Armstrong Solutions For Refining & Petrochemical Plants

Common Refinery and Petrochemical Problems and Armstrong Solutions

Armstrong University
Knowledge Not Shared Is Energy Wasted
Est 1900

Superheated Steam

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Utilities (steam)	• Superheated steam trap distribution lines – wet steam to turbines	• Superheat series (SH) traps designed for superheated service • AIM system for turbine protection

Questions to generate opportunities:

- Are you checking the superheat temperature levels in your superheated steam lines?
- How often are turbines being rebuilt?
- How do you protect your turbines from trap failures?
- How often do you check the critical drip traps in the turbine steam supply lines? Are these traps a fail open design?

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Turbines

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Utilities (steam)	• Turbine trip – due to not receiving enough steam	• Steam balance study

Questions to generate opportunities:

- Are you experiencing turbine trips due to lack of steam feed?
- Do you feel your steam system inefficiency is causing potential added risk to your online turbine performance?

Turbine Ejectors

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Utilities (steam)	• Turbine ejectors (condensate extraction from the vacuum side of a condensing turbine)	• Pumping traps

Questions to generate opportunities:

- Would the refinery save significant money if the turbine ejectors could be replaced with a proven system that does not require continual steam blow through?
- Have you considered using a pressure driven pump to remove the condensate instead of steam-consuming ejectors?

Steam Traps

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Utilities (steam)	• Maintaining the steam trap system	• Total trap management capability (SteamStar) and AIM
		• Trap selection - IB, SH series, F&T

Questions to generate opportunities:

- How do you currently maintain your trap population?
- How do you determine trap replacement ROI and do you have a tool to communicate plant-wide to concerned people?
- How do you select traps for your applications?
- How do you drive down your maintenance costs using existing technology?

Steam Traps

Questions to generate opportunities:

- Do you have a wireless strategy for the facility?
- Would it be advantageous to be notified when critical traps fail, thus alerting you of significant process problems before they occur?
- How do you get trap work orders to the field people and how is the work tracked when completed?
- Do the operators perform your low pressure trap repairs? Do they have difficulty isolating and safely de-pressuring traps?

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Steam Leaks

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Utilities (steam)	• Steam leaks – aged piping, loose flanges, pipe expansion, corroded piping, failed gaskets	• Steam leak surveys and energy loss calculations (steam loss table with plume calculator)

Questions to generate opportunities:
• Do you have a steam leak identification and loss quantification program?
• Would the facility be interested in saving the energy from all the steam leaks to atmosphere?
• Would the site be interested in a financial analysis of how much the leaks are costing the plant and solutions to stopping leaks?

Wet Plant Air, Air Leaks and Compressors

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Utilities (compressed air)	• Wet (compressed) plant air – motive gas used to actuate the process control valves	• Separators and liquid drainers
	• Air leaks throughout the utility loop	• Air leak surveys
	• Compressor optimization	• Compressor optimization analysis

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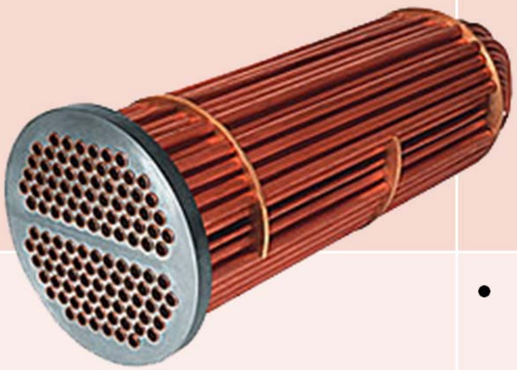
Wet Plant Air, Air Leaks and Compressors

Questions to generate opportunities:
• Do you feel your compressed air equipment experiences reduced life because of wet air and a lack of proper system design to address moisture in the system?
• Would it be interesting to know the ROI from reducing system moisture and how to address it?
• Would it be advantageous to reduce the regeneration time on your desiccant dryers?

