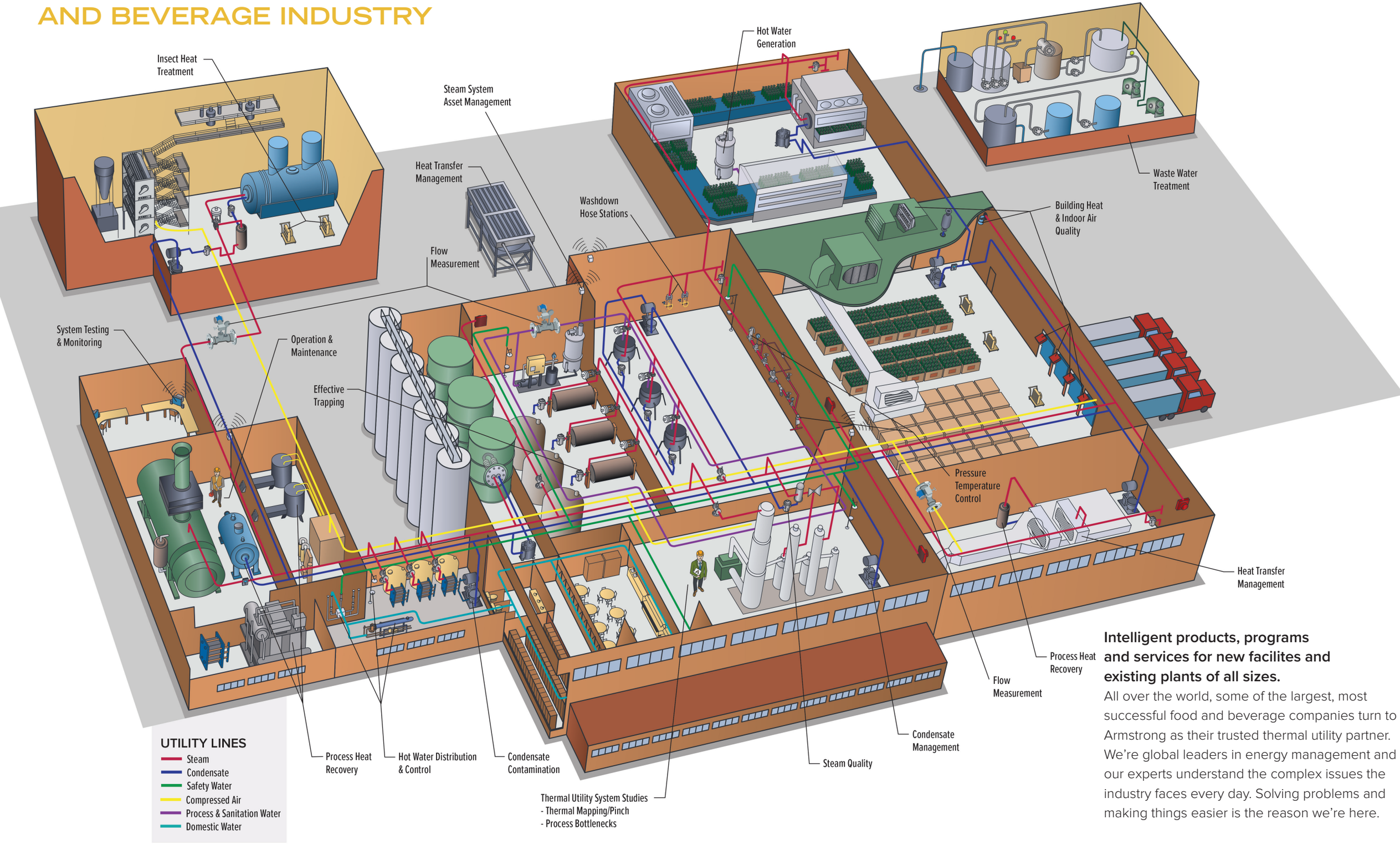
Armstrong®

REPRESENTATIVE'S PLAYBOOK FOR FOOD AND BEVERAGE

GLOBAL EXPERTISE FOR THE FOOD AND BEVERAGE INDUSTRY



Intelligent products, programs and services for new facilites and existing plants of all sizes.

All over the world, some of the largest, most successful food and beverage companies turn to Armstrong as their trusted thermal utility partner. We're global leaders in energy management and our experts understand the complex issues the industry faces every day. Solving problems and making things easier is the reason we're here.

