

## Process Quality

Topic Name	Objectives
<b>Course Overview</b>	<ol style="list-style-type: none"> <li>1. Define quality.</li> <li>2. Trace the rebirth of quality in the United States.</li> <li>3. Discuss Deming's philosophy of quality.</li> <li>4. Discuss Juran's philosophy of quality.</li> <li>5. Discuss Crosby's philosophy of quality.</li> <li>6. Discuss other quality gurus (e.g., Shewhart, Taguchi) and their philosophies of quality.</li> <li>7. Discuss quality programs significant to the process industry today: ISO 9000, and Six Sigma.</li> <li>8. Explain the purpose and benefits of ISO 9000 certification.</li> <li>9. 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.</li> </ol>
<b>TQM (Total Quality Management) and Economics</b>	<ol style="list-style-type: none"> <li>1. Discuss the philosophy, methods and elements of TQM – Total Quality Management.</li> <li>2. List different terms for "quality management".</li> <li>3. Distinguish between the "old" versus "new" philosophy of quality; e.g., Conformance to Specifications versus Maintenance of Consistency.</li> <li>4. Discuss the impact of quality.</li> <li>5. Discuss the cost of quality: appraisal, internal failure, external failure and prevention.</li> <li>6. Discuss the cost associated with a lack of quality.</li> <li>7. Define economics.</li> <li>8. Explain competition.</li> <li>9. Discuss relationship between supply and demand.</li> <li>10. Define inflation.</li> <li>11. Describe risk.</li> <li>12. Define standard of living.</li> <li>13. Discuss the concept of the operator as a stake-holder.</li> <li>14. Describe downsizing.</li> <li>15. Explain profit and loss.</li> </ol>

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<b>Total Quality Management and Economics (Cont'd.)</b>	<ol style="list-style-type: none"><li>16. Define revenue.</li><li>17. Describe the "Five Factors of Production".</li><li>18. Describe assets and liabilities.</li><li>19. Distinguish between accounts payable and accounts receivable.</li><li>20. Define income.</li><li>21. Illustrate the relationship between income before taxes, taxes, and income after taxes.</li><li>22. Explain fixed and variable costs.</li><li>23. Discuss relationship between profitability and /operating rate as it relates to fixed and variable costs.</li><li>24. Define gross profit.</li><li>25. List the costs that contribute to operating expenses.</li><li>26. Define depreciation.</li><li>27. Discuss how productivity affects plant profits.</li><li>28. Discuss how natural resources are used by the process industry.</li><li>29. Discuss the impact of off-spec production: re-grading or re-working.</li><li>30. Describe how substandard production in one part of the process affects the remaining parts.</li><li>31. Explain the economic impact of lost opportunities due to lack of certification or production limitations.</li></ol>
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<b>Customer Service and Personal Effectiveness</b>	<ol style="list-style-type: none"><li>1. Describe customer service.</li><li>2. Differentiate between internal and external customers.</li><li>3. Differentiate between customer specifications and customer requirements.</li><li>4. Discuss what customers want from their providers and suppliers.</li><li>5. Explain the relationship between the customer's processes and the supplier's processes.</li><li>6. Describe the importance of customer visits.</li><li>7. Describe the importance of responding to customer requests and comments.</li><li>8. Explain why good customer relationships are important to the success of your company's business</li><li>9. Explain why a "win/win" relationship must exist between customer and supplier for the business to prosper.</li><li>10. Explain why the employee "is" the organization in the customer's eyes.</li><li>11. Identify personal strengths and weaknesses and how they impact personal effectiveness.</li><li>12. Describe the characteristics of an effective, efficient person.</li><li>13. Explain the concept of a person's sphere of influence.</li><li>14. Describe and practice time management skills.</li><li>15. Describe and demonstrate organizational skills.</li><li>16. Discuss and demonstrate planning and prioritization skills.</li><li>17. Define personal productivity.</li><li>18. List and discuss the factors that impact productivity.</li><li>19. Describe personal accountability and examples of employee evaluation processes.</li><li>20. Explain how expanded duties benefit the organization and the individual.</li><li>21. Explain the importance of organizational mission, vision, and values.</li><li>22. Explain the importance of aligning one's own values with those of the organization.</li><li>23. Describe various organizational structures and one's place therein.</li><li>24. Describe various organizational resources (i.e., training department, HR, quality assurance lab, maintenance, and engineering) and how to utilize them.</li></ol>
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<p><b>Customer Service and Personal Effectiveness (Cont'd.)</b></p>	<p>25. Describe ways to improve time management.</p> <p>26. Describe the importance of the following as they relate to personal effectiveness:</p> <ul style="list-style-type: none"> <li>• Display patience.</li> <li>• Take initiative.</li> <li>• Display task-orientation.</li> <li>• Demonstrate flexibility.</li> <li>• Display the ability to adapt to change.</li> <li>• Express confidence.</li> <li>• Characterize and display a strong work ethic.</li> </ul> <p>27. Discuss the importance of acknowledging one's limitations, without being defensive and recognizing opportunities for growth.</p> <p>28. Explain the importance of obtaining knowledge and skills quickly and completely.</p> <p>29. Explain the importance of having a willingness to:</p> <ul style="list-style-type: none"> <li>• learn in various environments</li> <li>• be multi-skilled and accept additional responsibilities</li> <li>• share knowledge and train others</li> <li>• take ownership of processes and systems outside normal technical duties</li> </ul>
<p><b>Team Skills</b></p>	<p>1. Summarize various concepts surrounding team dynamics.</p> <p>2. Identify and demonstrate effective interpersonal skills.</p> <p>3. List various personality type characteristics which can be found among a diverse group of team members.</p> <p>4. Explain the following effective meeting management techniques.</p> <ul style="list-style-type: none"> <li>• Importance of meetings.</li> <li>• Delegating and assigning tasks.</li> <li>• Assessing and allocating resources.</li> <li>• Methods for managing conflict.</li> <li>• Showing respect for and courtesy toward team members</li> <li>• Recognize possible strengths and weaknesses of team members (including you)</li> </ul>

