

# Quality Performance and Learning Objectives

## Performance Objectives

At the conclusion of the course, participants will be able to:

1. Discuss the history of the quality movement in the United States and the state of the movement in the process industry today.
2. Describe the impact of quality on the organization's economic performance.
3. Meet or exceed customer expectations.
4. Employ personal effectiveness techniques.
5. Understand and use effective system communication techniques to ensure operating consistency and reduce variability in the process.
6. Function as an effective team member.
7. Discuss the principles associated with process orientation and system thinking and theory.
8. Contribute to the establishment and success of a learning organization.
9. Demonstrate how to follow procedures and policies in order to ensure operating consistency, reduce variability in the process, reduce waste, and prevent safety incidents.
10. Use continuous improvement methodology to optimize processes.
11. Take preventive or corrective action to ensure operating consistency, reduce variability in the process, reduce waste, and prevent process safety incidents.
12. Use problem solving and decision making techniques to identify areas for improvement and correct process deficiencies.
13. Use Quality Tools and team problem solving to resolve a real-world, process industry dilemma.
14. Use basic statistics in one's work, as necessary.
15. Collect valid and reliable data to use in the analysis of process problems or to plan for process improvement.
16. Represent, analyze, and interpret process data using various types of control charts.
17. Represent, analyze, and interpret process data using a variety of Quality Tools.
18. Use process capability data in one's work as necessary.
19. Apply data collection, representation, analysis, and interpretation skills in a real-world, process industry scenario.

## Learning Objectives

### Session 1: Course Overview

1. List the attendance requirements for Quality.
2. List the homework requirements for Quality.
3. List the class participation requirements for Quality.
4. List the evaluation requirements (quizzes and tests) for Quality.
5. List the team activity requirements for Quality.
6. Define quality.
7. Trace the rebirth of quality in the United States.
8. Outline Deming's philosophy of quality.
9. Outline Juran's philosophy of quality.
10. Outline Crosby's philosophy of quality.
11. Discuss other quality gurus (e.g., Shewhart, Taguchi) and their philosophies of quality.
12. Discuss quality programs significant to the process industry today: ISO 9000 and Six Sigma.
13. Explain the purpose and benefits of ISO 9000 certification.
14. Explain what policies and procedures must be in place in order for a manufacturing facility to receive ISO 9000 certification; i.e., procedures, audits, and recordkeeping.

## **Session 2: TQM and Economics**

1. Discuss the philosophy, methods and elements of TQM – Total Quality Management.
2. List different terms for "quality management".
3. Distinguish between the "old" versus "new" philosophy of quality; e.g., Conformance to Specifications versus Maintenance of Consistency.
4. Characterize the dimensions of quality.
5. Characterize the cost of quality: appraisal, internal failure, external failure and prevention.
6. Characterize the cost associated with a lack of quality.
7. Define economics.
8. Explain competition.
9. Characterize supply and demand.
10. Define inflation.
11. Describe risk.
12. Define standard of living.
13. Discuss relationship between productivity and standard of living.
14. Describe downsizing.
15. Explain profit and loss.
16. Define revenue.
17. Describe the "Five Factors of Production".
18. Describe assets and liabilities.
19. Distinguish between accounts payable and accounts receivable.
20. Define income.
21. Illustrate the relationship between income before taxes, taxes, and income after taxes.
22. Explain fixed and variable costs.

23. Discuss relationship between fixed/variable costs and profitability/operating rate.
24. Define gross profit.
25. Break down the costs that contribute to operating expenses.
26. Define depreciation.
27. Discuss how productivity affects plant profits.
28. Discuss how natural resources are used by the process industry.
29. Discuss the impact of non-conforming production.
30. Discuss the impact of re-grading or re-working production.
31. Describe the domino-effect impact of sub-standard production in a derivative-type plant.
32. Explain the economic impact of lost opportunities.

