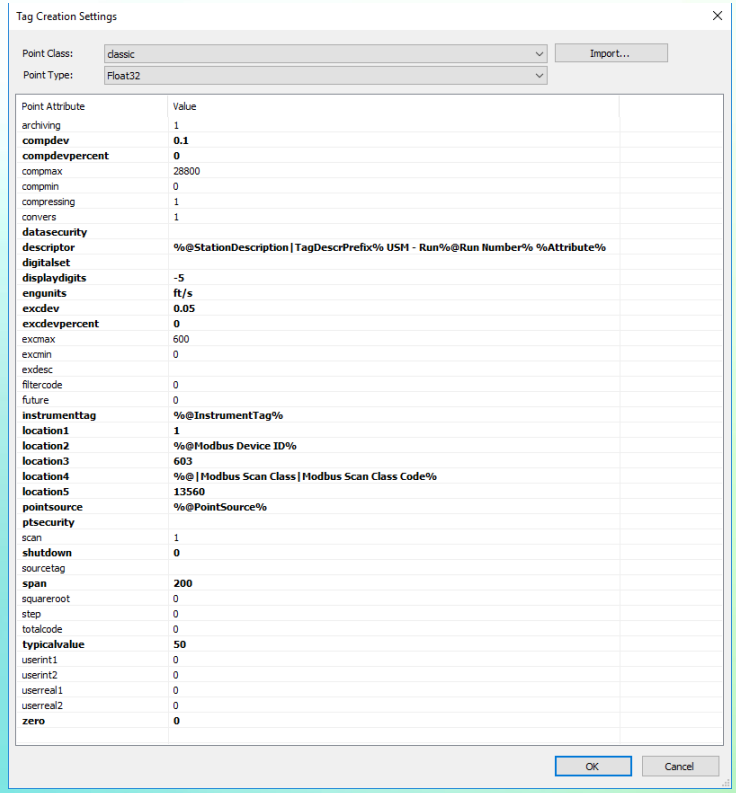


PI AF Structure & Element Template Example



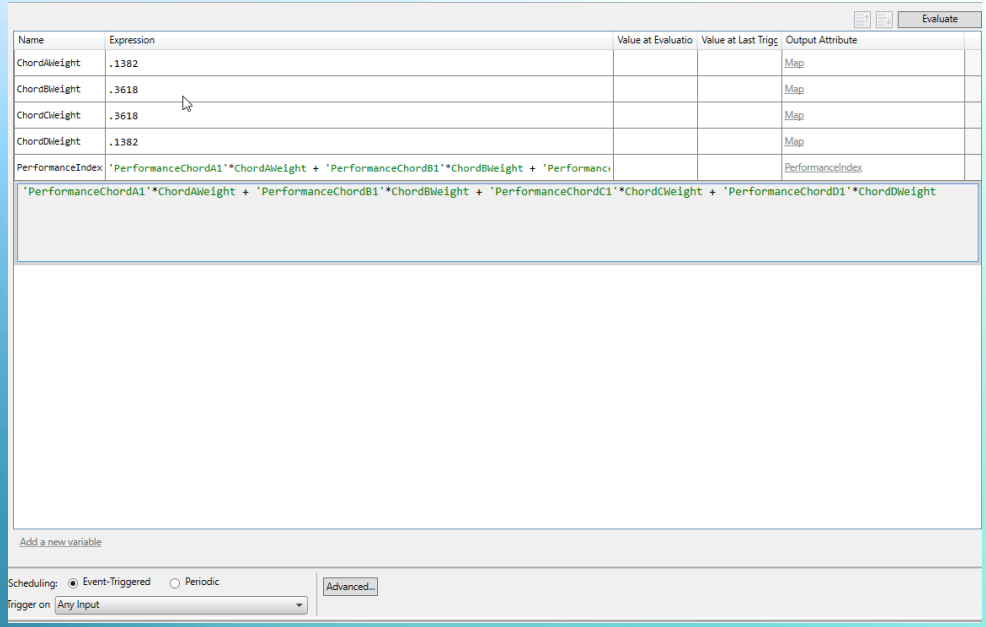
PI AF Automatic Tag Creation Example

- Use parameters inside tag creation templates
- Standardizes tag configuration
- Fast asset deployment
- Eliminates human error



