



ACM

Aerospace Components
Manufacturers

TOGETHER. A WORLD OF EXPERTISE.

WORKFORCE DEVELOPMENT TEAM

INCUMBENT WORKER TRAINING SYLLABUS

Revised July 2019

Index of Courses

Course	Duration	Prerequisite
Applied Shop Math - Level 1	20 hours	None
Applied Shop Math - Level 2	30 hours	Shop Math Level 1
Blueprint Reading	20 hours	None
Geometric Dimensioning & Tolerancing	20 hours	Blueprint Reading; Shop Math Level 2
Teamwork	16 hours	None
Problem Solving	16 hours	None
CNC Edits / Offsets	8 hours	Experience with CNC machine controls
Process Improvement	16 hours	None
Overview of Machining Processes (was, Cutting Theory)	20 hours	Shop Math Level 1 & 2; Basic machine operating experience
Heat Treat – Option 1 Ferrous Aerospace Alloys	16 hours	None
Heat Treat – Option 2 Aluminum & Magnesium Aerospace Alloys	16 hours	None
Heat Treat – Option 3 Titanium and Refractory Metal Alloys	16 hours	None
SPC for Shop Operators	12 hours	Shop Math Level 1; Blueprint Reading
SPC for Engineers	12 hours	Shop Math Level 2; Blueprint Reading
Use of Measurement Tools	14 hours	Shop Math Level 1; Blueprint Reading
Finding Root Cause	8 hours (one day workshop)	None
Front Line Supervisor's Training	24 hours	None

APPLIED SHOP MATHEMATICS

- Expectation:** This course is intended to provide a working knowledge of shop related mathematics for entry level students and serve as a refresher course for those students having prior mathematics training.
The course shall be offered as:
-Level I: Basic Skills and Arithmetic, Decimals, and Fractions, and Graphing / Charting Practices
-Level II: Algebra, Plane Geometry, Trigonometry
- Prerequisite:** Level I: None
Level II: Knowledge of the Level I skills
- Group Size:** Maximum fifteen (15)
- Schedule:** Level I: Nine (9), two (2) hour sessions
Level II: Fifteen (15), two hour sessions
- Texts:** Mathematics for Machine Technology 3rd edition – Robert D. Smith,
Statistical Quality Assurance – Francis J. Guldner,
or equivalent texts

Key Subjects:

LEVEL I:

Arithmetic Skills
Review of Decimals
Review of Fractions
Graphing / Charting Practices Graph
Types / Graph Reading
Frequency Charts
Mean, Median, Mode
Standard Deviation
Normal Distribution
Sample Data
Use of Calculators
Basic Functions
Trigonometric Functions

APPLIED SHOP MATHEMATICS (con't)

LEVEL II:

Fundamentals of Algebra

Signed Numbers

Roots and Powers

Manipulating Equations

Solving for Unknowns

Fundamentals of Plane Geometry

Angular Measurement

Deg. Min. Sec. Deg. Decimal Conversions

Definitions of Geometric Terms

Axioms

Propositions

Theorems

Practical Problems

Right Angle Trigonometry

Definitions of Trigonometric Terms

Trigonometric Functions

Practical Problems

Oblique Trigonometry

Sine – Cosine laws

Practical Problems

BLUE PRINT READING

Expectation: This course is intended to improve students ability to competently interpret aerospace blueprints, focusing on machined components drawings.

Prerequisite: None

Group Size: Maximum fifteen (15)

Schedule: Ten (10), two (2) hour sessions

Text: Text to conform to NTMA curriculum, or equivalent text

Key Subjects:

- Drawing Format
- Lines and Symbols
- Orthographic Projection
- One, Two & Three view drawings
- Auxiliary views
- Dimensions Tolerances
- Section Views
- Surface texture
- Violations of True Projection
- Special Views
- Geometric Tolerancing (overview)
- Combined Sections
- Auxiliary Section Views
- Detail Sections
- Parts Lists
- Assembly Drawings
- Combined Assembly and Detail Drawings
- Partially Detailed Assembly Drawings
- Complex Part Drawings
- Related Documents (overview), i.e., Revision Status Sheets, Effectivity Sheets, Engineering Change Notices (ECN's), etc.

GEOMETRIC DIMENSIONING & TOLERANCING

Expectation: This course is intended to provide students with the ability to understand and interpret the principles of GD&T as related to aerospace machined parts drawings.

Prerequisite: Blueprint Reading; Shop Math Level I

Group Size: Maximum fifteen (15)

Schedule: Ten (10) Two (2)-hour sessions

Text: Text to conform to NTMA curriculum, or equivalent text

Key Subjects:

- Fits
- Limits
- Tolerances
- Geometric tolerancing
- Straightness of a feature of Size
- Flatness
- Datums & the three plane concept
- Datum Targets
- Orientation Tolerancing
- Coordinate Tolerancing
- Positional Tolerancing
- Roundness Tolerance
- Cylindricity
- Profile of a Line
- Profile of a surface
- Coplanarity, Concentricity & Coaxiality
- Circular Runout
- Total Runout

TEAMWORK

Expectation: This course is intended to develop and improve those skills necessary to manage, or participate on, a working level Team.