### **Session 3: Customer Service and Personal Effectiveness**

1. Describe customer service.
2. Differentiate between internal and external customers.
3. Differentiate between customer specifications and customer requirements.
4. Characterize what customers want from their providers and suppliers.
5. Explain the relationship between the customer's processes and the supplier's processes.
6. Describe the importance of customer visits.
7. Describe the importance of responding to customer requests and comments.
8. Display respect for the fact that the customer keeps one's organization in business.
9. Realize that a "win/win" relationship must exist between customer and supplier for the business to prosper.
10. Realize the employee "is" the organization in the customer's eyes.
11. Recognize personal strengths and weaknesses.
12. Describe the characteristics of an effective, efficient person.
13. Explain the concept of a person's sphere of influence.
14. Describe and practice time management skills.
15. Describe and demonstrate organizational skills.
16. Outline and employ planning and prioritization skills.
17. Characterize productivity.
18. Outline the factors that impact productivity.
19. Describe various examples of organizational employee evaluation processes.
20. Explain how expanded duties benefit the organization and the individual.
21. Characterize organizational mission, vision, and values.
22. Recognize the importance of aligning one's own values with those of the organization.
23. Recognize various organizational structures and one's place therein.
24. Describe various organizational resources and how to access them.
25. Display patience.
26. Take initiative.
27. Display task-orientation.
28. Demonstrate flexibility.
29. Display the ability to adapt to change.

30. Describe and demonstrate the characteristics of a lifelong learner.
31. Express confidence.
32. Characterize and display a strong work ethic.
33. Look for ways to work more efficiently.
34. Recognize value of your time.
35. Demonstrate a willingness to admit lack of knowledge without defensiveness.
36. Recognize that one's performance is a reflection on oneself.
37. Demonstrate a willingness to progress through training at a rate that ensures skills are acquired quickly and completely.
38. Display a willingness to learn in various environments.
39. Exhibit a willingness to be multi-skilled and accept additional responsibilities.
40. Demonstrate a willingness to share knowledge and train others.
41. Take ownership of processes and systems outside normal technical duties.

## **Session 4: Effective Communication and Team Skills**

1. Describe and demonstrate verbal and written communication skills and techniques:
  - Organize thoughts
  - Match appropriate message to audience
  - Use eye contact
  - Avoid sending mixed messages (when nonverbal gestures do not match the verbal message)
  - Speak clearly
  - Check for understanding
  - Use hand signals, when necessary (noisy environments)
  - State information concisely
  - Make requests clearly enough for others to understand and follow
  - Ask questions in order to correct misunderstandings
  - Field questions about one's ideas
  - Give feedback
  - Emphasize key points
  - Listen attentively
  - Ask probing questions
  - Communicate "professionally" (avoid being personal, critical, etc.)
  - Show respect for the other individual(s) when communicating
2. Define and use plant language and jargon appropriately.
3. Explain organizational communication etiquette; i.e., communicating appropriately across the organization.
4. Outline types of plant communications; i.e., shift turnover, shift meetings, etc.
5. Employ tools for plant communication: i.e., software applications, email, voicemail,

- telephone, radio, log book, documentation.
6. Qualify the value of written communication; i.e., legible, specific, signed.
  7. Justify the need to "Seek first to understand, then to be understood".
  8. Value accuracy in communication.
  9. Explain the necessity for sharing information.
  10. Emphasize the importance of checking email and voicemail regularly.
  11. Demonstrate a willingness to use personal computer and other technology for communications.
  12. Justify the purpose and function of teams; i.e., types of teams.
  13. Outline the life cycle of teams.
  14. Point out the stages of team development.
  15. Describe the "group process".
  16. Summarize various concepts surrounding team dynamics.
  17. Convert team goals and objectives into team mission and statements.
  18. Identify and demonstrate effective interpersonal skills.
  19. List various personality type characteristics which can be found among a diverse group of team members.
  20. Show respect for and courtesy toward team members.
  21. Recognize possible strengths and weaknesses of team members.
  22. Explain and employ effective meeting management techniques.
  23. Discuss the importance of meetings.
  24. Delegate and assign tasks.
  25. Assess and allocate resources.
  26. Illustrate how to, and practice methods for managing conflict.
  27. Demonstrate the ability to get over the "us" versus "them" mentality.
  28. Display a willingness to share and participate.
  29. Appreciate diversity.
  30. Value others' perspectives.
  31. Display resourcefulness.
  32. Align individual values and subsequent actions with those of the team.
  33. Recognize that many points of view are better than one.
  34. Accept feedback.
  35. Show a willingness to depend on others.
  36. Appreciate value of "win/win" thinking.

