Measure Reliability

Rethink Instrumentation & Improve Uptime

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Polling Question #1

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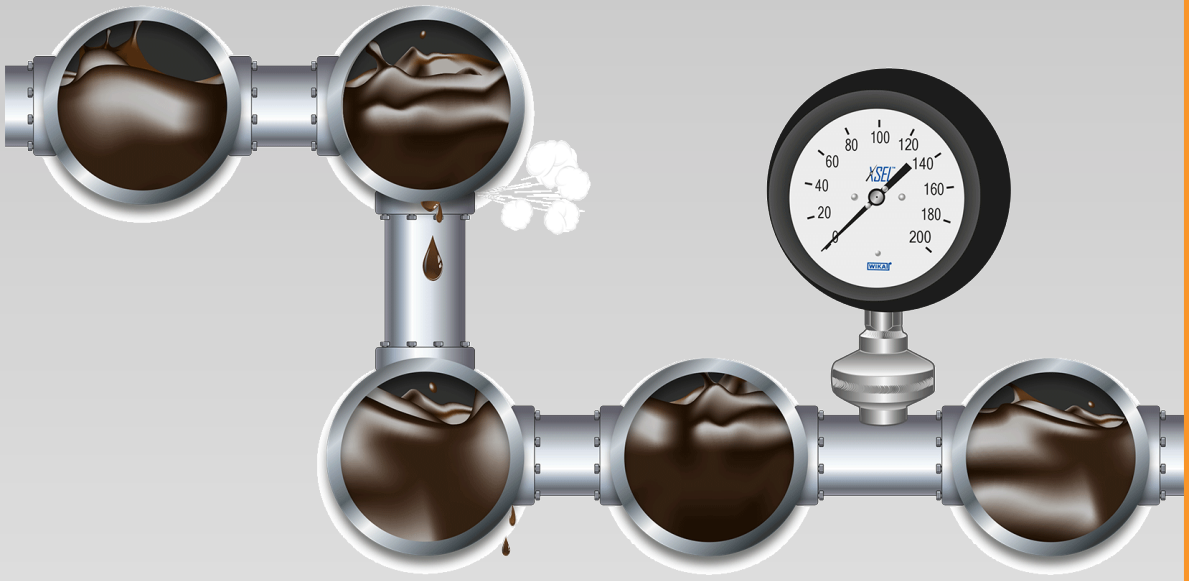
Importance of Mechanical Gauges

Why Maintain Them?