Heat Exchangers, Reboilers and Tube Bundles

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Processes	• Heat exchanger optimization	• HE optimization assessments – may include air vents, condensate pumps, steam traps, and control valves
	• Tube bundle failure/corrosion	• Condensate pumps, air vents and fin tube replacement bundle
	• Modulating Process Control temperatures	• Condensate pumps, air vents, and traps



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Heat Exchangers, Reboilers and Tube Bundles

Questions to generate opportunities:
• Do you use "level control" of steam condensate to regulate your heat exchanger output?
• Is the expense the refinery spends each year on tube bundle replacements significant?
• Would it be attractive to you to reduce the amount of tube bundle failures you experience each year?

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Turndown and Modulating Outlet Temperatures

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Processes	• Turndown - or modulating process flow rates • Modulating inlet/outlet temperatures	• Double-Duty pumps 

Questions to generate opportunities:

- Would you like to optimize, or increase, your turndown in your heat exchangers without encountering the typical problems that occur when turndown is higher?
- Would there be significant financial savings if the refinery could optimize the turndown in their heat exchangers and avoid flooding?

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Vacuum

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Processes	• Fouling of exchanger surfaces	• Double-Duty pumps

Questions to generate opportunities:
• How often do you need to replace corroded tube bundles?
• Would having more latent heat available to increase exchanger efficiency be beneficial to the plant?
• How does your plant address condensate drainage from vacuum space?
• Are flooded exchangers a common practice within your facility?
• If we could help you produce the same amount of product, and consume less energy, would that be of value?

Control Scheme

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Processes	• Control scheme	• Condensate pot level controls vs. steam control/DD pumps

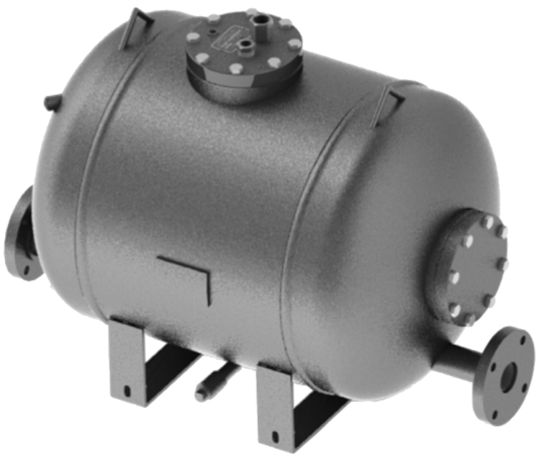
Question to generate opportunities:

- Do you have trouble holding condensate levels in your pots?

Fouling of Exchanger Surfaces

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Processes	• Fouling of exchanger surfaces	• Double-Duty pumps

Questions to generate opportunities:
• Do you have to take unplanned shutdowns (squats) to clean fouled reboilers?



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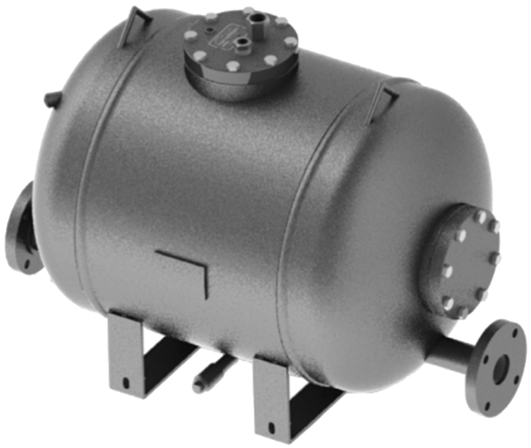
Air, NCGs, and Condensate Drain to Atmosphere

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Processes	• Air and NCGs	• Air vents
	• Condensate drain to atmosphere	• DD pumps • Proper trap sizing

Questions to generate opportunities:

- Do you experience premature gasket failure on steam fed tube bundles?
- Are you dumping condensate to drain?