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<b>Effective Teams</b>	<ol style="list-style-type: none"><li>1. Explain the importance of communicating appropriately across the organization.</li><li>2. Describe the importance of terms used in plant communications; i.e., shift turnover, shift meetings, plant jargon, etc.</li><li>3. Discuss tools for plant communication: i.e., software applications, email, voicemail, telephone, radio, log book, documentation.</li><li>4. Discuss the importance of written communication; i.e., legible, specific, signed, recordkeeping, legalities.</li><li>5. Discuss the importance of accuracy in communication.</li><li>6. Describe and demonstrate effective verbal and written communication skills and techniques.</li><li>7. Explain the necessity for sharing information.</li><li>8. Discuss the importance of checking email and voicemail regularly.</li><li>9. Describe the purpose and function of teams.</li><li>10. Explain the life cycle of teams.</li><li>11. List and describe the stages of team development.</li><li>12. Convert team goals and objectives into team mission statements.</li><li>13. Identify and demonstrate effective interpersonal skills.</li><li>14. Describe the following concepts as they relate to team performance:<ul style="list-style-type: none"><li>• Getting over the "us" versus "them" mentality.</li><li>• Willingness to share and participate.</li><li>• Appreciate diversity.</li><li>• Value others' perspectives.</li><li>• Display resourcefulness.</li><li>• Align individual values and subsequent actions with those of the team.</li><li>• Recognize that many points of view are better than one.</li><li>• Accept feedback.</li><li>• Show a willingness to depend on others.</li><li>• Appreciate value of "win/win" thinking.</li><li>• Team dynamics</li></ul></li></ol>
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<b>Variance and Operating Consistency</b>	<ol style="list-style-type: none"><li>1. Define variation.</li><li>2. List variables that affect processes.</li><li>3. Summarize the various causes of variation.</li><li>4. Explain the difference between common cause and special cause variation. Examples:<ul style="list-style-type: none"><li>• Common cause variation: an air-conditioned room the temperature varies as a result of common causes such as body heat, thermostat control settings, etc.</li><li>• Special cause variation: opening a window, compressor failure, etc.</li></ul></li><li>5. Discuss the concept of operating consistency.</li><li>6. Outline the Standardize/Do/Check/Act (SDCA) process for process standardization and continuous improvement.</li><li>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.).</li><li>8. List the different levels of documentation found in the process industry today:<ul style="list-style-type: none"><li>• Policies</li><li>• General Procedures</li><li>• Specific Procedures (or Job Instructions)</li><li>• Forms</li></ul></li><li>9. Define variation.</li><li>10. List variables that affect processes.</li><li>11. Summarize the various causes of variation.</li><li>12. Discuss the concept of operating consistency.</li><li>13. Outline the Standardize/Do/Check/Act (SDCA) process for process standardization and continuous improvement.</li></ol>
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<b>Variance and Operating Consistency (Cont'd.)</b>	<ol style="list-style-type: none"><li>14. 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.).</li><li>15. List the different levels of documentation found in the process industry today:<ul style="list-style-type: none"><li>• Policies</li><li>• General Procedures</li><li>• Specific Procedures (or Job Instructions)</li><li>• Forms</li></ul></li><li>16. Describe different types of procedures, procedure formats and information found in procedures.</li><li>17. Describe different types of policies, policy formats and information found in policies.</li><li>18. Discuss the process technician's role in following and maintaining procedures and policies.</li><li>19. Describe the concept of "best practices".</li><li>20. Illustrate how the information found within a policy relates to how business is conducted.</li><li>21. Explain how the information found within a procedure relates to the functioning of the process.</li><li>22. Explain the concept of "document control"</li><li>23. Explain the importance of document control</li><li>24. Discuss document retention policies found within industry.</li><li>25. Explain the importance of keeping process documentation "evergreen".</li><li>26. Discuss the consequences of not following policies and procedures; i.e., product inconsistencies, threats to safety, health and environment.</li><li>27. Discuss and explain the importance of the following:<ul style="list-style-type: none"><li>• Willingness to take directions.</li><li>• Attention to detail.</li><li>• Completing tasks in sequential order.</li><li>• Motivation to perform steps as stated in procedures.</li></ul></li><li>28. Discuss the value of policies and procedures.</li><li>29. Discuss the importance of recognizing when instructions given by others are in conflict with approved policies and procedures and discuss steps taken to resolve the conflict.</li></ol>
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<p><b>Continuous Improvement and Corrective/Preventive Action</b></p>	<ol style="list-style-type: none"> <li>1. Define continuous improvement.</li> <li>2. Differentiate between chronic and sporadic process problems.</li> <li>3. List the various strategies companies engage in to improve their processes.</li> <li>4. Discuss various management approaches to process improvement.</li> <li>5. Discuss the following as they relate to continuous improvement: <ul style="list-style-type: none"> <li>• Considering alternatives</li> <li>• Willing to get involved</li> <li>• Practicing observant behavior</li> <li>• Challenging the process</li> <li>• Desiring to improve upon the current state</li> <li>• Ability to take action.</li> <li>• Ability to take initiative.</li> <li>• Assertiveness.</li> <li>• Willingness to share ideas in an environment where contributory behavior is not readily rewarded</li> <li>• Displaying an openness to change.</li> <li>• Respecting the fact that people can learn from ideas that "don't work".</li> </ul> </li> <li>6. Discuss preventive action.</li> <li>7. Discuss corrective action.</li> <li>8. Describe the concept of cause and effect.</li> <li>9. Define non-conformance. <ul style="list-style-type: none"> <li>• Describe the consequences of not addressing a non-conformance.</li> </ul> </li> </ol>
<p><b>Group Problem Solving</b></p>	<ol style="list-style-type: none"> <li>1. Explain the use of various: <ul style="list-style-type: none"> <li>• Problem solving processes</li> <li>• Solution generation techniques</li> <li>• Decision making tools</li> </ul> </li> </ol>