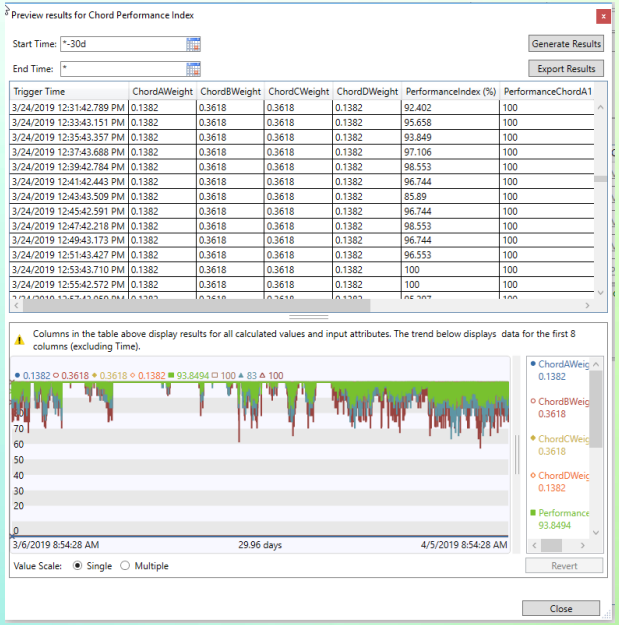
Backfill Example

New PI AF analysis

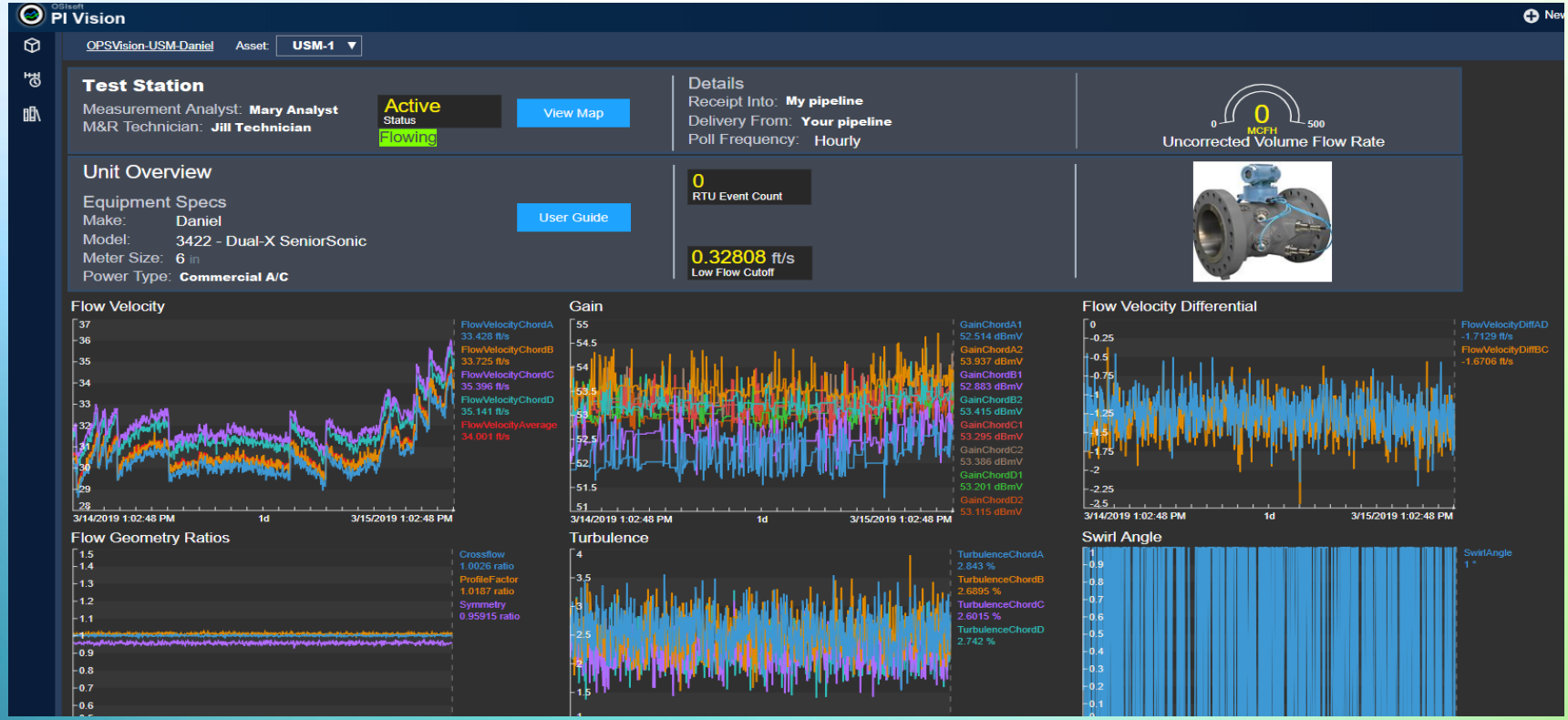


Backfill

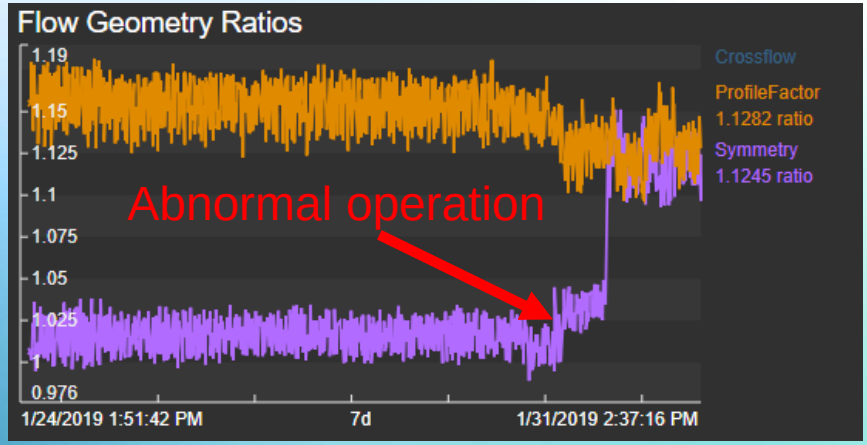
Preview results



