

Robust Loop Diagnostics

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Introduction

- ▶ One of the fundamental issues when configuring any plant or loop monitoring tool is information accuracy:
 - ◆ Many problem loops can be highlighted which do not fall into the sphere of interest of engineers and technicians on the plant.
 - ◆ The result is low trust in the long term as many perceived false results are acted upon.
 - ◆ Benefits are not achieved as ultimately the PlantTriage results are not acting upon
- ▶ This talk describes a route to delivering robust PlantTriage diagnostics

Typical false alerts

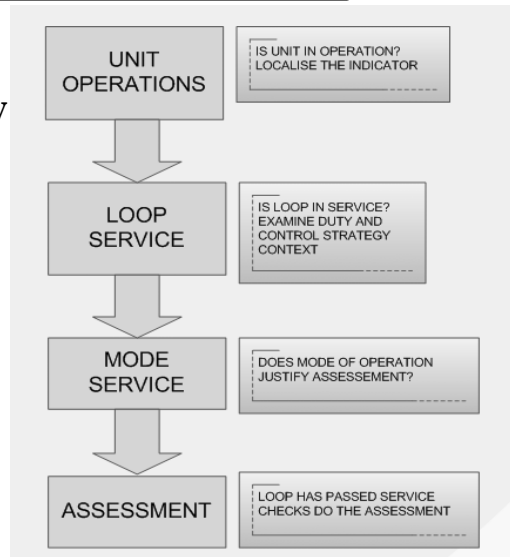
- ▶ Unit is not operational but loop is being flagged as poor
- ▶ Loop is not in service but is being flagged as poor
 - ◆ Overridden
 - ◆ Initialising
 - ◆ Valves/slave loops at limits
- ▶ Oscillation detected but not significant
- ▶ Problem is not obvious to technician

Without care false alerts may account for MAJORITY of loops in payback lists.

An approach

- ◆ Robust loop service decisions
- ◆ Rigorous economic ranking
- ◆ Tailored loop assessment choice
- ◆ Setting baselines
- ◆ PlantTriage Output and Usage

**Work down
the decision flow
to decide loop
service**



Work on Decision Stages

- ▶ Unit Operations
 - ◆ Relate them to physically meaningful equipment
 - ◆ Make them local to the loop
 - ▶ Minimises spurious alerts due to abnormal situations, start-ups, etc.

Work on Decision Stages

- ▶ Loop Service
 - ◆ Examine context in control schemes
 - ▶ Position in override scheme
 - ▶ Possibility of bypass
 - ▶ Protection duty
 - ◆ Can be done in bulk
- ▶ Mode Service
 - ◆ Does Mode justify assessment?

Economic Ranking

- ▶ Make it systematic
- ▶ Process or duty orientated (Process context)
- ▶ Avoid double accounting
 - › Master/slave duties are independent
- ▶ Change the ranking coefficients to promote the loops that you want to highlight

Economic ranking table example

- ▶ In reality there would be many more duties
- ▶ May be specific to industry

Duty	Protection	Mainstream	Utility
Flow	High	Medium	Low
Level	High	Medium	Medium
Temperature	High	Medium	Low

Loop monitoring deliverables : a restricted set

- ▶ Improve process stability to allow operation close to constraints
- ▶ Improve process stability to reduce alarm frequency and improve plant reliability
 - Identify poorly tuned loops
 - Indirectly highlight actuators that need maintenance

The benefit is in addressing and highlighting loops and actuators that would not be looked at otherwise

Loop monitoring deliverables : a restricted set

- ▶ Interested only in loop variability initially
- ▶ Assessments focus in on these areas
- ▶ By limiting the number of assessments you do two things:
 - ◆ Limit information flow to well defined areas
 - ◆ Control and improve these metrics easily

Key assessments

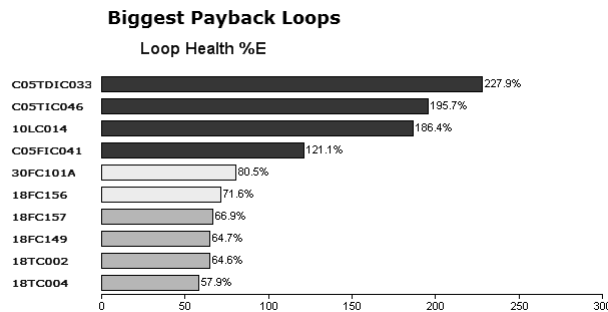
- ◆ Used to generate Loop Health Metric
- ◆ Focus in on deliverables and restrict range
- ◆ e.g for tuning performance
 - ▶ Oscillation
 - ▶ Harris
- ◆ Limit to 4 or 5
- ◆ Prove then expand

Bringing it together

- ♦ Plant ownership
- ♦ Baseline using an initial version of templates
 - ▶ Usually tailored
- ♦ Review periodically and re-baseline using full templates (3-6 months, after loop work, after TAR)
- ♦ Lifecycle – plant management
- ♦ Solve loops iteratively – top 10 a month for example
 - ▶ Tailored top ten loops
- ♦ Yields benefits systematically

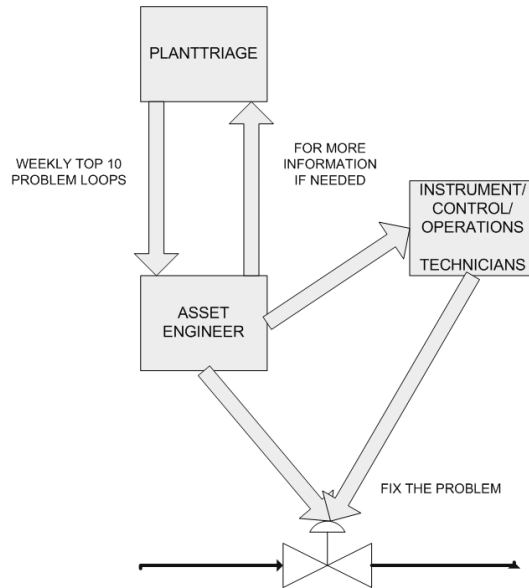
Bringing it together

- ♦ Solve loops iteratively. Top 10 loops.

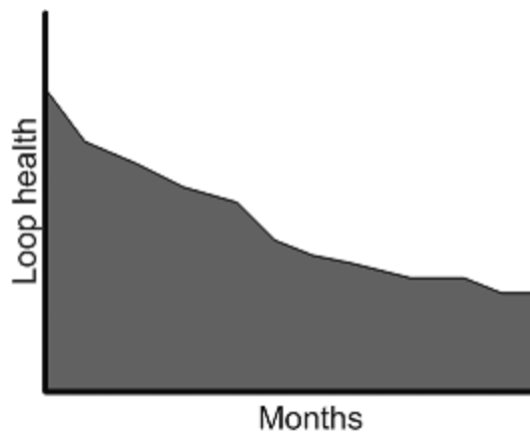


- ♦ E-mail asset owner

Workflow



**Reduce
problem
loops
incrementally**



Keys to success

- ▶ Taking the time to input system knowledge
- ▶ Configure the application logically
- ▶ Identify what you want to achieve
 - ◆ Is it realistic?
- ▶ Control information flow
- ▶ An iterative process (Daily, Weekly, Monthly routines)
- ▶ A 90% accuracy rate is possible
- ▶ Get benefits and Engineer/technician buy-in

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