Prerequisite: None

Group Size: Maximum fifteen (15)

Schedule: Eight (8), two (2) hour sessions

Text: Instructor to select text or to provide course materials

DESCRIPTION: Globalization of business markets requires that companies can make decisions quickly, are flexible enough to respond to rapid changes in the business environment and, ensure that decisions meet the customers needs. Effective teamwork is an essential ingredient for success in today's business climate. The teambuilding course will prepare team members and leaders to work together efficiently and productively to create improved work methods and business results. Through the use of lecture, class exercises, videos and discussions, participants will learn to create the conditions for successful teamwork, participate effectively in team meetings, contribute to positive group dynamics, participate in team decisions and embrace change for continuous improvements.

OBJECTIVES: Upon completion of this course, participants will be able to:

1. Understand the organizations particular needs for effective teamwork.
2. Describe the competitive advantages of working in teams.
3. Understand the critical importance of maintaining all team members' self-esteem.
4. Function as an effective team member.
5. Use good communication skills, giving and receiving feedback effectively.
6. Participate effectively in team meetings.
7. Use positive approaches to managing disagreements.
8. Participate in consensus team decisions.

ASSESSMENT: Participants will learn through class activities, and analyze ways in which teamwork can positively impact their own work groups. The class sessions will include lecture/discussion, action activities and exercises to build communication and problem-solving skills, self-assessments, case studies and role-playing. Participants will complete course evaluations during the last class session.

TEAMWORK (continued)

Day 1:

- Maintaining Each Other's Self-Esteem (Exercise and Role Play) □ Why is Your Company in Business?
- What's in it for You
- Discussion of the Aerospace Industry:
 - Global Markets & Competition
 - Future Outlook
- Need for Continued Improvement for:
 - Customer Retention/Satisfaction
 - Competition and Pricing
- Outcomes - Participants will be able to:
 - Understand why effective teamwork leads to increased productivity.
 - Understand that increased productivity in today's competitive marketplace equates to a higher level of job security and opportunities. (What is in it for them) Day 2:
- Maslow's Theory and how it relates to a:
Team Environment>> Getting to Self-Actualization
- Bird Exercise >>effects of developing leadership potential, dynamic thinking and learning
- Team Definition Discussion
- Survival Run>>(Film and exercise) – Components of Teamwork
- Outcomes - Participants will be able to:
 - Understand the concept that to ensure excellent results from employees, the team members, they need to become self-motivated/self-actualized.
 - Understand that a great leader establishes and maintains an environment for team members to become self-motivated.
 - Understand how teamwork makes the job more interesting, fun and productive. Identify the components of effective teamwork.

Day 3:

- Introduction to the DISC Model {Behaviors}
- Complete the DISC Survey
- The Four Core Behavior Styles and the Importance of Each Style to the Team □ Outcomes
 - Participants will be able to:
 - Identify their core behavioral style and characteristics.
 - Understand the importance of each style to the team.
 - Understand that consciousness of their individual styles can lead to positive self-behavior modification.

Day 4:

- Identifying the Behavioral Style of Your Teammates
- Ground Rules for Teamwork
- Levels of Empowerment
- Guidelines for Participants
- Ingredients for Successful Teamwork
- Outcomes - Participants will be able to:
 - Understand and identify the behavioral characteristics of their teammates.

TEAMWORK (continued)

- Develop procedures to get work done.
- Have the knowledge of how best to communicate with other styles.
- Identify factors (including beneficial behaviors) necessary from all parties to make a team run effectively.
- Increase the overall productivity of a team.

Day 5:

- Trust and Communications Exercise and Matrix
- Bush Fire Simulation
- Outcomes - Participants will be able to:
 - Understand the direct relationship between trust and communications in any team setting.
 - Practice team concepts to develop strategies and solutions to a specific situation.

Day 6:

- Fundamental Interactive Skills for Teamwork and Effective Relationships
 - Maintain Each Others Self-Esteem
 - Focus on Behavior
 - Encourage Participation from All Team Members
 - Listen to Motivate Each Other
- Outcomes - Participants will be able to:
 - Create the setting to foster teamwork, innovation and creativity. -Understand the concept of focusing on observable behavior rather than perceptions of other teammates.
 - Build momentum by encouraging all team members to participate, resulting in 110% effort towards goals and objectives.

Day 7:

- Effective Communications
 - What Makes a Message Clear
 - Organizing Your Messages
 - Barriers to Understanding
 - Questions/Wrap-up
- Outcomes - Participants will be able to:
 - Avoid confusion and frustration by developing written and verbal messages that are clear, concise, focused and easily understood by the listener.
 - Minimize physical and emotional barriers that hinder the communication process in the workplace setting.

Day 8:

- Exercise in Organizational Values
- Questions
- Wrap-up
- Outcomes - Participants will be able to:
 - Develop and instill team values to ensure that all team members are on the same page regarding work ethics, customer focus, quality, attendance, etc.

PROBLEM SOLVING

Expectation: This course is intended to provide students with an understanding of Problem Solving methodologies.

Prerequisite: None

Group Size: Maximum of fifteen (15)

Schedule: Eight (8), two (2) hour sessions

Text: Instructor to select text or provide course materials

Key Subjects:

Introduction: Seven Management and Planning Tools for Continuous Quality and Productivity Improvement Problems

in Implementing this Cycle

Impact of the "TQM" Revolution

History of the 7MP Tools; What are the 7MP Tools?