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## **Session 6: Test #1, Processes and Systems, and Organizational Learning**

1. Differentiate between processes and systems.
2. Outline the concept of Process Orientation:
  - Definition of a process
  - All work is the result of a process
  - Value-added tasks
  - Cost-added-only tasks
3. Discuss the concept of Process Management:
  - Process owner
  - Process flow
  - Vertical alignment (aim: please boss)
  - Horizontal alignment (aim: please customer)
4. Discuss the factors which impact Process Performance:
  - Efficiency (utilization of resources)
  - Effectiveness (meeting customer needs)
  - Adaptability (responsiveness to change)
  - Goals
  - Plans
  - Measurements
  - Feedback
5. Describe systems theory and systems thinking.
6. Characterize the interdependency of units.
7. Characterize suboptimization.
8. See the value of a system and the various functions within an organization.

9. Define the term "learning organization".
10. Describe the attributes organizations must adopt in order to form a learning organization.
11. Describe the barriers that can inhibit the creation of a learning organization.
12. Discuss the advantages learning organizations have over other traditional organizations.

## **Session 7: Variance and Operating Consistency**

1. Define variation.
2. List variables that affect processes.
3. Summarize the various causes of variation.
4. Differentiate between common cause and special cause variation.
5. Discuss the concept of operating consistency.
6. Outline the Standardize/Do/Check/Act (SDCA) process for process standardization.
7. Explain the importance of documentation in maintaining operating consistency (i.e., Why is documentation necessary: ISO 9000, customer requirements, best management practices, PSM compliance, etc.).
8. List the different levels of documentation found in the process industry today:
  - Policies
  - General Procedures
  - Specific Procedures (or Job Instructions)
  - Forms
9. Describe different types of procedures, procedure formats and information found in procedures.
10. Describe different types of policies, policy formats and information found in policies.
11. Discuss the process technician's role in following and maintaining procedures and policies.
12. Describe the concept of "best practices".
13. Illustrate how the information found within a policy relates to how business is conducted.
14. Explain how the information found within a procedure relates to the functioning of the process.
15. Explain the concept of "document control".
16. Discuss the various document retention systems found within industry.
17. Discuss the consequences of not following policies and procedures; i.e., product inconsistencies, threats to safety, health and environment.
18. Demonstrate a willingness to take directions.
19. Demonstrate attention to detail.
20. Display an appreciation for tasks that need to be completed in sequential order.
21. Demonstrate motivation to perform steps as stated in procedures.
22. Recognize the value of policies and procedures.

23. Display acceptance of personal choice constraints due to document control requirements.
24. Recognize importance of keeping process documentation "evergreen".
25. Recognize when instructions given by others are in conflict with approved policies and procedures and challenge the issue.

## **Session 8: Continuous Improvement and Corrective/ Preventive Action**

1. Define continuous improvement.
2. Outline the Plan/Do/Check/Act (PDCA) process for continuous process improvement.
3. Differentiate between chronic and sporadic process problems.
4. List the various strategies companies engage in to improve their processes:
5. Discuss various management approaches to process improvement.
6. Differentiate between the goal-post model and the bull's-eye model of operating philosophy.
7. Present alternatives.
8. Display a willingness to get involved.
9. Display observant behavior.
10. Challenge the process.
11. Possess a desire to improve upon the current state.
12. Display an openness to change.
13. Respect the fact that people can learn from ideas that "don't work".
14. Characterize preventive action.
15. Characterize corrective action.
16. Describe the concept of cause and effect.
17. Define non-conformance.
18. Describe the consequences of not addressing a non-conformance.
19. Demonstrate ability to take action.
20. Demonstrate ability to take initiative.
21. Display assertiveness.
22. Exhibit the willingness to share ideas in an environment where contributory behavior is not readily rewarded.