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<b>Basics of SPC (Statistical Process Control)</b>	<ol style="list-style-type: none"><li>1. Explain why statistics are necessary for process control.</li><li>2. Define SPC – statistical process control.</li><li>3. Discuss the foundation for SPC.</li><li>4. Explain the need for a SPC control system.</li><li>5. Discuss the following as they relate to SPC.<ul style="list-style-type: none"><li>• Properties of distributions: location, spread, range.</li><li>• Normal distribution.</li><li>• Bi-modal distribution.</li></ul></li><li>6. Define and determine mean, median and mode.</li><li>7. Explain standard deviation.</li></ol>
<b>Data Collection and Control Charts</b>	<ol style="list-style-type: none"><li>1. Illustrate how plant data represents the process.</li><li>2. Identify various types of data process technicians would collect.</li><li>3. Explain the value of plant data.</li><li>4. Explain the purposes for collection data:<ul style="list-style-type: none"><li>• To describe</li><li>• To infer</li><li>• To predict</li></ul></li><li>5. Explain the uses of plant data:</li><li>6. Explain how data is collected.</li><li>7. Explain how you would use observation skills to collect data:<ul style="list-style-type: none"><li>• Touch</li><li>• Hear</li><li>• Feel</li><li>• See</li></ul></li><li>8. Explain how data is used to troubleshoot a process.<ul style="list-style-type: none"><li>• inconsistent data</li><li>• irreconcilable data</li></ul></li><li>9. Explain how questioning techniques (five why's) are used to collect data.</li></ol>

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<b>Data Collection and Control Charts (cont)</b>	<ol style="list-style-type: none"> <li>10. Define representative samples.</li> <li>11. Explain the problems associated with improper sampling techniques. Describe the importance of completing documentation.</li> <li>12. Describe the following <ul style="list-style-type: none"> <li>• Consequences of falsifying records.</li> <li>• Importance of accuracy and precision.</li> <li>• Importance of attention to detail.</li> <li>• The ability to not become complacent.</li> <li>• The ability to seek clarification when unclear.</li> </ul> </li> </ol>
<b>Control Charts and Data Representation, Analysis and Interpretation</b>	<ol style="list-style-type: none"> <li>1. Explain the purpose and use of control charts.</li> <li>2. Explain the characteristics of control charts (upper and lower limits, average, mean, range).</li> <li>3. Explain control charts for variables (continuous data): Xbar/R, X/Moving R, and Xbar/S charts.</li> <li>4. Explain control charts for attributes (discrete data): p, np, c, and u charts.</li> <li>5. Explain why control charts should only be used with certain types of processes (variable as opposed to fixed).</li> <li>6. Calculate control limits.</li> </ol>
<b>Process Capability</b>	<ol style="list-style-type: none"> <li>1. Interpret the data on a control chart.</li> <li>2. Describe the rules for determining "out-of-control" status.</li> <li>3. Explain over-controlling and under-controlling.</li> <li>4. Define "process capability".</li> <li>5. Define process capability limits.</li> <li>6. Define Cp, Cpu, Cpl, and Cpk indices.</li> <li>7. Compare and contrast potential capability (Cp) with actual capability (Cpk).</li> <li>8. Explain the benefits of capability indices.</li> </ol>
<b>Team Project</b>	Apply data collection, representation, analysis, and interpretation skills in a real-world, process industry scenario.