Tool Description

How Do These Tools Flow Together?

Who Uses the 7MP Tools?

Case Study

1. Affinity Diagram

When to Use an Affinity Diagram

Typical Uses of an Affinity Diagram

Construction of an Affinity Diagram

2. Interrelationship Diagram

When to Use an Interrelationship Diagram

Typical Uses of an Interrelationship Diagram

Construction of an Interrelationship Diagram Matrix

Model Options

3. Tree Diagram

Key Questions Answered

When to Use the Tree Diagram

Typical Uses of the Tree Diagram

Construction of a Tree Diagram

5. Prioritization Matrices

When to Use the Prioritization Matrices

Typical Uses of the Prioritization Matrices

Construction of Prioritization Matrices

--Full Analytical Criteria Method

--Consensus Criteria Method

--Combination ID/Matrix Method

PROBLEM SOLVING (continued)

6. Matrix Diagram
 7. When to Use the Matrix Diagram
 - Typical Uses of the Matrix Diagram
 - Matrix Diagram Formats
 1. L-Shaped Matrix
 2. T-Shaped Matrix
 3. Y-Shaped Matrix
 4. X-Shaped Matrix
 5. C-Shaped Matrix
 - Tree Matrix
 - Construction of a Matrix Diagram
 8. Process Decision Program Chart (PDPC)
 - When to Use a Process Decision Program Chart
 - Broad Uses of a Process Decision Program Chart
 - Typical Uses of a Process Decision Program Chart
 - Construction of a Process Decision Program Chart
 9. Activity Network Diagram
 - History of an Activity Network Diagram
 - Various Construction Options
 - Common Language and Symbols
 - Activity Network Diagram Construction Options
 - When to Use an Activity Network Diagram
 - Typical Uses of an Activity Network Diagram
 - Construction of an Activity Network Diagram
 10. Implementing the 7MP Tools: Behavioral Requirements
 - Trust the Process
 - Value Brainstorming
 - Discipline
 - Patience
 - Trust in the Initial Gut Reaction
 - Listening Skills
 - Know When to Stop
 - Know When the Tools Are Not Appropriate
 - Integrity – People Commit to Use the Outcome of the Process
 - Flexibility, Tolerance of Ambiguity, and Creativity
 - Value, Not Simply Tolerate the Different Perceptions of Others
 10. Implementing the 7MP Tools in Your Organization Training
 - Opportunistic Training --Classroom
 - Training
 - Training at Which Level?

CNC EDIT/OFFSETS

Expectation: This course is intended to provide an understanding of basic programming and the skills necessary to be capable of making shop floor modifications to CNC machine controls.

Prerequisite: Operators having some setup experience on CNC machine controls

Group Size: Maximum fifteen (15)

Schedule: Four (4) two (2)-hour sessions

Text: Text to conform to NTMA curriculum, or equivalent text

Key Subjects:

Program Formats

Name

Sequence Numbers

M Codes

G Codes

Modal & Non-modal Commands

Tool Offsets

Part Offsets

Fixture Offsets

Cutter Compensation

Manual data Input (MDI)

PROCESS IMPROVEMENT

Expectation: This course provides a working knowledge of various process improvement technologies.

Prerequisite: None

Group Size: Maximum fifteen (15)

Schedule: Eight (8), two (2) hour sessions

Text: Instructor to provide class material

Key Subjects:

- Statistical Process Control
- Root Cause
- Quality Control Process Charts-Process Mapping
- Machine Capability
- 5S Orderliness
- Gage Repeatability & Reproducibility
- Total Productive Maintenance
- Poka-Yoke (Mistake Proofing)

OVERVIEW of MACHINING PROCESSES

- Expectation:** This course is intended to upgrade the shop operators background knowledge of metal removal processes.
- Prerequisite:** Basic machine operating experience; Shop Math Levels I & II
- Group Size:** Maximum fifteen (15)
- Schedule:** Ten (10), two (2) hour sessions
- Text:** Text to conform to NTMA curriculum, or equivalent text (e.g., Machine Tool and Manufacturing Technology – Krar, Rapisarda & Check)

Key Subjects:

- Safety
- Metal Cutting
- Cutting Fluids
- Drilling
 - Types of drills
- Speeds & feeds
- Turning
 - Types of tooling
 - Tool Geometry
 - Processes & applications
 - Speeds & Feeds
 - CNC lathes
 - Control
 - Operation
- Milling
 - Types of tooling
 - Cutter geometry
 - Climb vs. Conventional
 - Tooling problems
 - Speeds & feeds
 - CNC Milling
 - Control
 - Operation
- Grinding
 - Wheel Ident., Selection & Applications
 - Diamond Wheel Ident., Selection & Applications
 - Truing & Dressing wheels
- EDM
 - Electrode Selection & Design

HEAT TREAT/PROCESSING & METALLURGY

- Expectations:** This course is intended to provide an awareness by aerospace industry machine and process operators, quality personnel, and process engineers of Heat Treatment procedures preceded by an overview of the basic metallurgical principles and alloy manufacturing processes.
The course shall be contracted as offering either:
Option 1 Ferrous Alloys,
Option 2 Nonferrous Aerospace Alloys, or
Option 3 Special Aerospace Alloys.
- Prerequisite:** None
- Group Size:** Maximum fifteen (15)
- Schedule:** Eight (8) two (2)-hour sessions
- Text:** Text to conform to NTMA curriculum, or equivalent, for the selected course option.

