SPENCER TECHNICAL INNOVATIONS

WHAT FLUID POWER IS AND HOW IT IS USED IN AN EVERYDAY INDUSTRIAL ENVIRONMENT

This course begins with an overview of Pneumatic and Hydraulic principles: what fluid power is and how it is used to perform useful work. We discuss the differences and similarities of Pneumatics and Hydraulics, distinguishing which to use - (when and why, including the use of various physical and natural laws and formulas that govern the use of fluids) - to provide fluid flow to move loads and fluid pressure to support loads, progressing through identifying pneumatic components by their schematic symbols and identifying the components in circuits, what they do and why they are in the circuit, how leakage and contamination affects performance and a discussion of common failures. The program is devoted to safety and the requirements for creating a "skilled worker."

This course covers an overview of pneumatic principles and progresses through pneumatic system components including compressors, valves, cylinders, motors, rotary actuators, accumulators and filters, with emphasis on component structure and the identification of the components by the proper symbol as standardized by ANSI and ISO.

Methods of instruction include lecture, discussion, audio-visual material including PowerPoint presentation, lab exercises with simulation and the use of real-world hydraulic components and problem solving.

COURSE OUTLINE

- Pneumatic Principles
- Compressors - Positive & Dynamic; Including single and multi-stage
- After Coolers
- Receivers (Surge Tanks)
- Flow Control Valves
- Directional Control Valves
- Pressure Control Valves
- Check Valves
- Dryers –
- Pneumatic Cylinders
- Pneumatic Motors
- Pneumatic Rotary Actuators
- Pilot Operated Valves
- Accumulators & pressure storage devices
- Fluid Conductors
- Filters

PURPOSE OF THE TRAINING

Being able to operate, maintain, and troubleshoot your own pneumatic equipment and systems, starts simply by understanding how all the various components work, what they are doing in the circuit and why they are there. Learning the basic building blocks of fluid power makes the student proficient in working with industrial pneumatics. This course is perfect for beginners, multi-craft technicians needing to understand basic pneumatics and skilled fluid power technicians needing a solid refresher. Time is money and this course is designed to have an immediate impact by saving maintenance dollars on costly repairs, service calls, and needless downtime. Students attending this course are expected to be able to go back to their workplace and immediately apply their new-found knowledge to their fluid power systems ... safely and effectively.

TRAINING OUTCOMES

1. Identify pneumatic components and their schematic symbols
2. Understand the characteristics and applications of primary and auxiliary components
3. Selection of the proper components (compressors, valves, motors & actuators) to obtain the desired result
4. Design simple pneumatic circuits using schematic drawings
5. Diagnose and avoid common systems and component problems
6. Understand the differences and commonality of industrial pneumatics and industrial hydraulics
7. Determine applications for installing and charging pneumatic storage devices
8. Determine the proper methods of installing and routing hoses and pipes
9. Determine proper filtration and methods of controlling contamination in pneumatic systems
10. Working with compressed air and components in a safe and environmentally friendly manner
11. Testing and inspecting pneumatic systems safely
12. Diagnosing system versus component issues
13. Evaluate the cause and effect of changing or re-sizing system components
14. Identifying methods to prevent future breakdowns and downtime

COURSE AGENDA

DAY 1 - PNEUMATIC SYSTEMS & COMPONENTS: *WHAT THEY ARE AND HOW THEY WORK.*

We begin with an overview of fluid power principles and progress through pneumatic system components including compressors, valves, motors, rotary actuators, accumulators, storage devices, and filters with an emphasis on component structure and identification of the components by the proper symbol as standardized by ISO (International Symbols Organization).

Methods of instruction include discussion, audio-visual material including PowerPoint, animation of components, and valve cut-a-ways.

DISCUSSION TOPICS

- Pneumatic Principles including Pascal's, Boyle's and Charles' Laws
- Differences between Hydraulics and Pneumatics

- Compressibility of Fluid
- What is Fluid Power?
- Why is Fluid Power used?
- Where is Fluid Power used?
- How Fluid Power is used
- What Fluid Power Systems consist of
- Pneumatic Terminology

- Basic Formulas
- Basic Pneumatic System
- Control Valves
- Intermediate Devices
- Power Devices
- Basic Hydraulic System
- Side-by-Side Comparison

❖ Pneumatic Symbols
❖ Positive and Dynamic compressors
❖ Check Valves
❖ Needle Valves
❖ Flow Control Valves
❖ Directional Control Valves
2 and 3 position valves
2, 3, 4 way, and 5-ported 4 way valves

❖ Pressure Control Valves
❖ Pilot Operated Control Valves
❖ Pneumatic Cylinders
❖ Pneumatic Motors
❖ Pneumatic Rotary Actuators
❖ Accumulators and Storage Devices
❖ Fluid Conductors and Fittings
❖ Air Logic Systems

DAY 2 - CIRCUITS - *AND HOW TO IDENTIFY AND FIX COMMON PROBLEMS.*

On Day 1, students gain a basic working knowledge of industrial pneumatic components and their function within an operational system.

Day 2 builds on that knowledge and is designed to help the student become aware of the decision-making process that is part of a logical troubleshooting approach, including doing it safely.

The instructor focuses the class on selection of the proper components, problem solving, and troubleshooting as a part of a systematic approach to locating malfunctions, their causes and many safety aspects associated with the circuit.

DISCUSSION TOPICS

- Application of Pneumatics
- Fluids
- Seals
- Contamination Control
- Filters

- Selection of Proper Components based on "Specification Requirements"
- Troubleshooting: Basic Troubleshooting

❖ Noisy and Cavitating Cylinders
❖ No System Pressure Low or Erratic System Pressure
❖ Low or Erratic System Pressure
❖ No Actuator Movement
❖ System Running Hot
❖ Slow or Erratic Actuator Movement

❖ Common System Problems
❖ Solenoid Failure and Causes
❖ Internal and External Leakage Control
❖ Air Logic Systems
❖ Safety
❖ Web Content for Added Learning

WHO SHOULD TAKE THIS COURSE?

This course is designed for people involved with fluid power at industrial facilities, utilities, or commercial and private building facilities. These attendees come from a wide variety of industries, skill levels, (novice to those needing a refresher) company sizes and job titles. Companies that benefit from these seminars include, but are not limited to:

- ✓ Manufacturing Plants
- ✓ Utilities
- ✓ Waste Water Facilities
- ✓ Mining
- ✓ Government Facilities
- ✓ Oil Refineries
- ✓ Drilling Platforms
- ✓ Military
- ✓ Ship Building and Repair
- ✓ Commercial Buildings
- ✓ Construction Sites
- ✓ Airports
- ✓ Any Facility that requires hydraulic implementation and/or repair.

Including:

- ✓ Maintenance Mechanics & Technicians
- ✓ Fluid Power Technicians
- ✓ Machine Operators
- ✓ Plant Managers
- ✓ Plant Engineers
- ✓ Facilities Managers
- ✓ Design Engineers
- ✓ Pipefitters
- ✓ Multi-Craft and those requiring Cross Training of Personnel
- ✓ Purchasing Agents
- ✓ Any person needing a thorough understanding of fluid schematics

Upon completion of this course the student will more readily understand **THEIR OWN** systems and how to identify, prevent and fix common problems; and most importantly, will be able to immediately put this training to use in your facility safely.