Innovarpel 2025

TECHNICAL DAYS

DIGITAL TRANSFORMATION
& INDUSTRIAL CYBERSECURITY
IN THE OIL&GAS INDUSTRY

arpel 60 YEARS

JUNE, 24 & 25
Rio de Janeiro, Brazil

Optimizing Inspection Strategies using Integrity-related Big Data

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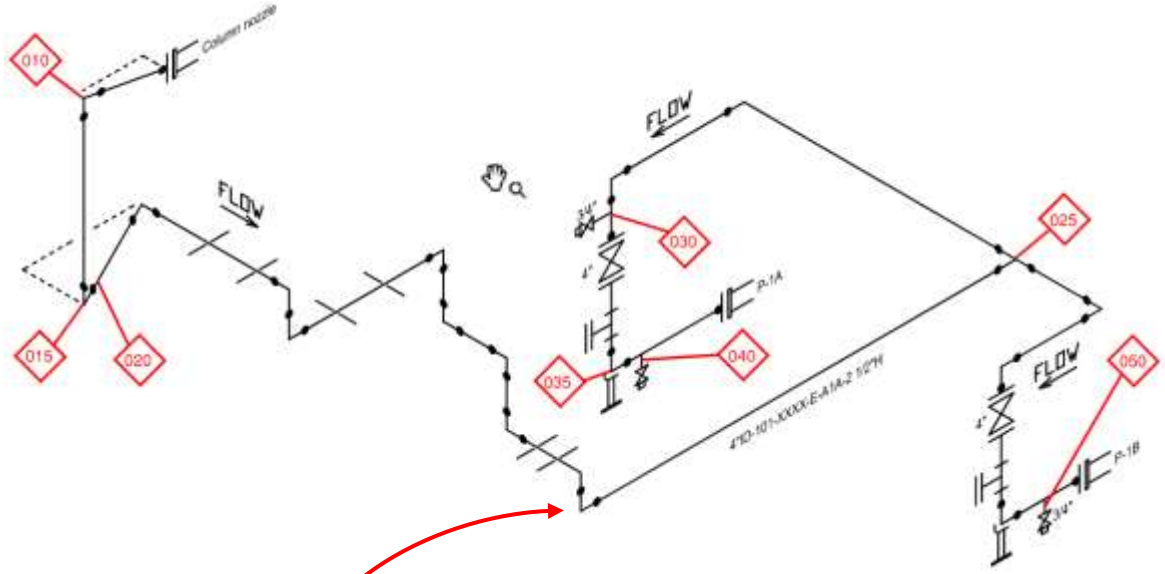
Agenda

- Disparate Integrity Data Sources
- Converting data to action (and inaction)
- Case Study Results and Benefit

Background

- **Goal:** Prevent loss of containment
- **Boundary:** Cost
- CML = Corrosion Monitoring Location
- Schedule is driven by:
  - Max time interval (per Code, such as API 570, API 510)
  - Corrosion rate and remaining life (half life inspection)
  - Optional: Risk calculation



Modern Integrity Data

CorrExpert® Crude

Site | Unit | Resid.D06.9DP50.005

Home | Export

Last Updated
6/16/25 14:00

Locations
136

Refresh Data

Live Data

Corrosion Rate

Current	Target
6.5	8

CR < x < 2 * CR | > 2 * CR

Alarm

Sulfur

Current	Target
1.8	<1.5

< 1.8

Alert

TAN

Current	Target
1.7	> 1.2

> 1.2

Alarm

Remaining Life

Current	Target
11.5	10

Target

Corrosion Sensor

Current

6.3

CR < x < 2 * CR

Alert

MTD Profit

$ 6.12M

Region	Sr. No.	Location	CML #	Stream Numbe	MOC	Base Corrosion Rate	Design CR
						mpy	mpy
1	1	CDU feed transfer line		94A	9 Cr	2.4	3.1
	2	CDU feed transfer line		91A	CS	10.5	12.5
2	6	CDU feed transfer line		91D	CS	8.5	12.5
	7	CDU feed transfer line		91D	CS	9.3	12.5
	8	CDU feed transfer line		91E	CS	8.3	12.5
	9	CDU feed transfer line		91E	CS	9.0	12.5
3	10	Atm tower No. 3 stream			CS	1.4	12.5
4	11	Atm tower No. 4 stream		109A	9 Cr	1.3	3.1
5	12	Atm tower LPA		111A	9 Cr	2.1	3.1
	18	Atm tower LPA		78A	CS	4.8	12.5
	19	Atm tower LPA		113A	9 Cr	2.1	3.1
	20	Atm tower LPA		113A	9 Cr	2.1	3.1
6	21	Atm tower No. 5 stream		112A	9 Cr	6.4	3.1
	22	Atm tower No. 5 stream		112A	9 Cr	6.4	3.1
	23	Atm tower No. 5 stream		112A	9 Cr	6.4	3.1
7	24	Atm tower reduced crude		114A	9 Cr	21.4	3.1
	25	Atm tower reduced crude		114A	9 Cr	21.4	3.1
	26	Atm tower reduced crude		148A	9 Cr	21.9	3.1
	27	Atm tower reduced crude		148A	9 Cr	23.6	3.1
8	28	Atm reduced crude to Vac heater		148A	9 Cr	23.6	3.1
	29	Atm reduced crude to Vac heater		148A	9 Cr	23.6	3.1
10	33	Vac tower No. 7 stream		159A	9 Cr	3.2	3.1
	34	Vac tower No. 8 stream		79A	9 Cr	9.4	3.1
	35	Vac tower No. 8 stream		79A	9 Cr	7.1	3.1
	36	Vac tower No. 8 stream		79B	9 Cr	7.1	3.1
	37	Vac tower No. 8 stream		79B	9 Cr	7.3	3.1