OPTION 1: FERROUS ALLOYS

- Introduction to Metallurgy
 - Iron and Steel Production (brief background)
 - Wrought Iron
 - Iron Ores
 - Purification Processes
 - The Blast Furnace
 - Production of Iron
 - Steel making
 - Steel Casting
 - The Measurement of Metal Properties
 - Metal Testing and Control
 - Dimensional & Chemical Measurement
 - Metal Defects and Their Causes
 - Metallurgical Testing
 - Crystals and Atoms
 - Metal Solutions and Phases
- Heat Treatment
 - Phase relationship
 - Types of Heat Treatment
 - Mechanics of Cooling
 - Hardenability Surface Heat Treatment (Case Hardening)
 - Heat Treatment of Carbon and Iron Alloys

HEAT TREAT/PROCESSING & METALLURGY

(continued)

Carbon-Iron Alloy Metals

Allotropic Forms of Iron

Critical Temperature of Allotropic Change

Heating & Cooling Changes

Cast Irons - Wrought Irons

Heat Treatment of Alloy Steels

Metal Requirements

Alloy Elements

Types of Alloy Steels

Stainless Steels

Tool Steel Alloys

Tool Steel selection

OPTION 2: NON-FERROUS AEROSPACE ALLOYS

Similar curriculum to that above, however, focus on the Metallurgy and Heat Treatment of **Aluminum and Magnesium** as used in the Aerospace Industry.

OPTION 3: SPECIAL AEROSPACE ALLOYS

Similar curriculum to that above, however, focus on the Metallurgy and Heat Treatment of **Titanium Alloys and Refractory Metal Alloys** as used in the Aerospace Industry.

STATISTICAL PROCESS CONTROL (SPC) for SHOP OPERATORS

Expectation:	This course is intended to provide a basic knowledge and ability to understand and apply Statistical Process Control for Shop Personnel. The course should focus on the information the SPC chart provides and how to use this information as a problem solving tool. It should include 'hands-on' examples and utilize the data format (if provided) used by the facility hosting the course (otherwise, use generic formats).
Pre-requisite:	Shop Math Level I; Blueprint Reading
Group Size:	Maximum fifteen (15)
Schedule:	Six (6), two (2) hour sessions
Text:	Instructor to provide course material
Key Subjects:	SPC and Quality Variation Histograms Standard Deviation & Mean Bell Curves & Targeting to Basic Calculator Lesson & Practice (~30 minutes) Random Vs Assignable Variation Valid Data Common SPC Forms Multi Purpose Data Collection Charts Rainbow Charts Run Charts X and R Charts Special Charts Designed to Need Problem Solving Tools Operator Gage Capability Studies Operator Machine Capability Studies Attribute Data (Nicks & Scratches) Analyze Vertically & Horizontally Analyze to Solve Problems

STATISTICAL PROCESS CONTROL (SPC) for SHOP OPERATORS (continued)

Process Improvement Strategies

Measure & Analyze

Fix It

Process Control Limits Vs Blueprint (SPC Tolerancing)

Control Strategies

Operator Responsibilities Management

Responsibilities

Engineering Responsibilities

Analyze current data from Operator's processes

Open Time – Data Analysis

STATISTICAL PROCESS CONTROL (SPC) for ENGINEERS

Expectation: This course is intended to provide a basic knowledge and ability to understand and apply Statistical Process Control for Engineers. The course will focus on use and analysis of various SPC charts and how to develop and apply this information as a problem solving tool.

Pre-requisite: Shop Math Level 2; Blueprint Reading

Group Size: Maximum fifteen (15)

Schedule: Six (6), two (2) hour sessions

Text: Instructor to provide course material

Key Subjects:

A. Introduction to Statistical Process Control (SPC)

1. Design Engineering
2. Manufacturing
 - a. Five Phases of SPC system
3. Quality problems
 - a. Six Factors

B. Statistics

1. Basic Statistical Concepts – Using Examples
 - a. Populations and Samples
 - b. Inherent Variability
 - c. Distribution Patterns
 - d. Bell Curves
 - e. Probability
 - f. Standard Deviation

C. Definitions

1. Glossary of Terms and Definitions

D. Charts & Graphs

1. Analysis – Using Section B
 - a. SPC Measurement Record
 - b. Spread and Target Worksheet
 - c. Distribution Patterns
 - d. Desired Distribution Pattern
 - e. Spread Distribution Pattern
 - f. Shift Distribution Pattern
 - g. Combination Shift and Spread Pattern
 - h. Abnormal Distribution Pattern
 - i. Cut-Off
 - ii. Bi-modal
 - iii. Stray

**STATISTICAL PROCESS CONTROL (SPC) for ENGINEERS
(continued)**

2. Identification of Factors
 - a. Shift Problems
 - b. Abnormal Distribution Patterns
 - c. Stray Patterns
 - d. Spread Problems
3. Steps for Isolating Mechanical Variability
4. Process Variability / Determination
5. SPC Identification Flow Chart
6. Comparing Process Variation to the Specification Tolerance
7. Capability of Process or Process Performance
- E. Charting Capabilities
 1. Objectives
 2. SPC Charts – Using Examples
 - a. Pareto
 - b. Fishbone
 - c. Flow
 - d. Run
 - e. Correlation
 - f. Control
 - i. R Control
 - ii. X Control
 3. Variation
 4. Causes of Variation
- F. Corrective Action to the Process
 1. Corrective Action
 2. Verification
 3. Control

