COMPRESSED AIR SYSTEMS

PROCESS STABLIZATION AND IMPROVEMENT
AND
ENERGY ABATEMENT
CLASS AGENDA OUTLINE

TRAINING CLASS ABSTRACT

Producing compressed air is one of the largest energy requirements / costs in manufacturing / processing companies today.

This training class details the basics of compressed air generation, types of equipment, critical issues of supply and demand, and essentials of maintenance / safety. Cost reduction strategies are presented with specific action plans on how to specify / acquire / install / operate / maintain compressed air system equipment.

Every strategy and action presented in this training class is directed at optimizing the compressed air system and lowering the energy requirement / cost of compressed air while assuring the best safety modalities are incorporated.

Methodologies are included on how to conduct a thorough assessment of the compressed air system and implement corrective actions to achieve substantial current / on-going system and energy cost reductions.

The vision includes a continuous improvement process focused on improving process reliability and repeatability and ensuring the highest quality and quantity of throughput in a logical, reasonable, and prudent way.

This training class will bring both novice and experienced personnel working with compressed air systems current with the knowledge and skills they need to optimize their compressed air system in order to substantially reduce energy costs.

The training course is designed in discrete modules which allow wide latitude in structuring the course agendas to address the various attendee groups' job requirements and tasking. This versatility facilitates meeting each attendee's needs in a specific manner and geared for the most effective use of the time spent in class.

PROJECT DEVELOPMENT

1. Understand the elements of success
    A. Thorough research
    B. Define the net conditions

C. Identify the required actions
D. Implement broad reaching measurements
E. Compile the data
F. Develop specifications the encompass the best chances of success
G. Develop strategies for innovation and empowering all steff to seek success
H. Implement strategies rationally

2. Study and understand the problem from a root cause analysis basis
3. Create a verifiable statistical presentation
4. Identify the true motivational factors
5. Look outside the status quo and foster and embrace innovation
6. Incorporate reliability modalities
7. Developing standard Global Best Practices specifications and guidelines and enforce their implementation throughout the organization

FACILITIES ISSUES:

1. Point of generation
    a. Compressors-type and horsepower- Note: A running compressor is an indication of cost but not necessarily an indication of need.
        i. Reciprocating- 5 CFM/HP
        ii. Sliding Vane – 4.9 CFM/HP
        iii. Rotary Screw
            1. Oil Flooded- 4.5 CFM/HP
            2. Oil Free – 4.0 CFM/HP
        iv. Centrifugal
            1. Single and Two Stage – 3.8 CFM/HP
            2. Three Stage – 3.8 CFM/HP
            3. Four Stage – 3.95 CFM/HP
    b. Cooling and drying equipment
        i. Refrigerated
        ii. Chilled Water
        iii. Desiccant
            1. Heatless Line Purge
            2. Vacuum Assist
            3. Blower Purge
            4. Heat of Compression
            5. Steam heated options
        iv. Air Cooled
        v. Integrated systems i.e. ethylene glycol based
        vi. Standard designs versus high efficiency designs
        vii. Dew points and what they really are and what they really mean
    c. Storage- is it necessary in the first place and if so, is it sufficient and truly effective or not
        i. Physics of storage
        ii. Choosing storage volume

iii. Local Dedicated storage
iv. Safety issues involved in storage

d. System pressure control in terms of weight flow and demand at all points in the system.
e. System control-Refine and where necessary, upgrade controls to respond to a controlled demand, interpreted through effective storage
f. Condensate removal effectiveness and abatement of system contamination

2. Overhead transmission
    a. Demand control- You must control the weight flow of the gas despite the variations in pressure, temperature, humidity, and flow. An effective strategy is focused on the concept that the closer that you can do this, the more efficiently you can control the applied energy and associated costs. Attempting to control air compressors without first controlling demand is an expensive exercise in futility.
    b. Intermediate and sector controls
    c. Sector pressure identification and isolation
    d. Header design influences on meeting point of use demand

3. Point of use transfer
    a. Initial pressure versus article pressure
    b. Weight/flow versus pipe and tubing sizes
    c. Identifying and abating unnecessary flow restriction

4. Infrastructure design
    a. New plant design-inspire innovation
    b. Expansion of existing facilities and integration of new to legacy designs

5. New equipment specification and purchase
    a. Involvement and active integration of production, engineering, and purchasing, as well as management, in creating a sensible approach to specifying and purchasing equipment and components for both supply and demand requirements.
    b. Requiring production equipment suppliers to justify compressed air requirements due to design and construction of equipment and components
    c. Seek solid methods of determining the best life cycle costs in purchases while avoiding buying on price only
6. Maintenance philosophy and action plan
    a. Institute a continual leak identification and repair program
    b. Establish standards for pipe, tube, FLR and accessories sizing and reliability
    c. Establish a standard using a Teflon free thread sealant on threaded air fittings, piping and tubing
    d. Condensate removal
    e. Inlet filtration

f. Cooling water supply and conservation

6. Point of use production oriented issues
    1. Machinery design and placement in terms of actual work required
    2. Local dedicated storage and sudden event demands
    3. Piping and tubing in original installation and maintenance retrofits
    4. Point of use pressure regulation (is it really needed or not?)
    5. Gauge and instrumentation quality, specification and placement
    6. Valves
    7. Operator issues
        a. Walk-offs/shift changes
        b. Artificial loading
        c. Clean-up/ blow off nozzles
    8. Leak rate influences on production rate and quality
    9. Engineer out sudden event demands whenever possible
    10. Avoidance of unnecessary restriction issues

7. Quality issues
    1. Influence of pressure versus volume on product quality
    2. Foundational compressed air stream quality requirements
    3. Point of use compressed air alternatives
8. Purchasing
    1. Production equipment
    2. Compressors and peripheral equipment
    3. MRO items
    4. Contractors services
9. Safety issues
    1. Blow off hoses
    2. Receivers
    3. Exhaust Mufflers
    4. Velocity Fuses
    5. Airborne aerosols