Inspection Strategy Optimization Process

Data Clean Up

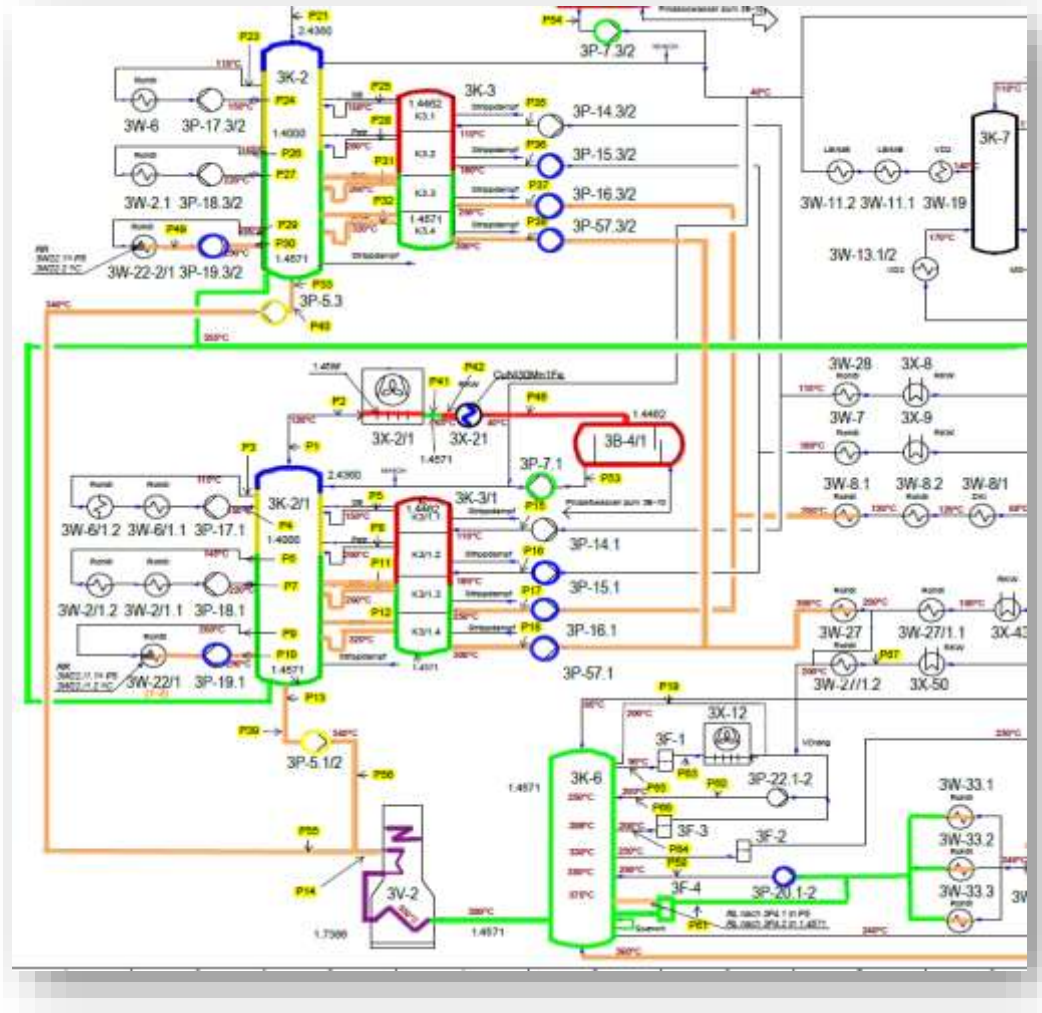
- Assess outliers
- Remove erroneous data
- ***AI use case:*** Inspection History