Visualization Example

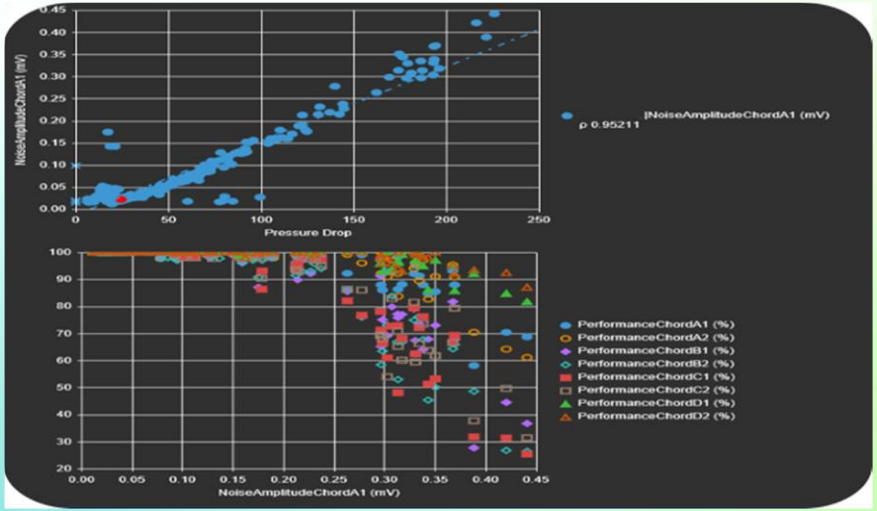


Example 1: Flow Profile Anomaly



- Debris removed from meter tube in a matter of days
- Saved months of reduced meter certainty