## **Session 9: Group Problem Solving**

1. Discuss various processes used for problem solving.
2. Discuss various ways to generate solutions.
3. Discuss various methods used for decision making.
4. Demonstrate the use of various problem solving processes.
5. Employ various solution generation techniques.
6. Apply various decision making tools.

## **Session 10: Group Problem Solving and Review for Test**

1. Discuss various processes used for problem solving.
2. Discuss various ways to generate solutions.
3. Discuss various methods used for decision making.
4. Demonstrate the use of various problem solving processes.
5. Employ various solution generation techniques.
6. Apply various decision making tools.

## **Session 11: Test #2, Statistical Thinking and SPC Basics**

1. Explain the term "statistical thinking".
2. Explain why statistics are necessary for process control.
3. Define SPC – statistical process control.
4. Discuss the foundation for SPC.
5. Justify the need for a SPC control system.
6. Discuss population and sample.
7. Describe the properties of distributions: location, spread, range.
8. Discuss normal distribution.
9. Discuss bi-modal distribution.
10. Describe the measure of central tendency: mean, median and mode.
11. Calculate mean, median and mode.
12. Explain standard deviation.
13. Demonstrate ability to perform various operations with a statistical calculator or computer spreadsheet.

## **Session 12: Data Collection and Control Charts**

1. Illustrate how data represents the process.
2. Identify various types of data process technicians would collect.
3. Distinguish the value of data to the functioning of the unit.
4. Explain the purposes for collection data:
  - To describe
  - To infer
  - To predict
5. Explain the uses of data:
  - Enumerative (action on the product)
  - Analytic (action on the process)

6. Characterize the process of data collection.
7. Explain the concept of operational definition.
8. Use observation skills to collect data.
9. Employ investigative techniques to collect data.
10. Use questioning techniques to collect data.
11. Characterize the purpose of sampling (infer meaning to a larger population).
12. Discuss the severe problems associated with conventional sampling and testing schemes.
13. Outline the importance of completing documentation.
14. Point out the consequences of falsifying records.
15. Demonstrate an analytical mindset.
16. Practice discernment.
17. Emphasize the importance of accuracy and precision.
18. Emphasize the importance of attention to detail.
19. Demonstrate the ability to not become complacent.
20. Demonstrate the ability to seek clarification when unclear.

## **Session 13: Control Charts and Data Representation, Analysis and Interpretation**

1. Explain the purpose and use of control charts.
2. Discuss the characteristics of control charts (upper and lower limits, average, mean, range).
3. Discuss control charts for variables (continuous data):  $\bar{X}$ /R,  $\bar{X}$ /Moving R, and  $\bar{X}$ /S charts.
4. Discuss control charts for attributes (discrete data): p, np, c, and u charts.
5. Explain why control charts should only be used with certain types of processes (variable as opposed to fixed).
6. Calculate control limits.

## **Session 14: Process Capability and Review for Test**

1. Interpret the data on a control chart.
2. Describe the rules for determining "out-of-control" status.
3. Explain overcontrolling and undercontrolling.
4. Define "process capability".
5. Discuss process capability limits.
6. Discuss  $C_p$ ,  $C_{pu}$ ,  $C_{pl}$ , and  $C_{pk}$  indices.
7. Compare and contrast potential capability ( $C_p$ ) with actual capability ( $C_{pk}$ ).
8. Explain the benefits of capability indices.

## **Session 15: Class Project**

1. Apply data collection, representation, analysis, and interpretation skills in a real-world, process industry scenario.

## **Session 16: Test #3**

No new learning objectives.

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