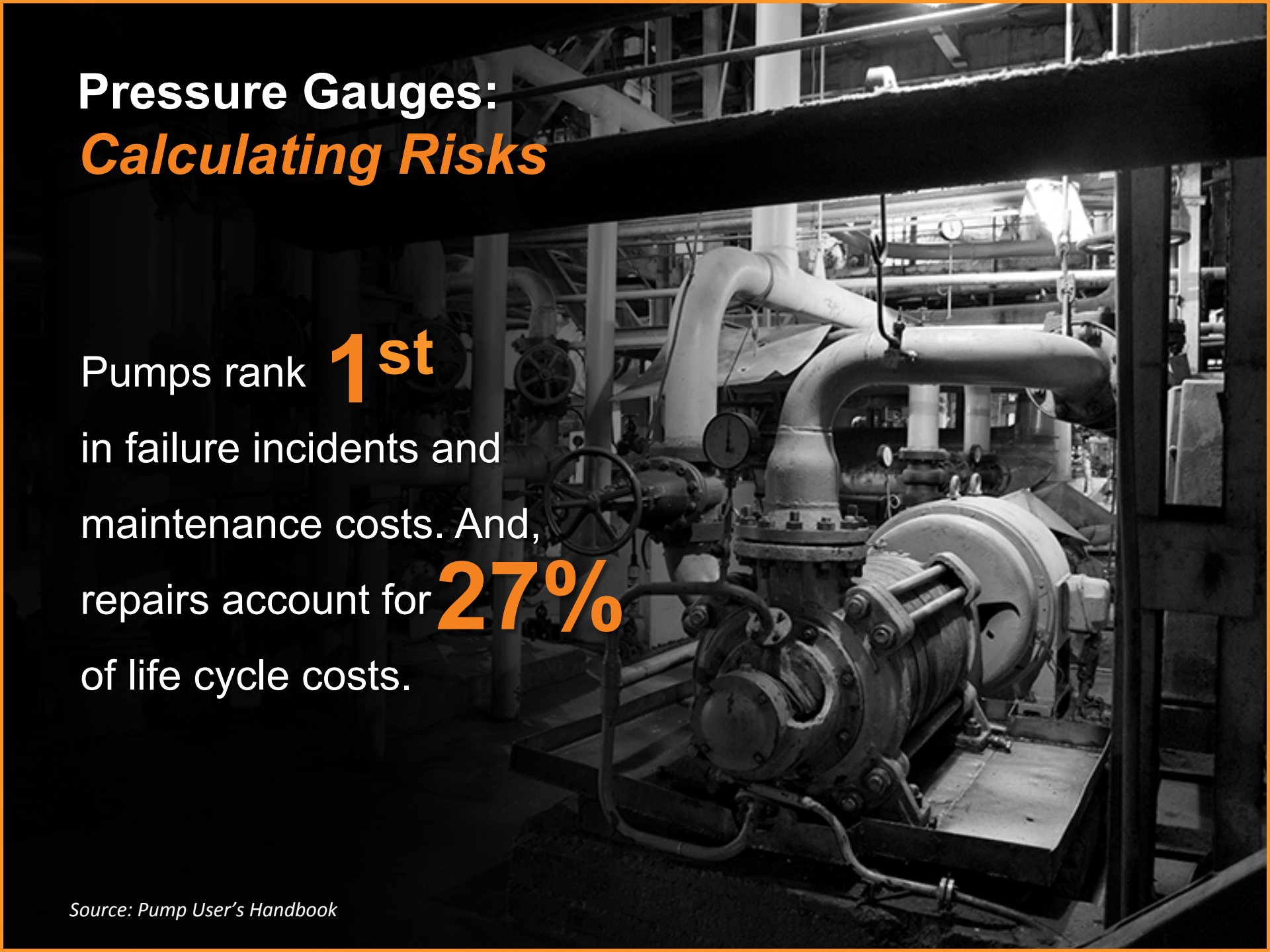
- Provide a local pressure indication
- Detect signs of degradation in process performance not otherwise tracked through DCS equipment
- Identify potential loss of process or loss of containment
- Predict how long a piece of equipment can be safely and economically run
- Diagnose causes of system and production disruptions



Pressure Gauges:
Sole Source of Data

- Discharge pressure
- Suction pressure
- Differential pressure
- Mechanical seal flush pressure
- Steam quench pressure

Pressure Gauges:
Calculating Risks



Pumps rank **1st** in failure incidents and maintenance costs. And, repairs account for **27%** of life cycle costs.

Source: Pump User's Handbook

The Pressure Gauge:
Current State

39% of pressure gauges reviewed had failed or were in danger of failing.

What's Really at Risk

It's Reliability and Much More

- Unplanned shutdowns
- Lost productivity
- Fugitive emissions
- Media releases
- Fire and accidents
- Fines and penalties
- Public relations disasters

Outdated specs and calibration:

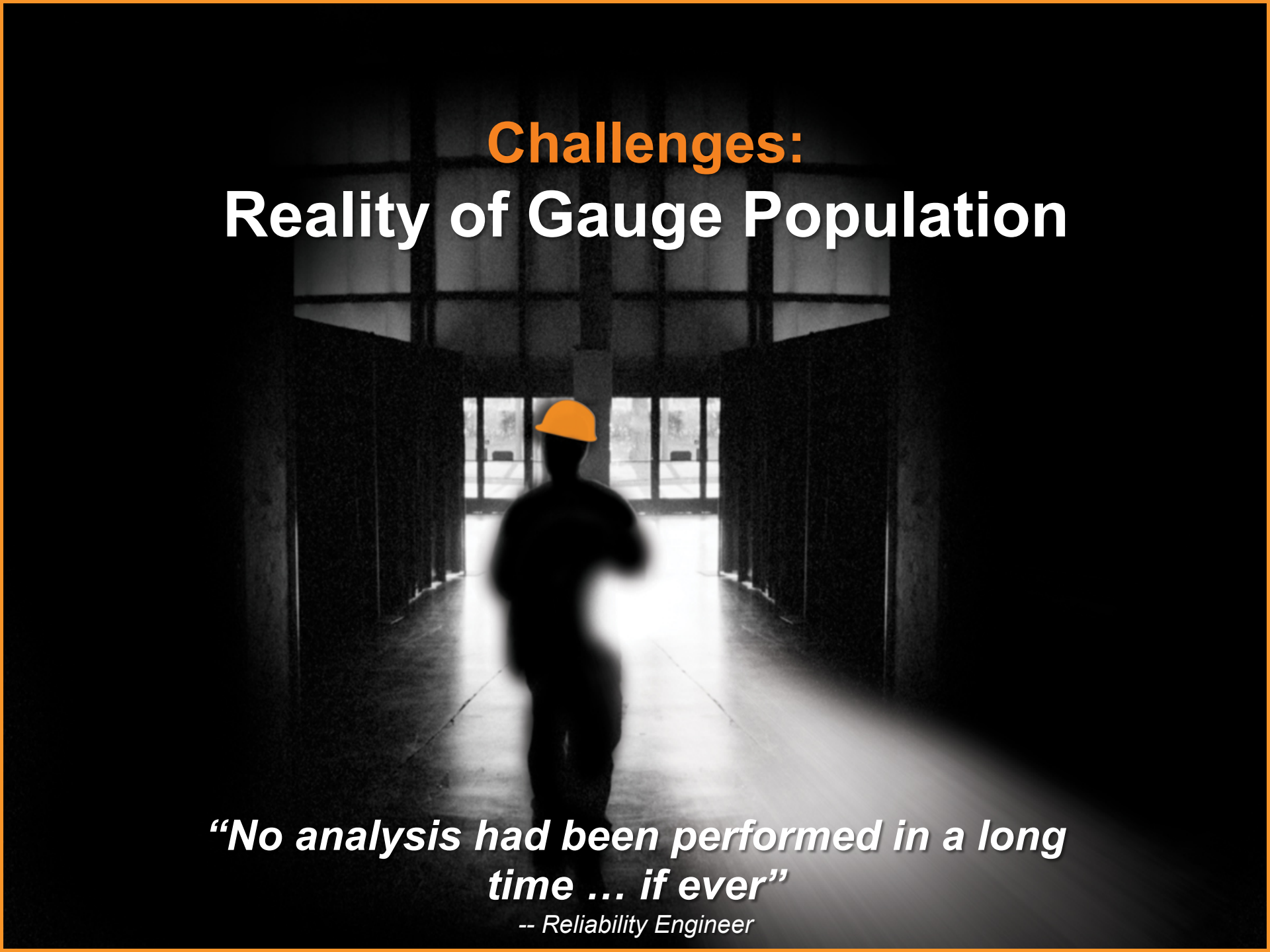
Overflow and explosion at *Texas City Refinery*

Polling Question #2

Chemical Plant

Louisiana

Challenges:
Reality of Gauge Population



"No analysis had been performed in a long time … if ever"

-- Reliability Engineer

Challenge:
Knowledge gap

"I inherited a mixed bag. The plant was constructed before I was born."