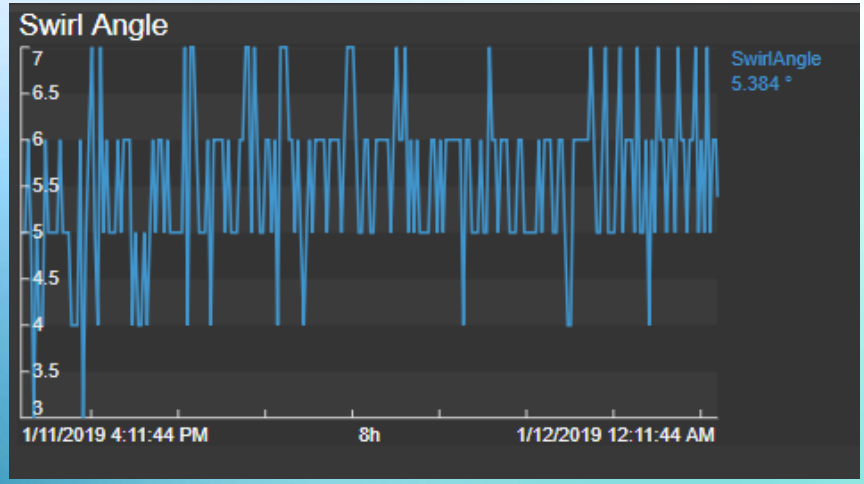
Example 2: Transducer Anomaly



- Low transducer performance detected
- With PI Vision we see correlation to noise

- Noise correlates to pressure differential across control valve;
- Created knowledge – how much before negatively impacting the meter…Tune PI AF!

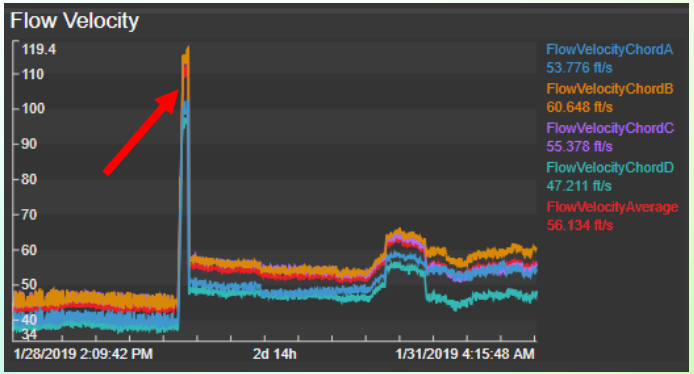
Example 3: Excessive swirl



- Swirl anomaly indicated partial blockage of the gas stream
- Led to prompt removal of foam caught in flow conditioner

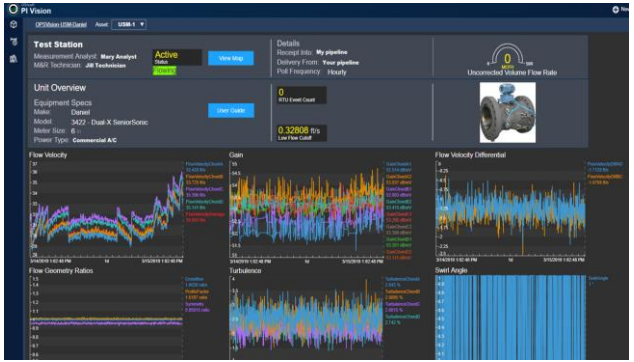
Perspectives in Best Practices

1. Take time with your asset templates not just to map attributes to tags, but to allow AF to create your tags;
2. Utilize your templates in PI Vision – why build more than one screen for the same kind of asset?
3. Spend time with your SME/asset experts. Build their knowledge into PI AF analyses;
4. Tune PI AF Expressions over time – do not try to build the “perfect PI AF template”. Use agile methodology;
5. Track your findings, develop KPIs, and ensure business value awareness;



TransCanada

Using PI AF/EF and PI Vision to Improve Ultrasonic Meter Testing and Performance



CHALLENGE

Continue the success of TransCanada's Enterprise Analytics program by looking at Gas Measurement related assets

- 500 ultrasonic smart meters; dark data;
- Manual testing process ~ 1/month;
- Improve accuracy;
- Evolve to proactive, exception based;
- Reduce impact to customers;

SOLUTION

Use PI AF/PI Vision to Ultrasonic meters; expand to other "smart" assets; Leverage Existing EA

- Configure PI AF/PI Vision templates with SME in agile approach;
- Deploy using PI AF tag auto creation of tag; Links to metadata;
- Develop PI AF tuning processes to evolve over time
- Develop process to track business impact;

RESULTS

Moving from a reactive/manual testing process to a proactive, exception based process – generating significant business value and customer success;

- Identified 75 meter issues to date;
- Considering frequency reduction or elimination of manual testing;
- Reduction in customer satisfaction issues;
- Reducing O&M and lost opportunity costs;

Real-time ultrasonic meter testing

Brad Barker

Gas Measurement Technology Consultant

TransCanada

brad_barker@transcanada.com

Questions?

Please wait for the **microphone**

State your **name & company**

Please remember