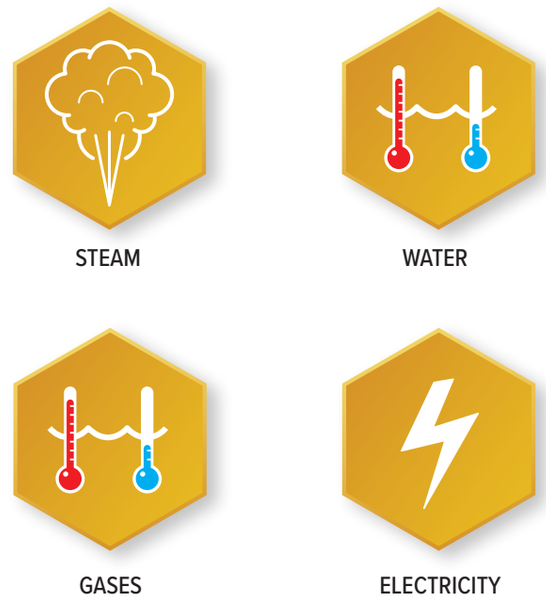
ENGINEERED FOR THE FOOD AND BEVERAGE INDUSTRY'S MOST DIFFICULT CHALLENGES

Armstrong offers rugged, dependable products, state-of-the-art technology, and custom designed, fully integrated systems. We have solutions to satisfy this industry's most unique requirements for: steam and condensate management, hot water generation and digital temperature control, heat transfer, flow measurement, and more. We can also provide expert, on-site staffing and supervision to operate and maintain an entire utility infrastructure, 24 hours a day.

FOOD AND BEVERAGE PROCESSES SERVED THAT REQUIRE THERMAL UTILITIES

- Beverages (carbonated and non-carbonated)
- Coffee
- Poultry processing (slaughter and process)
- Meat processing (slaughter and process)
- Rendering plants
- Dairy (Milk/Yogurt/Cheese)
- Breweries
- Corn milling/processing
- Sugar refining
- Edible oils (soybean, vegetable etc.)
- Dried or dehydrated foods
- Cereal
- Fruit & Vegetable processing
- Confections (chocolate/candy etc.) processing
- Pet food
- Bakery
- Prepared food processing (frozen pizza, pre-packaged meals/snacks)
- Soups/Sauces
- Dry ingredients (spices etc.)
- Flavorings
- Pharmaceutical (plant and clean steam)

UTILITIES PRESENT



INCREASE PRODUCTION AND YIELD

Armstrong's innovative thermal utility products and systems are hard at work, consistently saving time, money and energy — all engineered to improve productivity and efficiency.

- State-of-the-art tools and software for smart trap surveys and steam system management
- Instantaneous hot water generation and digital temperature control for tighter processcontrol of hot water
- Flow measurement technology that delivers reliable accuracy for any application
- Wireless/Battery-less steam trap monitoring
- Automatic steam quality monitoring
- Heat transfer management, including custom-built coils
- Steam separators and filters to remove impurities
- Comprehensive on-site system assessments and studies by our experts to identify opportunities for improvement

IMPROVE SAFETY

We understand the complex regulations and guidelines for safety and sanitation in the food and beverage industry, and we can provide the equipment, technology, utility system packages, and online education needed to satisfy this industry's toughest requirements. Armstrong offers:

- Steam separators and steam filters to remove impurities
- Automatic steam quality monitoring that continuously measures and communicates the dryness fraction of steam
- Hose stations that will not pass live steam
- Hot water systems, complete with instantaneous hot water generation and digital water temperature control with instantaneous hot water generation and +/- 1 ° F digital hot water temperature control
- Online courses to help address a variety of environmental health and safety issues, including water hammer