Multi-factor Model

- Numerical model development
- Weighted factors related to corrosion
- Use **eCCD** to assign classification, triage corrosive vs. non-corrosive assets

Optimize Strategy

- Compare existing inspection strategy to model output
- **Statistical analysis** as tool
- Many data inputs inform decisions



Case Study

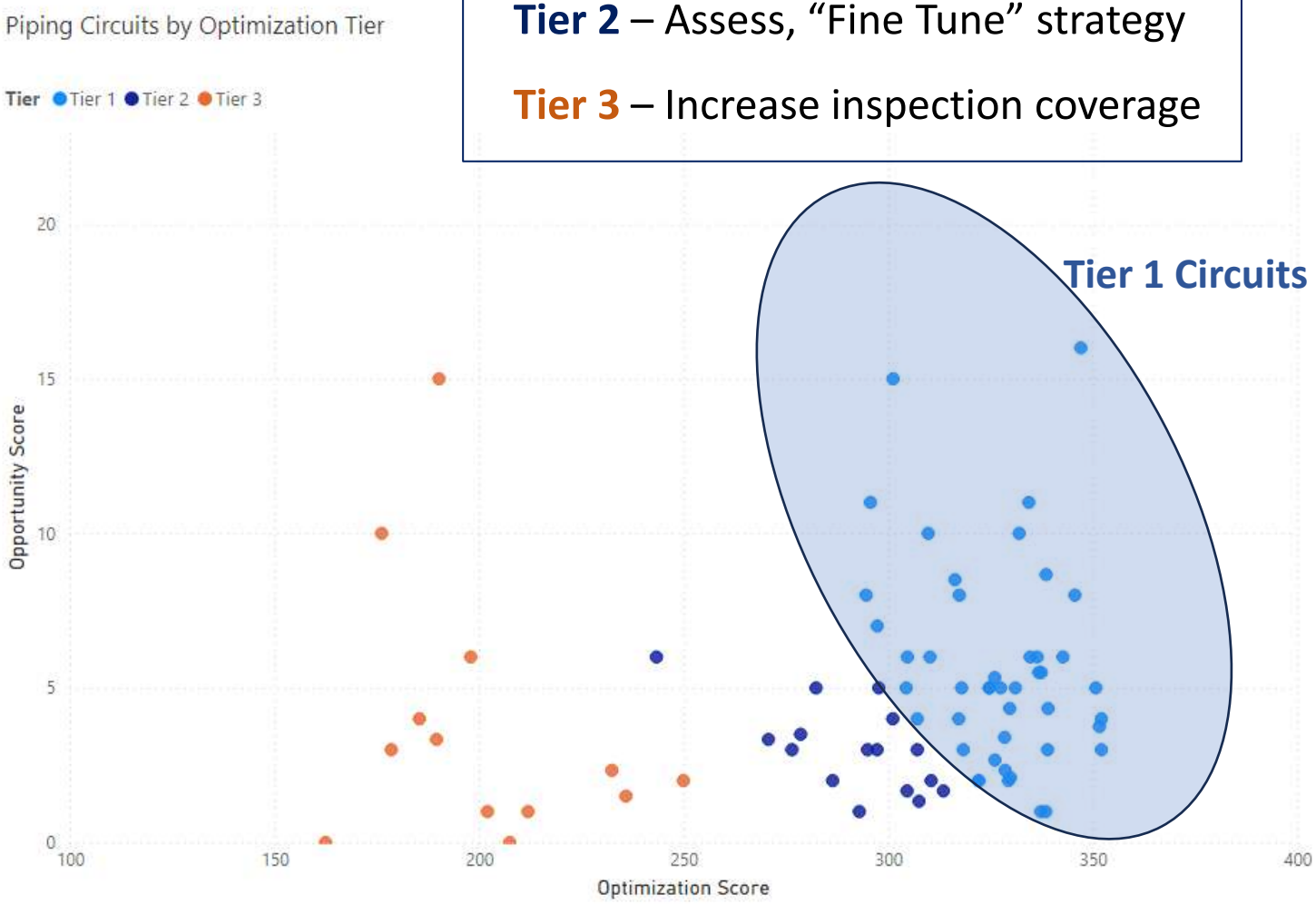
- Refinery Naphtha Hydrotreater
- 74 process piping circuits (and 120 dead leg circuits)
- 1480 Historical CMLs (Avg. 5 historical readings/CML)
- All CMLs were UT locations, no historical methodology for placement
- 60% of process circuits categorized as **Tier 1**, indicating high potential for optimization