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Gas Leaks/Valve Leaks

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Processes	• Leaking relief valves (which tie into flare lines)	• AIM System
	• Gas leaks/valve leaks	• AIM System

Questions to generate opportunities:

- Have you had any flare issues recently that took a while to identify the relief valve causing the incident?
- Are there actuated valves that could be leaking and you are not aware of?
- Would it be helpful to have instant notification of failed relief valves on your flare lines?

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Tank and Railcar Heating

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Processes	• Tank heating coil failures • Temperature control • Condensate removal • Water removal	• Condensate pumps • Air vents • Full line of tank heaters • Manifolds, TVS, traps • Double Duty pumps • Dual gravity drainers

Questions to generate opportunities:

- Are your heat-up times adequate for current plant operations?
- Are you using the proper trap technology for railcar transfers?
- Do you experience premature failures with tank coils?

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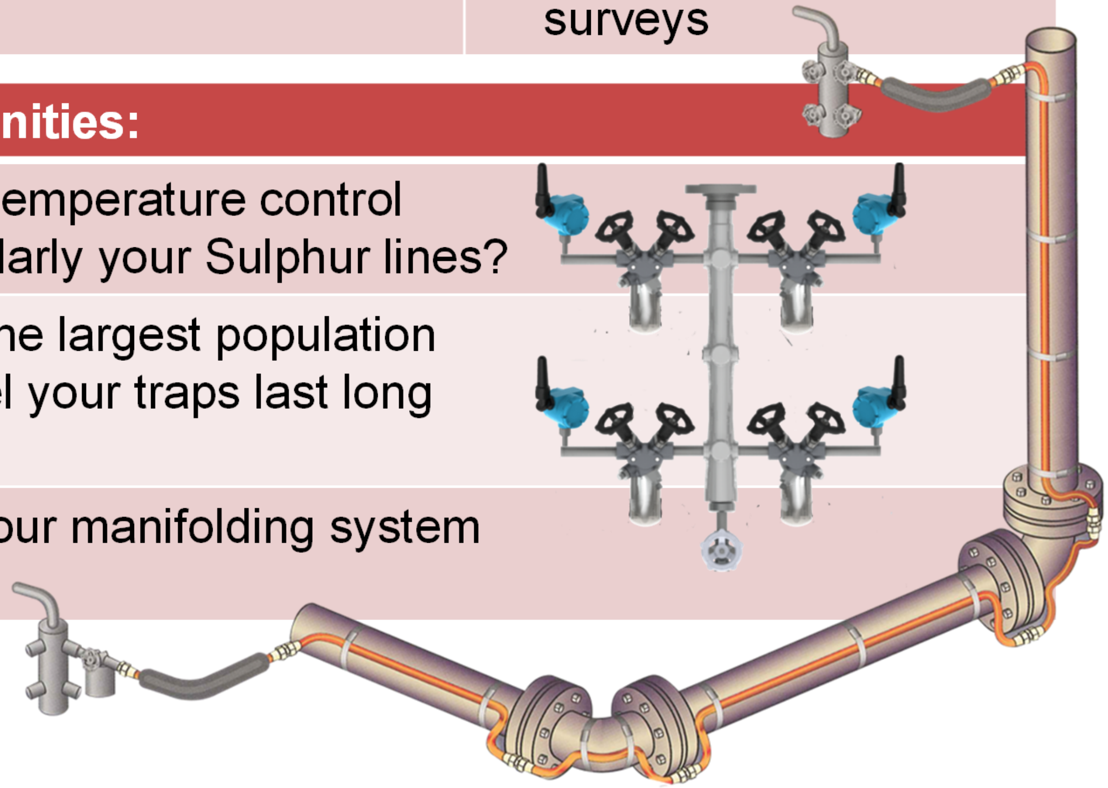
Tracing

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Tracing	• Cold circuits	• AIM trap monitoring • Tracing optimization surveys

Questions to generate opportunities:

- Are you maintaining effective temperature control in your tracing system, particularly your Sulphur lines?
- Since tracing traps comprise the largest population of traps in a facility, do you feel your traps last long enough and are as efficient?
- Would it benefit your plant if your manifolding system utilized a smaller footprint?