BOOST ENERGY EFFICIENCY AND SUSTAINABILITY

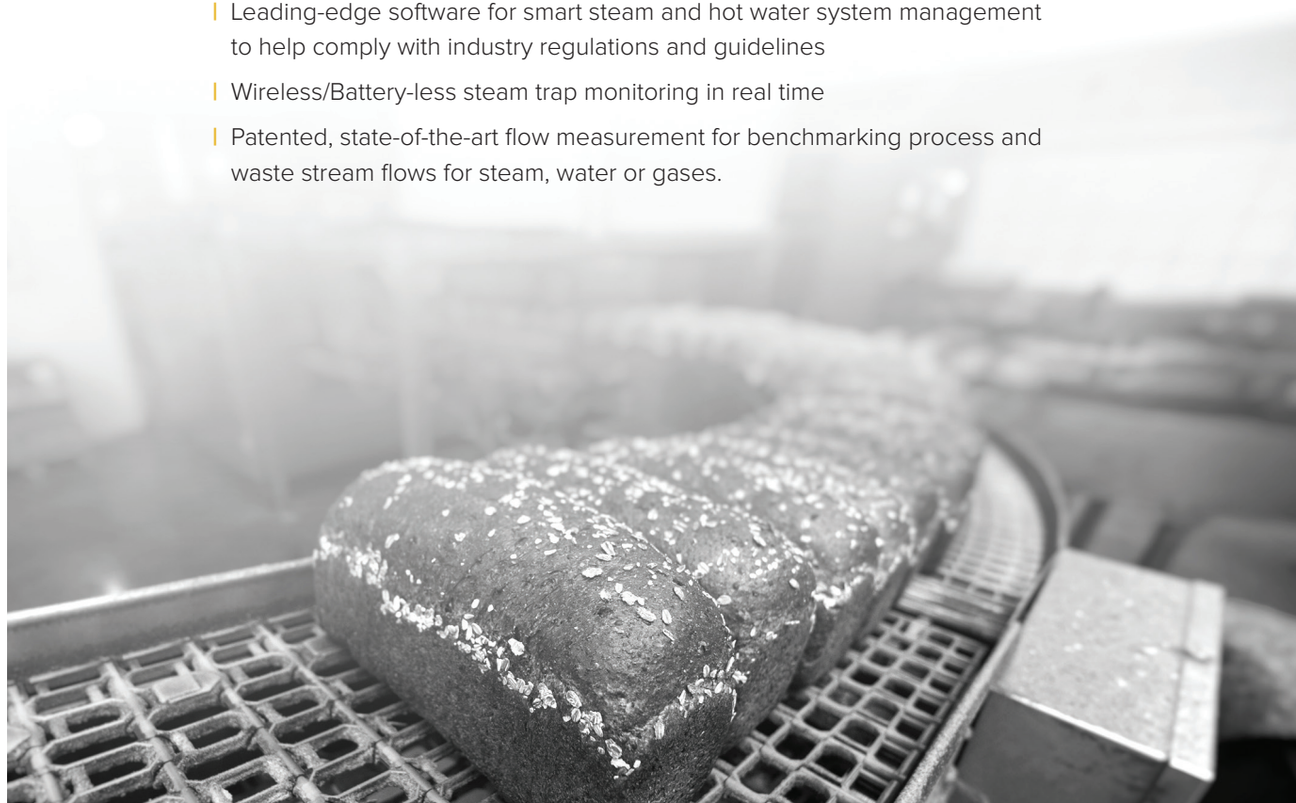
Our experts can help customers maximize performance, reduce energy costs and emissions, and get a better ROI in their plant. Our complete range of thermal utility system equipment includes:

- Cutting-edge tools, software and programs for smart trap surveys and steam system management
- Wireless/Battery-less steam trap monitoring in real time
- Instantaneous hot water generation and digital temperature control for tighter process control of hot water
- Advanced flow measurement technology for steam, air and gas
- Complete, on-site operation and maintenance of thermal utilities
- Expert, on-site evaluation of utility systems to identify problems, inefficiencies, and areas with the potential for improvement
- Optimize, Minimize and Decarbonize Roadmap development

WORLD-CLASS ACCURACY IN MONITORING, MEASURING AND AUDITING

Armstrong offers a complete array of state-of-the-art tools, technology and software for monitoring, metering, submetering, auditing and documentation engineered to deliver exceptional efficiency, accuracy and dependability in every application, 24 hours a day. We provide some of the most advanced solutions in the industry, such as:

- Leading-edge software for smart steam and hot water system management to help comply with industry regulations and guidelines
- Wireless/Battery-less steam trap monitoring in real time
- Patented, state-of-the-art flow measurement for benchmarking process and waste stream flows for steam, water or gases.



KNOW WHAT YOU'RE GETTING INTO

UTILITIES PRESENT

PRIMARY UTILITY AREAS

CONTACT ROLES AND RESPONSIBILITIES

CONTACT PAIN POINTS

QUESTIONS TO ASK

FOOD MARKET OPPORTUNITIES

Heat Generation

The generation of heat can include steam and hot water streams both of which offer opportunities for various product solutions. Steam separators reduce the effects of boiler carryover, flow measurement provides a key data point which is the amount of steam generated in a given day and steam quality monitors to determine the dryness fraction of the steam.

Steam Distribution

As the lifeblood of many food plants, the steam distribution network offers plenty of opportunities for efficiency improvements. An evaluation of the network can highlight the need for additional steam traps, insulation of piping and isolation valves, and expose potential piping arrangements that could lead to water hammer and other performance issues.

Hot Water Generation and Temperature Control

70% of the hot water generated in many food plants is for washdown purposes. Typically, using steam to generate washdown water is at best 60% efficient. Direct contact heaters offer 99.7% efficiency which helps reduce natural gas usage which improves overall plant efficiencies. Additionally, accurate hot water generation and digital temperature control improves those critical chilled or hot water streams needed for tank jacketing, recipes, CIP and the like.

Point of Use

Proper piping of heat exchangers (Coils, Jackets, Shell & Tube, PHE etc.) can lead to improvements in the production of product or hot water. Best practice design of the steam delivery stations, air venting, trapping and the elimination of heat exchanger stall provide you with proven product solutions that deliver consistent results.