USE OF MEASUREMENT TOOLS

- Expectation:** This course is intended to provide a working knowledge in the use, care, maintenance, accuracy, and calibration of measurement tools found in today's modern aerospace machine shop. The course shall provide hands on instruction.
- Prerequisite:** Shop Math Level I; Blueprint Reading
- Group Size:** Maximum fifteen (15)
- Schedule:** Seven (7), two (2) hour sessions
- Text:** Instructor to provide course material
- Key Subjects:** Course must conform to NTMA curriculum.
Demonstrate the proper gaging techniques for the following:
OD & ID Micrometers (barrel, digital and electronic)
Vernier & Digital Calipers
Depth Micrometer
Flatness (using dial indicator)
Profilometer
Optical Flat
Dial Indicator Comparator
Optical Comparator
Height Gage
Gage Blocks
Radius Gage
Plug Gage
Special Gage of Choice

FINDING ROOT CAUSE

This workshop is presented as a one day (8 hour) session.

WORKSHOP SYNOPSIS

Understanding and addressing root cause is essential to the process of implementing real and lasting improvement, yet teams as well as individuals frequently go straight from problem to solution. That is not to say that it might not be necessary to deal with symptoms that are urgent problems. If your arm is bleeding, you must take care of that now. However, unless the root cause is found (what cut your arm as you walked through that doorway) and dealt with, the probability of recurrence of the symptoms is very high. This one-day workshop is intended to cover a number of different tools and strategies for digging beyond the obvious to finding the underlying root cause and solution methodologies for addressing those issues. The session will include both short lecture segments and hands-on activities to illustrate the concepts or techniques.

If you sometimes feel as if you are making lots of fixes, but your problems don't seem to be going away, this workshop may help you to understand why.

OBJECTIVES:

- Definition of Root Cause
- Road map for Root Cause Analysis
- Developing “Why?” and “Because” Statements
- Boundaries - How Far Do You Go?
- Cause and Effect Diagrams
- Measurement/Pareto Philosophies
- The Application of an Interrelationship Digraph
- Tree Diagram for Cause Expansion
- The Plan, Do, Check, Act Cycle (PDCA)
- Typical Rocks We Might Hit as We Dig

Front Line Supervisor's Training

This workshop is presented by the Quality Leadership Network (Mike Schulde) in 6 half-day sessions (24 hours).

Leadership at the 'Front Line' has never been more challenging or important. This program provides the skills needed to do it effectively.

The following information has been provided by the QLN:

Overview:

This 24-hour program teaches 'Front Line' leaders how to achieve greater efficiency and control costs. Cooperative effort between supervisors, production workers, support staff, and management is presented as key to increasing productivity and competitiveness.

Our supervisory development program has proven its' ability to accomplish this by providing necessary skills, as well as the confidence to apply them. An increase in professionalism and morale has been found to accompany this skill improvement.

Program Content

1. Leadership Development

- Leadership as a Role and a Relationship
- Leadership Style – Situational Leadership
- Promoting Accountability and Adult Behaviors
- Maximizing Motivated Behavior
- Vertical Teamwork in the Leadership Team

2. Communication and Interpersonal Skill Development

- Behavior Types and Behavior Style Flexibility
- Improving Interpersonal Communication Style and Skills
- Interviewing to Hire
- Meeting Management Skills
- Inter-Organizational Communication

3. Personal Organization & Self-Management

- Personal and Professional Goal-Setting
- Personal Organization Strategies and Time Management

4. Setting Expectations To Enable Performance

- Orienting and Training Employees
- Delegation Skills
- Planning and Organizing Work
- Setting Objectives

5. Managing Performance

- Feedback & Coaching Skills to Improve Performance
- Analyzing Performance and Behavior Problems
- Improving Performance without Defensiveness
- Corrective Discipline
- Effective Performance Review

6. Managing Change & Conflict

- * Decision-Making Techniques
- * Managing Change
- * Managing Conflict

Approach:

This training itself is informal, highly interactive, and discussion-oriented.

Discussion, assignments, and experiential activities will prepare participants for confident application of new skills.

Skills and principles are illustrated with relevant examples, and demonstrations of techniques and tools are provided. Care is taken to provide realistic opportunities for participants to try skills by gradually and consistently pushing beyond their 'comfort zone'.

Who Should Attend

This course is designed for new and experienced front line supervisors, managers, lead people, and working foremen. Instruction is combined with skill building exercises to develop the knowledge and confidence of participants.

Each participant will receive all training materials for use in the classroom and later reference.

Root Cause Corrective Action Problem-Solving

Overview:

This 16-hour program teaches team-based root-cause corrective action techniques. It also provides opportunities for participants to develop facilitation skills in the classroom by applying techniques to typical corrective action problem-solving in small break-out groups.