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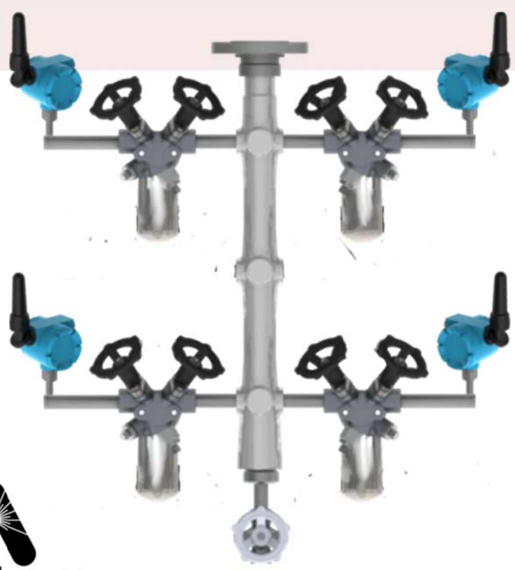
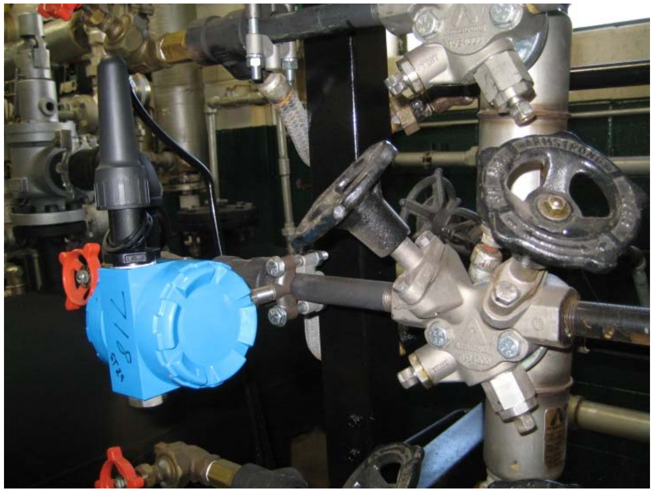
Circuit Troubleshooting, Pipe Temps and Maintenance

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Tracing	• Circuit troubleshooting and maintenance	• Manifolds/trap stations – check traps and circuit from one location
	• Process pipe temperatures	• Right steam traps • AIM detection system to alert personnel





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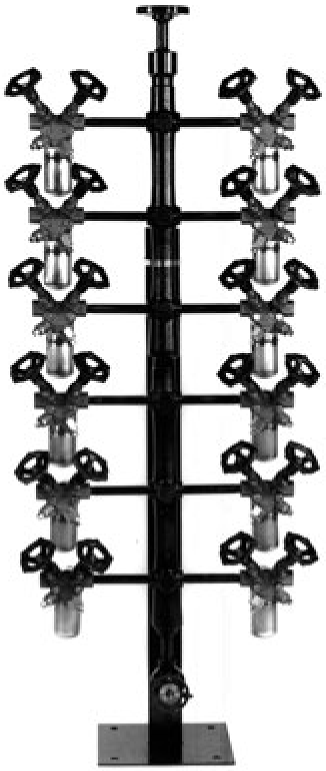
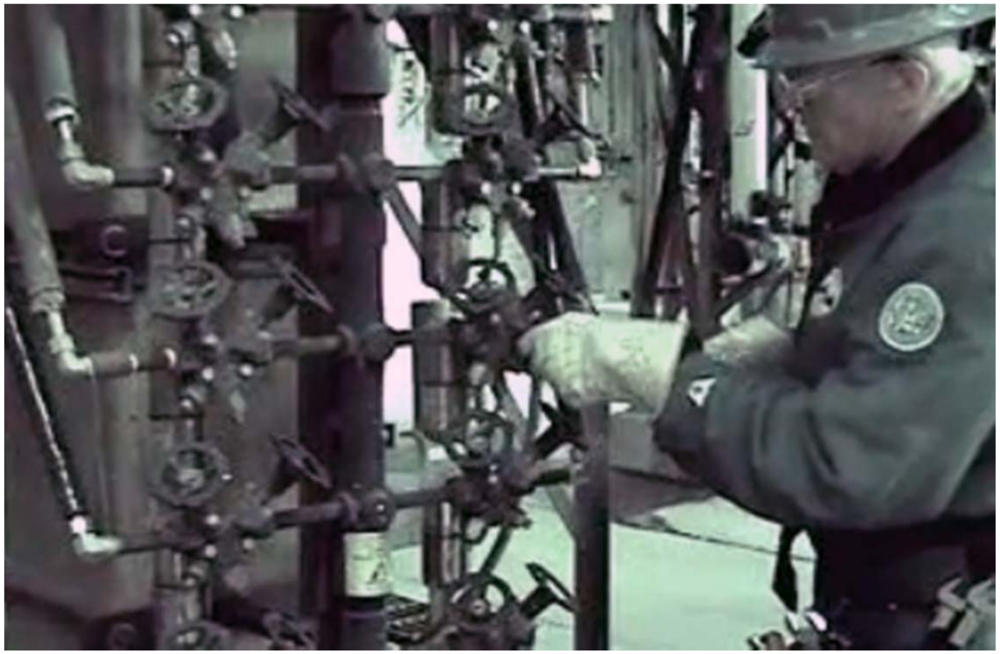
Circuit Troubleshooting, Pipe Temps and Maintenance