-- Reliability Engineer

Challenge:
Lack of Ownership

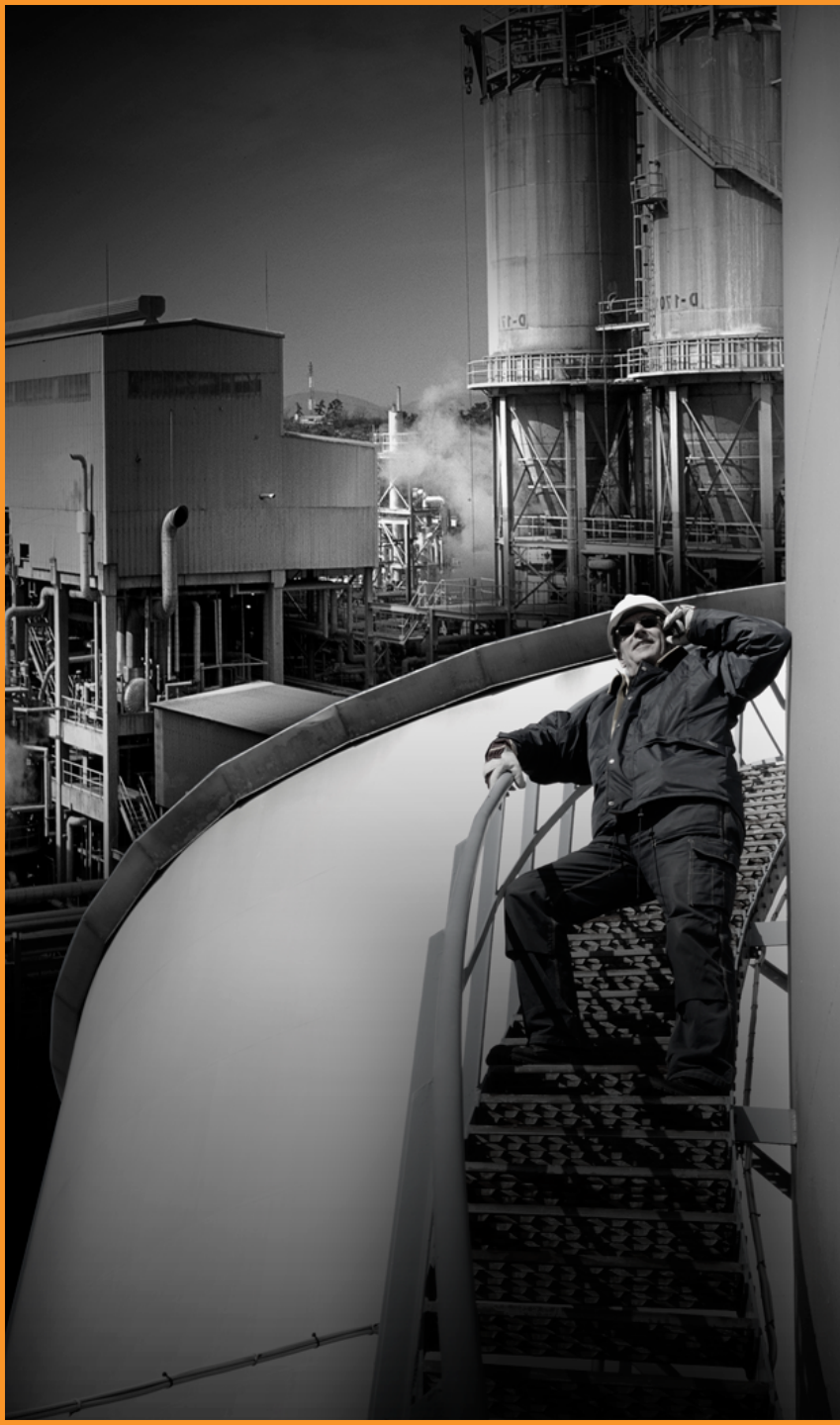
"Operations replaced gauges. Maintenance stored them. That was the extent of our procedures."

-- Reliability Engineer

Challenge: Like and Kind Replacement

"Our P&IDs had gauge locations marked but no specifications were indicated."

-- Reliability Engineer



Challenge:
Lack of Resources

"I didn't have time to identify, analyze, correct and document the 1000+ gauges in our plant. "

-- Reliability Engineer

Goals

- Correct critical gauge issues
- Increase reliability to reduce potential for downtime
- Develop a living document of gauge population to reduce guesswork
- Obtain gauge detail to establish specs
- Standardize population to decrease costs