Key Session Topics

- Understand and use the 8D problem-solving model
- Learn a “tool kit” of group problem-solving tools
- Techniques for fast and permanent corrective action
- Recognize who needs to be involved for efforts to succeed
- Learn to quickly build a Corrective Action Team
- Understand the stages of team development
- Taking a data-oriented approach to corrective action problem-solving
- Get positive participation and results cross-functional groups
- Stimulate creativity
- Get to the root cause of problems
- Learn to deal with organizational dynamics to implement solutions
- Manage conflict and negativism
- Implement solutions for more permanent improvement

Program Content

Problem-Solving Methods

1. Process Improvement and Corrective Action
2. The 8D Problem-Solving Process & Techniques
 - Pitfalls to avoid in problem-solving
 - Assembling a problem-solving team
 - Understanding scope & objective
 - Containing the problem
 - Access to information and decisions
 - Documentation in problem solving
 - Identifying root cause
 - Finding the best solutions
 - Planning and implementing solutions
 - Documenting process changes
 - Monitoring implementation and preventing recurrence

Group Facilitation Skills for Problem-Solving

- Team leadership
- Keeping focus
- Involving stakeholders
- Getting optimal team participation
- Managing change & conflict
- Coordinating team efforts with supervisors

Problem-Solving Tools

- Flow Charts (logical, physical, Value Stream, inventory)
- Process Observation Chart, Time Value Chart, Problem Statement
- Brainstorming, Brain Writing, TRIZ
- Interview, Group Interview, Survey, Problem Tracer
- Cause and Effect Diagram, 5 Whys
- Affinity Diagram, Root Cause Verification Table
- Check Sheet, Is / Is Not Chart, Concurrency Map, Logs
- Histogram, Scatter Diagram
- Run Chart, Control Chart
- Pareto Diagram, Concentration Diagram
- Cost-Benefit Analysis
- List Reduction
- Solution Selection Matrix
- Voting (Paired Voting/ID, Weighted), Consensus
- Forcefield Diagram
- Tree Diagram, Arrow Diagram

Approach:

A hands-on format is employed, which engages participants in discussion and skill-building

Introduction to Six Sigma

Overview:

This 8-hour 'Yellow Belt' program teaches the DMAIC model and introduces participants to a toolset of techniques which can be used to improve a process utilizing the DMAIC approach.

Program Content

1. DMAIC Improvement Model
2. Define Phase of DMAIC
 - Project Charter
 - Selecting & Managing a Project Team
 - Process Mapping
 - Value-added Analysis
 - Voice of the Customer
 - Understanding Critical Requirements
3. Measure Phase
 - Benchmarking
 - Measurement Indicators
 - Measurement Plan
 - Data Collection
4. Analyze Phase
 - Types of Data
 - Data Analysis Tools
 - Understanding the Concepts of Variability
 - Cause & Effect Analysis
 - Solution Selection & Verification Techniques
 - Solution Development Tools & Techniques
5. Improve Phase
 - Solution Generation & Selection Techniques
 - Piloting
 - Change Management
6. Control Phase
 - Implementation Techniques
 - Validation Tools
 - Process Management

Approach: *Examples, discussion, and skill-building.*

Continuous Improvement Champion Certification Program

Description: This course provides intensive exposure to the principles and practices needed to develop and sustain the Lean Enterprise.

Benefits for the client:

- Develop and certify a Continuous Improvement Champion with the skills to:
 - Complete a project focused on a major product family or a key process
 - Implement Lean and drive positive change throughout the organization by leading and/or facilitating process improvement initiatives

Target Audience: Company owners and leaders as well as other stakeholders responsible for improving material and information flow

Pre-Requisite(s): None

Certification Requirements:

- Participation in all classroom sessions
- Completion of an impactful project* with measurable results using the Lean methodology
- Project approval by CONNSTEP instructors

*Maximum of 2 participants per project

Length:	13 weeks	Instructor(s)	2
Min No. of Participants	14	Max No. of Participants	24

Session Outline:

Segment	Content/Key Points	Est. Time
Week 1	Lean Principles and Practices	8 hours
Week 2	Value Stream Mapping	8 hours
Week 3	Problem Solving & Mistake Proofing	8 hours
Week 4	<i>Project Mentoring</i>	4 hours
Week 5	Lean Office/Workplace Organization & Standardization (5S)/Visual Management	8 hours
Week 6	Cell Design & Set-up Reduction	8 hours
Week 7	Kaizen/Team Building Facilitation	8 hours
Week 8	Pull Kanban/Training Within Industry Job Relations	8 hours
Week 9	<i>Project Mentoring</i>	4 hours
Week 10	Training Within Industry Job Instruction/Standard Work	8 hours
Week 11	Total Productive Maintenance/Supply Chain/Green	8 hours
Week 12	<i>Project Mentoring</i>	4 hours
Week 13	Project Report Out	8 hours

Required Training Materials:

- Lecture:
 - Flipchart stand/paper with markers
 - Projector or TV screen, speakers

 - Participant Printed (and/or on Tablet) Training Materials
 - Books
 - Learning to See
 - Lean Thinking
 - Lean Memory Jogger
- Classroom Simulations and exercises
 - Videos
 - Instructor Materials

Value Stream Mapping

Description: Value Stream Mapping (VSM) is a tool to create a material and information flow map of a product or process. This powerful tool allows organizations to map the flow of products and information and forms the foundation for streamlining work processes, cutting lead time and reducing operating costs.