Becht Tier Summary

Tier 1 – Optimize, Reduce Inspection

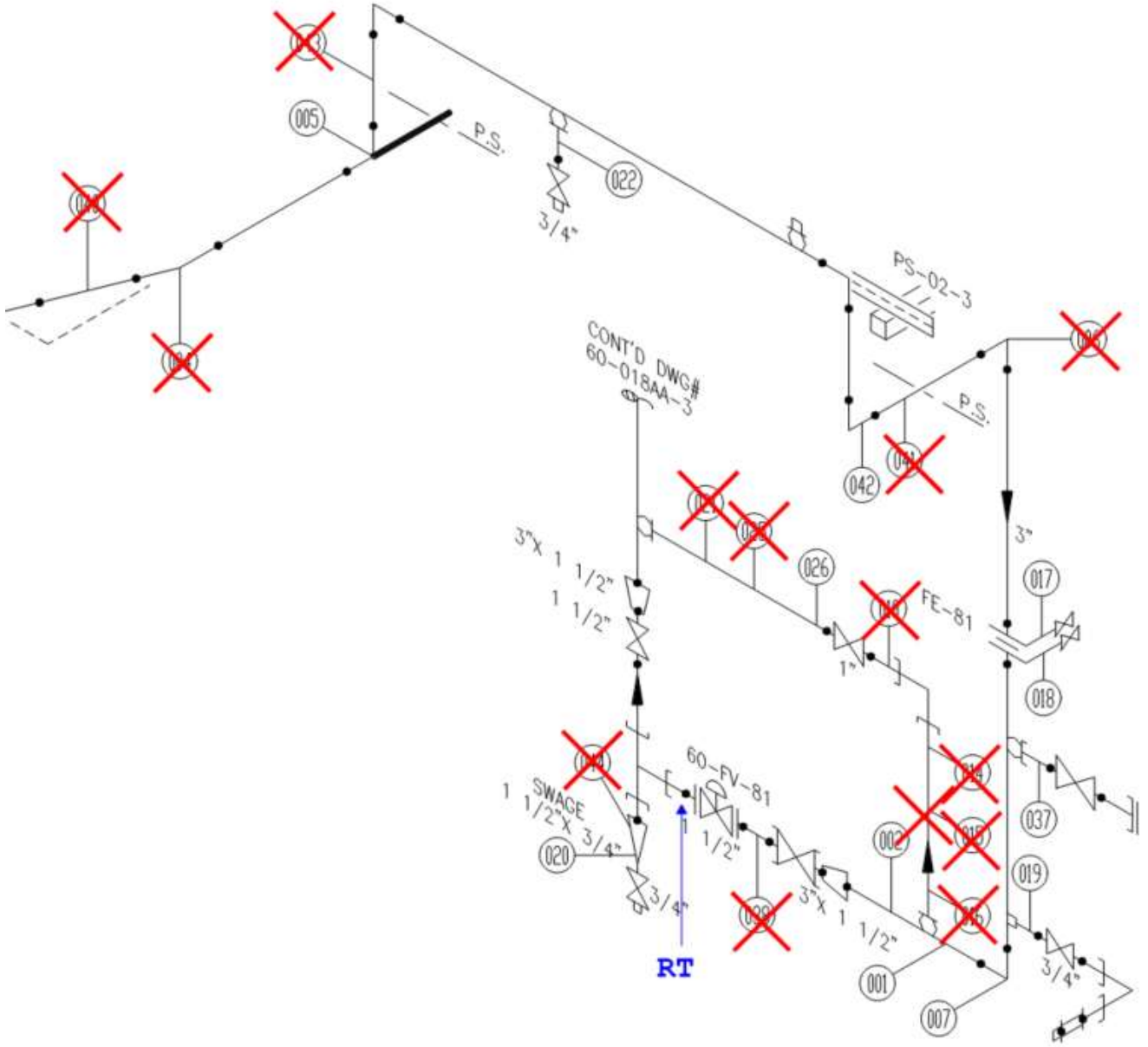
Tier 2 – Assess, "Fine Tune" strategy

Tier 3 – Increase inspection coverage



Optimization Considerations

- Historical thickness data
  - Opportunity to use statistical analysis (***with restrictions***)
- Expected damage locations
  - Remove low value inspection points where damage not expected
- Expected damage rates
  - Use inspection to match expectations
  - Rely on other safeguards (like IOWs)
- NDE Methods
  - Adjust based on damage morphology



Case Study Results

- **General** Corrosion circuits - 55% CML reduction
  - Statistical tools helpful in these case
- **Localized** Corrosion circuits
  - 39% overall reduction in CML count
  - 60% of historical CMLs were modified to NDE Methods more appropriate for localized corrosion
- Significant **risk reduction** achieved through revised CML locations
- CMLs are small part of value proposition, Crude Selection Optimization (CorrExpert-Crude) adds ~$7MM/yr savings

Thank you

Gracias

Obrigado

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