Case Study
5-Step Solution

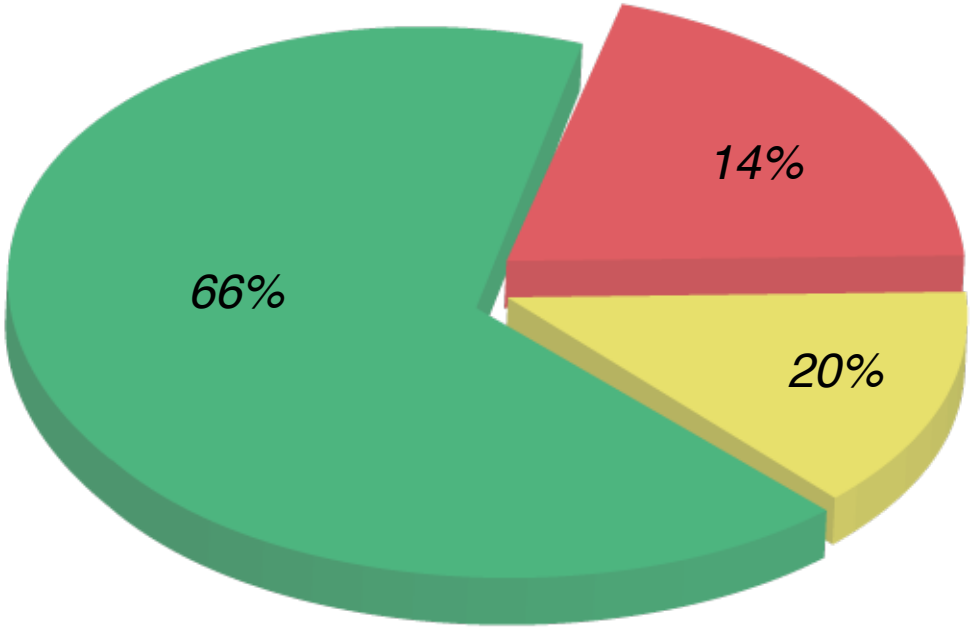
Solution: **Step 1**

Comprehensive Evaluation of All Gauges

1,019

Installations

Attention Ratings



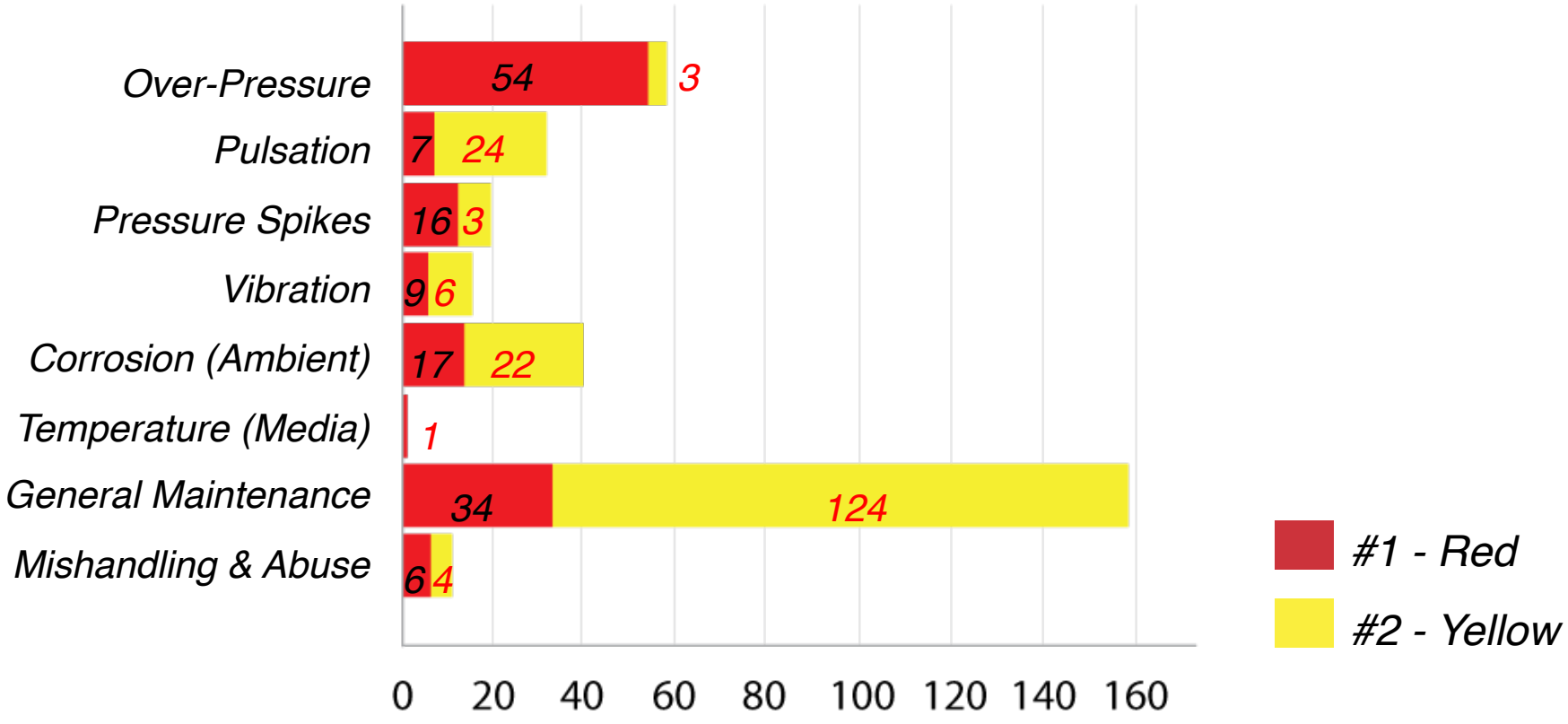
Solution: ***Step 2***

Analyze & Identify Areas for Improvement

34%

Gauges need corrective action

Problem Areas



Solution: ***Step 3***

Make Best Practice Recommendations

Solution: ***Step 4***

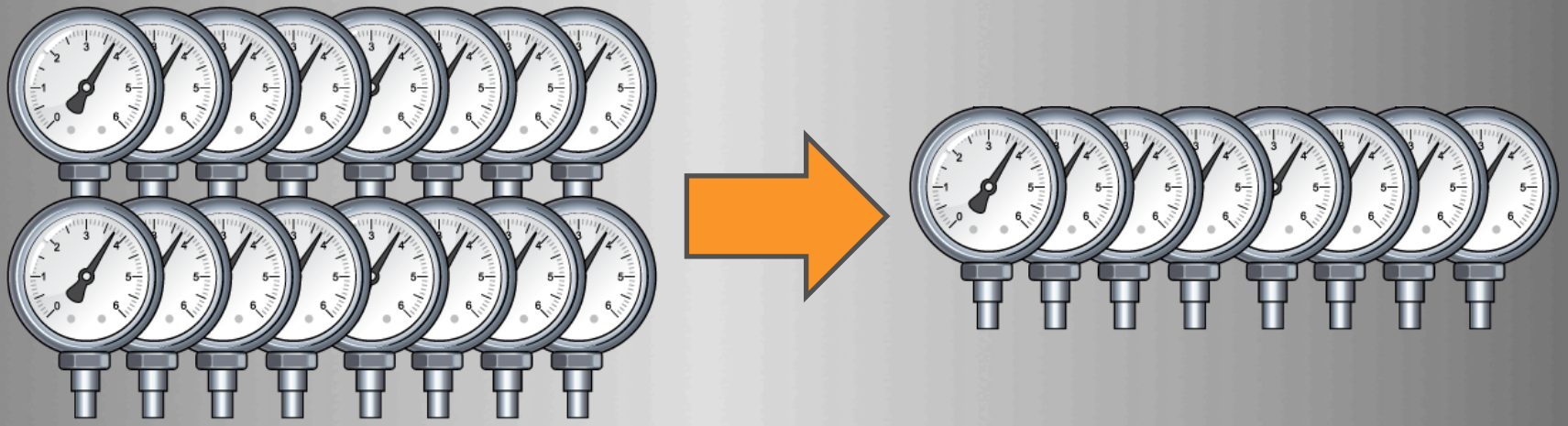
Standardize Inventory

24

Reduced SKU count

92.5%

Increased coverage



Inventory Trends

Complexity of Configurations

- Simplify configurations to reduce guesswork for operators and installers
  - Manufacturer, gauge type and model, pressure range, wetted materials, etc.
- Develop an effective storeroom inventory that will:
  - Maximize field coverage
  - Minimize complexity of configurations
  - Eliminate redundant, obsolete or wasted inventory