Benefits for the client:

- Learning to discover Lean opportunities and link process improvement activities to organizational strategic goals

Target Audience: Company Owners and Leaders responsible for improving material and information flow

Pre-Requisite(s): None

Length:	480 minutes	Instructor(s)	1
Min No. of Participants	8	Max No. of Participants	20

Session Outline:

Segment	Content/Key Points	Est. Time
	Introductions	10 minutes
	Lecture <ul style="list-style-type: none"> • Value stream mapping introduction • Performance measurement & management • Getting started • The current state • Lean guidelines • The future state • Planning for improvement • Keys to success 	390 minutes
	Breaks & Lunch	2-15 minutes & 30 minutes
	Q&A	20 minutes

Required Training Materials:

- Lecture:
 - Flipchart stand/paper with markers
 - Training Material (Presentation)
 - Participant Materials (Printed Copy)
 - Projector or TV screen
 - Blank VSM forms
 - Book – Learning To See
- Exercises (Assessment Strategy)
ACME Stamping Case Study-
Current State

AS9100D Internal Auditor Training

Description: To give each participant a solid overview of the AS9100D standard and its structure, key areas of focus and how to find information. This is accomplished through presentation, conversation and in-class exercises. Participants will be able to apply this information to perform internal audits based on compliance and process effectiveness using a Plan-Do-Check-Act and Process Requirement methodology.

Benefits for the client:

- An effective way to
 - Audit to the AS9100D revision
 - Use a process approach to evaluate the effectiveness of key processes
 - Evaluate key process to find opportunities for improvement.

Target Audience: Team members new or experienced to internal auditing.

Pre-Requisite(s): None

Length:	8 hours	Instructor(s)	1
Min No. of Participants	4	Max No. of Participants	16

Session Outline:

Segment	Content/Key Points	Est. Time
Introductions	Name, function, one issue impacting smooth flow	10 Minutes
Lecture	<ol style="list-style-type: none"> 1. To have a understanding of the major changes/structure of the AS9100D International Standard that includes: <ol style="list-style-type: none"> a. The reasoning behind the update of the standard b. Context of the organization c. Defining interested parties d. Understanding the requirements of identified company key processes and how to review their effectiveness. e. Reviewing the requirements for “Risk Based Thinking” f. Major clause differences between AS9100c and AS9100D g. General review of cause requirements h. Changes to required documents i. The elimination of Preventive Action 2. Auditing <ol style="list-style-type: none"> a. Reviewing general auditing definitions b. Understanding the purpose of auditing and how it can help an organization c. Understanding the role of evaluating process compliance vs. effectiveness d. Cause vs. Process audits e. Planning and preparing an effective audit f. Communicating effectively during an audit g. The elements of writing a good audit report 	360 Minutes

	<ul style="list-style-type: none"> h. Understanding the difference between assigning a Major, Minor or an Opportunity for Improvement i. How to properly write a non-conformance 	
Exercises	<ul style="list-style-type: none"> • Defining key words • Defining key processes and sub processes. • Working in teams to create a list of auditing questions for a assigned key process • Team assignment to find clauses related to non-conformances 	120 Minutes
Wrap up	Q&A; review list of issues generated at start of workshop; lessons learned as they apply to the participants' environment	10 Minutes

Required Training Materials:

- Lecture:
 - Flipchart stand/paper with markers
 - PowerPoint presentation
 - Handout for each participant: 2 color slides per page, double sided, and stapled
 - Projector or TV screen, speakers
- Participants are required to bring a copy of the AS9100D

Training Within Industry - Job Instructions (TWI-JI)

Description: Participants will learn an affect way to train, in a hands on one on one situation, which will reduce the learning curve for both new and current employees to help ensure standard work. Job Instruction is a way to get a person to quickly remember to do a job correctly, safely, and conscientiously.

Benefits for the client:

- An effective way to
 - Provide better Job Instruction training to your employees;
 - Improve job performance by the individual (productivity, quality, cost, and delivery);
 - Be better trainers;
 - Create a basis for standard work;
 - Create a basis for continual improvement;
 - Generate less scrap, rejects, rework and wasted time;
 - Create fewer accidents;
 - Do less damage to hardware, equipment and tooling

Target Audience: Managers, Supervisors, Team Leaders, Subject Matter Experts and Trainers

Pre-Requisite(s): None

Length:	960 minutes with possible additional 240 minutes	Instructor(s)	1
Min No. of Participants	12	Max No. of Participants	16

Session Outline:

Segment	Content/Key Points	Est. Time
Day 1 lecture	Introductions, 5 needs of a Leader, Standard Work, How people Train, Job Breakdown Sheet (JBS) & Training Matrix	240 minutes
Day 2 Client Site	Hands on, on the shop floor at one of the company sites to practice writing Job breakdown sheets and how to present	240 minutes
Day 3 Client Site	Hands on, on the shop floor at one of the company sites to practice writing Job breakdown sheets and how to present	240 minutes
Day 4 Client Site	Hands on, on the shop floor at one of the company sites to practice writing Job breakdown sheets and how to present	240 minutes
	Addition Site location added if 16 participants	240 minutes

Required Training Materials:

- Lecture:
 - Flipchart stand/paper with markers
 - Projector or TV screen, speakers
- Site Visits
 - Breakout room, access to shop floor

Cybersecurity NIST 800-171

Description: Participants will learn what the requirements of NIST 800-171 are as well as how to perform a gap analysis, set a plan in action and become compliant.