Condensate Recovery/Return

Returning condensate to the boiler room is an important process for most food plants. Condensate is hot, treated water that reduces the amount of fresh make-up water needed at the boiler feed tank or DA. A condensate savings analysis can be used to place a value on condensate streams discharged to the sewer and can help provide an ROI on any condensate pump solutions presented. Heat recovery opportunities may also exist for contaminated (or risk of contamination) condensate for the preheating of process or other water streams.

Heat Recovery

Recovery of heat from compressors, process streams, dryer exhaust and other waste streams can improve overall plant performance by reducing energy costs and CO2 emissions. Implementation of heat recovery projects can also work to lower plant operating expenses.

TYPICAL STEAM AND HOT WATER USES

Shell & Tube Heat Exchanger
- Product heating
- Water heating
- CIP (Clean-in-place) (washdown/sterilization)

Plate & Frame Heat Exchanger
- Pasteurizing
- Water heating
- Product heating

Coils
- Product drying
- Space heating
- Air handlers

Jacketed Kettles
- Soups/sauces
- Fruit/vegetable processing

Retorts
- Sterilization

Evaporators
- Evaporating moisture from product (sugar, milk (powdered) etc.

Sterilizers/Pasteurizers

Direct Steam Injection
- Food grade steam directly into or onto product (sauces/veggies/cereal/grains etc.)
- Hot water production

Blanchers/Steeper's
- Steam to heat exchangers to make hot water

Wort Kettles
- Breweries

In many food plants, steam is used to create hot water for CIP (clean-in-place/washdown), COP (clean out of place – such as sinks etc.), ingredient water or water for jacketed vessels.

PRODUCT SOLUTIONS

Heat Pump Packages

Heat Transfer Packages

99.7% Efficient
Hot Water Generation

Condensate Recovery

CONTACT ROLES AND RESPONSIBILITIES

PURCHASING

Responsibilities

Purchase goods and services needed day-to-day by the plant, capital projects, negotiating price and contracts/renewals, price and value comparisons

Pain Points

The need to consolidate suppliers and achieve best value on goods and services procured. Protect the integrity and uptime of the processes by selecting vendors and products that meet plant expectations of performance and warranty.

- How would you rank the following in consideration to your purchasing decisions:
  - Product Availability
  - Product Reliability
  - Product Cost
  - Product Service and Support
  - Product Quality

MAINTENANCE MANAGER

Responsibilities

Installations, maintenance procedures, maintenance budgets, expenses, inspections, spares, repairs

Pain Points

Reliable products, proper piping of systems (traps, control valves, condensate etc.), Repairability of products

- What steam products or users do you have to repair most often? Why?
- What is your most critical utility, the one you can't live without if it goes down?

PROCESS ENGINEERING/LEADERS

Responsibilities

Testing and monitoring equipment, updating processes, risk assessment

Pain Points

Production and yield, steam quality, hot water generation and control, trap management, heat transfer, flow measurement

- What is the biggest issue with trying to generate hot water in your facility?
- How do you generate hot water for your processes?
- Do you ever run out of hot water?
- When water temperature control become erratic, what is the typical root cause?

PLANT / RELIABILITY ENGINEERING

Responsibilities

Responsible for plant operations, redesign/construction of system upgrades, assesses risks and reliabilities of the facility assets and looks for ways to improve the reliability of systems.

Assesses risks and liabilities of a facilities assets, looks for ways to improve reliability of the systems, reduce system losses, life-cycle assessment

Pain Points

Proper piping of systems, efficiency of the equipment, reliability of the processes, safety of the processes

- Which utility affects production most often? Why?
- How do you produce washdown water? How do you control temperatures at the point of use?

ENERGY / SUSTAINABILLITY MANAGERS

Responsibilities

Assesses energy utilization in the facility including all processes requiring thermal energy. Redesign of processes and responsible for setting and reaching energy goals for the site. This role may also include environmental, safety & governance responsibilities.

Pain Points

Proper piping, heat recovery, trap management, utilities/ process optimizations, GHG goals/goal setting

- What are some ways that you're recovering waste heat?
- How to you plan to achieve your environmental goals?

PLANT MANAGER

Responsibilities

Responsible for all aspects of a facility – personnel safety to end-product produced, responsible for plant operations, redesign/construction of system upgrades, assesses risks and reliabilities of the facility assets and looks for ways to improve the reliability of systems.

Pain Points

All aspects of plant operations, people, safety, utilities, processes, production, energy/sustainability, training

- What types of projects are funded by maintenance budgets? What determines if a project will require CapEx?
- For what types of projects would you feel most strongly about trying to secure capital funding?

INTELLIGENT THERMAL UTILITIES SOLUTIONS FROM
A GLOBAL LEADER IN ENERGY MANAGEMENT
AND ENJOYABLE EXPERIENCES.

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