Question to generate opportunities:
• Do operators have trouble finding isolation valves for steam tracing?
• Are you having trouble maintaining desired process pipe temperatures with your current tracing?
• How long does a trap repair take to complete?
• Would you like a single spare part for all tracers and steam main drip traps below 400 psig (28 barg)?
• Is a 5-year warranty attractive?

Trap Safety





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Excessive Back Pressures

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Condensate return	• Excessive back pressures	• AIM system for trap failure • Condensate system audit • Flash tank condensate drums

Questions to generate opportunities:

- Do you know if your condensate line pressure is at system design?
- How do you control your back pressure in the condensate return system?
- Have you added to your condensate system over time but not considered the sizing impact to the original line when doing so?
- Are you currently using trap technology that is susceptible to excessive back pressure?

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Corrosive Condensate

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Condensate return	• Corrosive condensate	• Thermostatic air vents • Condensate polishers

Questions to generate opportunities:

- Are you allowing condensate to sub-cool and remain in steam lines?
- Do you have the ability to drain steam lines upon shut-down?
- Do you currently use air vents on your steam mains?
- Do you spend excessive amounts of money on corrosion prevention?

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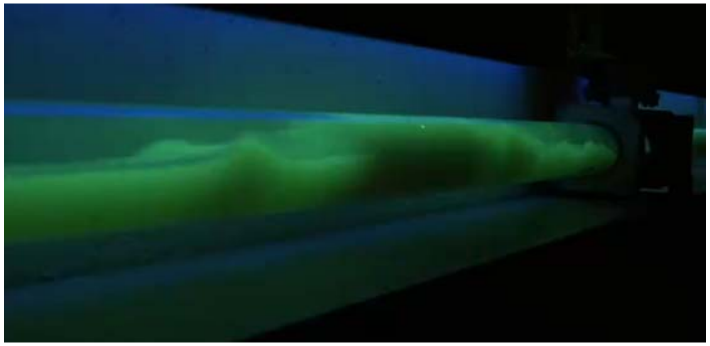
Water Hammer

Area of the Plant	Common Problems Encountered	Armstrong Solutions and Best Practices
Condensate return	• Water Hammer	• Condensate return system assessment

Questions to generate opportunities:
• Do you separate your pumped condensate return from your trapped condensate return?
• Are your condensate return lines undersized?
• Do you mix condensate from different steam pressures in a single return line?



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Armstrong provides intelligent system solutions that improve utility performance, lower energy consumption, and reduce environmental emissions while providing an "enjoyable experience."

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