Benefits for the client:

- A better understanding of why the Department of Defense is making it crystal-clear that NIST 800-171 is here to stay and why progressing towards compliance is an absolute must for those looking to remain competitive.
- In-depth knowledge of how to protect CUI and other important information, as well as pragmatic approaches for doing so.
- The know-how and ability to define all your cybersecurity processes in one place using the NIST 800-171 framework.
- Knowledge of how to demonstrate to a customer or regulator tangible efforts towards achieving and sustaining full NIST 800-171 compliance.
- Hands-on experience with leading-edge cybersecurity tools.
 - Do less damage to hardware, equipment and tooling

Target Audience: Owners, CEO's, Subject Matter Experts, IT, Operation Managers, and system users

Class size: 20

Duration: Each workshop is 4 hours; 16 hour total

Workshop Session #1

This workshop will provide an overview of NIST 800-171 and is intended specifically for executives and/or people responsible for risk management decisions.

- It is not intended for Operations managers or IT people unless designated by their senior management to attend.
- You'll receive a high-level overview of 800-171/DFARS, roles and responsibilities, compliance process.
- Cuts through the IT jargon so non-IT people can understand the practical guidance on complying with 800-171 and maintaining good supplier status.
- Examples will be shared to highlight the difference between compliance and a secure environment.
- We'll conduct a plain-language walkthrough of gap analysis, Plan of Action and Milestones (POA&M) and System Security Plan (SSP) as they pertain to NIST compliance.
- We'll review other important requirements - Incident Response Plan, Risk Assessment (not just IT risk), data inventorying & categorization, documentation.
- You'll learn why all three – policies, technical controls and training – are needed to be compliant.

- Roles and responsibilities will be outlined for senior management, HR, IT, Risk Management, and Operations.

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Workshop Session #2

This is a hands-on session designed to create and implement a Cyber Risk Management Plan (CRMP) to meet the DFARS Safeguarding Covered Defense Information and Cyber Incident Reporting requirements.

- It is intended for Operations Managers.
- In effect as of 12.31.2017, it pertains to Controlled Unclassified Information (CUI) residing in non-federal information systems.
- You'll receive an overview of and explanation of the tangible, practical use of the documents and plans associated with a CRMP -- risk management, communications, assessment, reporting, response, audit, etc.
- Please note: This workshop is limited to 20 attendees to ensure sufficient one-on-one attention.

Workshop Session #3

This is a policy and procedure development session covering how to build an effective cyber risk management policy handbook.

- It is intended for HR managers, Operations managers and IT managers.
- We'll review a template for 800-171.
- You'll learn how to make Incident Response Plans and Business Continuity Plans tangible and relevant to individual shop environments, able to be tested and documented. Much like a safety/OSHA approach.
- Includes 3 breakout sessions facilitated by specialists in each area – HR component, IT component, Operations/physical security component.
- Please note: This workshop is limited to 20 attendees to ensure sufficient one-on-one attention.

Workshop Session #4

This a hands-on session for IT professionals and people with IT responsibilities. We'll provide an overview on:

- How to effectively implement a network auditing and monitoring platform.
- How to use auditing tools to maintain ongoing 800-171 compliance.
- How to properly conduct a basic network audit and vulnerability assessment.
- How to recognize various types of attacks and ways to respond. Attacks will be simulated, and attendees will be given the opportunity to respond to each event. We'll review simulation results in the final hour.
- Please note: This workshop is limited to 20 attendees to ensure sufficient one-on-one attention.

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Excel 2016: Introduction

Description: This course is designed for people new to spreadsheets and for self-taught users who wish to expand their knowledge.

Benefits for the client: Using Microsoft's Excel 2016 version of their renowned spreadsheet software, students will learn to recognize the main areas of the Excel worksheet and workbook; enter, edit and delete data; create basic formulae and functions, including SUM, AVERAGE, MAX and MIN; enhance the presentation of workbook data; create, display and manipulate simple charts; work with multiple worksheets; freeze titles and add comments. Although this course uses Excel 2016 software, version 2013 is similar.

Target Audience: Anyone who uses spreadsheets

Prerequisite: Basic Windows, keyboarding and mouse skills.

Class Size: 16

Duration: 6 Hours / two 3-hour classes

Excel 2016: Intermediate

Description: This hands-on course integrates the features of Excel in real-world scenarios and provides a detailed overview of a wide range of Excel topics and builds upon the fundamentals presented in Excel 2016 Introduction.

Benefits for the client: Using Microsoft's Excel 2016 version of their renowned spreadsheet software, students will learn the concepts include applying hyperlinks and cell formats; hide and unhide rows and columns; manipulate page setup options for worksheets; manipulate window and workbook views; create and use named ranges in formulas; apply Sparklines, use Quick Analysis; filter and sort data; SumIf and SumIfs family of functions as well as utilizing Concatenate, Right, Left, Mid, Trim and other functions; apply conditional formatting; creating a basic Pivot Table; understanding error values; as well as other helpful skills. Although this course uses Excel 2016 software, version 2013 is very similar.

Target Audience: Anyone who uses spreadsheets

Prerequisite: Excel Introduction

Class Size: 16

Duration: 12 Hours / Three 4-hour classes