75%

Average Reduction in Unique Gauge Configurations*

Eliminate Duplicate Configurations

Reduce Make/Model Complexity

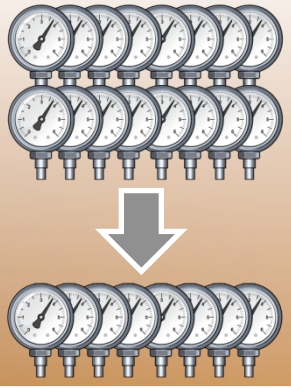
Standardize on Common Pressure Ranges

* Averages from WIKA FAST Instrument Audits

Improving Reliability & Total Operating Costs

OBJECTIVE
Reduce complexity and standardize

RESULT
Eliminate misapplications and repeat failures



OBJECTIVE
Specify correct configurations for process conditions

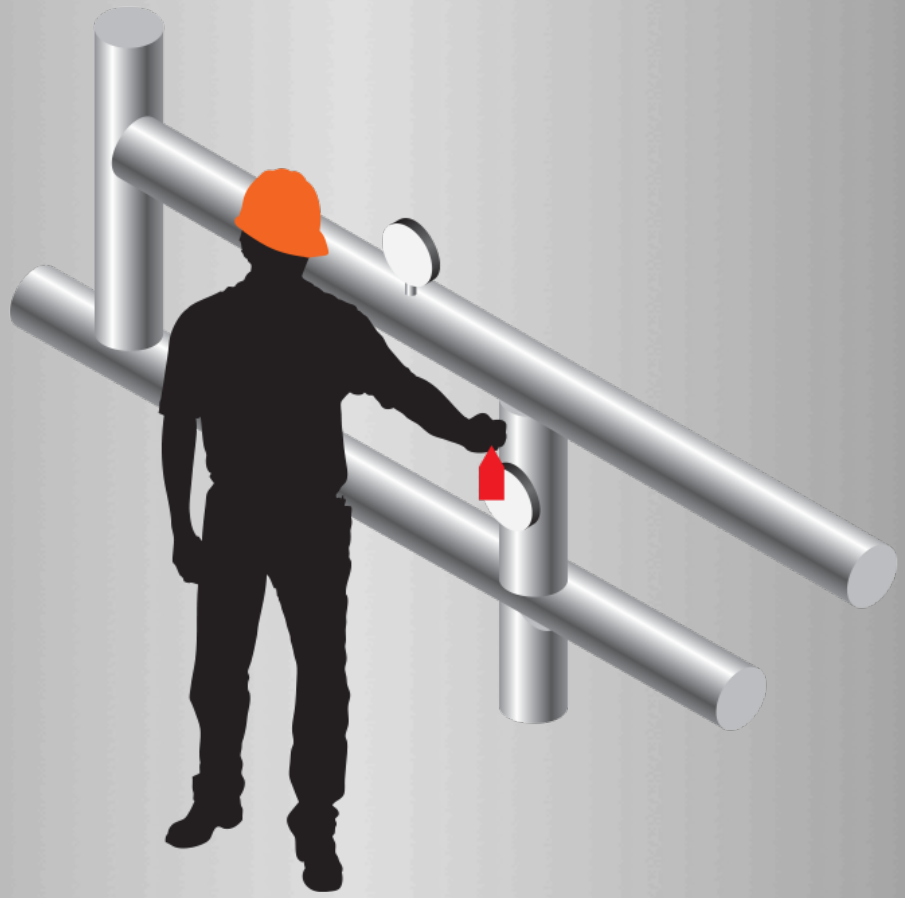
RESULT
Improve reliability with configurations that can handle operating conditions

OBJECTIVE
Prevent expensive, essential equipment failure

RESULT
Provide functional gauges for trouble-shooting, PdM capabilities

Solution: ***Step 5***

Compliance



Roadmap for Compliance

- Asset load spreadsheet built with proper configurations
- Bill of materials associated with location of installations
- Annual usage data to define stock levels
- Easy order guide to support reordering
- Stainless steel tags to ensure accurate replacement

Benefits

Improved and ongoing reliability & productivity

Coverage of ALL failure modes

Compliance with plant specifications

Consolidation of population – 64% reduction

Reduction of inventory and maintenance costs

How did we get here?

Compounding the Issue of Instrument Failure

AGING INFRASTRUCTURE

Missing documentation
Processes change, specs outdated

+

RETIRING EXPERTS "BRAIN DRAIN"

Doing more with less experience

+

UNDER INVESTMENT

Don't know what is failing or what to do about it

=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