

## Southwest WI Technical College

10-623-111 Lean Tools

# Course Design

### Course Information

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| --- | --- | --- |
|  | Description | In LEAN TOOLS learners will examine the lean tools available to identify and eliminate waste from a process. Learners will examine the benefits and challenges of conducting a 5S strategy and visual management in the workplace. Leaners will utilize process mapping and value stream mapping techniques to identify waste in the process and develop plans to reduce and/or eliminate identified waste. Learners will examine the role SMED (single minute exchange of dies) and TPM (Total Productive Maintenance) play in a lean enterprise.Meta Data: 5S, Cultural Resistance, Mistake Proofing, Peer Evaluation, Value Stream Mapping, Lean Value, Standardized Work, Total Production Maintenance, OEE (Overall Equipment , Effectiveness), A3, Quick Change Over, SMART Goals, Root Cause Analysis |
|  | Instructional Level | A.A.S. - Associate in Applied Science  |
|  | Total Credits | 3.00 |
|  | Total Hours | 54.00 |

Types of Instruction

|  |  |
| --- | --- |
| Instruction Type | Credits/Hours |
| Online | 3 credits |

Pre/Corequisites

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| --- |
| Lean Concepts (10-623-110) |

Textbooks

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| * Team, P. P. (1996). *5S for operators: 5 pillars of the visual workplace*. Productivity Press. ISBN-13: 978-1563271236 ISBN-10: 1563271230
 |
| * Shingō, S. (1997). *Mistake-proofing for operators: The ZQC system*. Portland, Or.: Productivity Press. ISBN-13: 978-1563271274 ISBN-10: 1563271273
 |
| * Rother, M., & Shook, J. (2003). *Learning to see: Value stream mapping to create value and eliminate muda*. Brookline, MA: Lean Enterprise Institute. ISBN-13: 978-0966784305 ISBN-10: 0966784308
 |
| * *Standard work for the shopfloor*. (2002). New York: Productivity Press. ISBN-13: 978-1563272738 ISBN-10: 1563272733
 |
| * Shirose, K., & Nakajima, S. (1992). *TPM for supervisors*. Portland, Or.: Productivity Press. ISBN-13: 978-1563271618 ISBN-10: 1563271613
 |
| * Recommended: Dennis, P. 1. (2007). *Lean production simplified: A plain language guide to the world's most powerful production system, 2nd edition*. Productivity Press. ISBN-13: 978-1563273568 ISBN-10: 156327356X
 |
| * *OEE for operators: Overall equipment effectiveness*. (1999). Portland, Or.: Productivity.
 |

### Core Abilities

|  |  |
| --- | --- |
| 1. | Act Professionally |
| 2. | Communicate Clearly |
| 3. | Solve Problems |
| 4. | Work Cooperatively |

### Course Competencies

|  |  |
| --- | --- |
| 1. | Maintain 5S Standards  |
|  | Linked Core Abilities |
|  | Act ProfessionallyCommunicate ClearlySolve ProblemsWork Cooperatively |
|  | Assessment Strategies |
|  | 1.1. | Project |
|  | Criteria |
|  | 1.1. | 5S Implementation Project is accepted for approval |
|  | Learning Objectives |
|  | 1.a. | Define five pillars of 5S |
|  | 1.b. | Understand cultural resistance to 5S |
|  | 1.c. | Define the scope of a 5S project |
|  | 1.d. | Create a red tagging procedure |
|  | 1.e. | Identify unwanted items |
|  | 1.f. | Implement a Sort |
|  | 1.g. | Determine appropriate location of tools, material and information |
|  | 1.h. | Identify location with appropriate markings |
|  | 1.i. | Implement a Set in Place |
|  | 1.j. | Create a cleaning procedure |
|  | 1.k. | Implement Shine |
|  | 1.l. | Address nonconformities by standardizing |
|  | 1.m. | Sustain 5S activities |
| 2. | Implement Effective Mistake-Proofing Devices  |
|  | Linked Core Abilities |
|  | Communicate ClearlySolve ProblemsWork Cooperatively |
|  | Assessment Strategies |
|  | 2.1. | Project |
|  | 2.2. | Peer Evaluation |
|  | Criteria |
|  | 2.1. | you complete the analysis of a student’s mistake proofing device |
|  | 2.2. | you submit your mistake-proofing device project |
|  | 2.3. | you complete the peer evaluation |
|  | Learning Objectives |
|  | 2.a. | Define Zero Quality Control |
|  | 2.b. | Define three approaches to product inspection |
|  | 2.c. | Analyze existing mistake-proofing device |
|  | 2.d. | Create a mistake proofing device |
| 3. | Improve Flow Using Value Stream Mapping  |
|  | Linked Core Abilities |
|  | Communicate ClearlySolve ProblemsWork Cooperatively |
|  | Assessment Strategies |
|  | 3.1. | Case Study |
|  | 3.2. | Projects |
|  | Criteria |
|  | 3.1. | you submit your Introduction to VSM Worksheet correctly |
|  | 3.2. | you complete the Current State Case Study |
|  | 3.3. | you submit a Lean Value Stream Worksheet correctly |
|  | 3.4. | you complete the Future State Case Study |
|  | 3.5. | you submit a Yearly Value-Stream Plan |
|  | 3.6. | Optional: Current State Map and Future Stare Map at your facility |
|  | Learning Objectives |
|  | 3.a. | Define Value-Stream Mapping (VSM) |
|  | 3.b. | Identify material and information flow |
|  | 3.c. | Define and select a product family |
|  | 3.d. | Identify mapping icons |
|  | 3.e. | Create a current state map |
|  | 3.f. | Calculate takt time |
|  | 3.g. | Develop continuous flow |
|  | 3.h. | Create a supermarket |
|  | 3.i. | Use a First-In-First-Out Lane |
|  | 3.j. | Select a Pacemaker |
|  | 3.k. | Create a future state map |
|  | 3.l. | Implement a future state map |
| 4. | Implement Standardized Work  |
|  | Linked Core Abilities |
|  | Communicate ClearlySolve ProblemsWork Cooperatively |
|  | Assessment Strategies |
|  | 4.1. | Projects |
|  | Criteria |
|  | 4.1. | you submit Introduction to Standardized Work Worksheet meeting rubric standards |
|  | 4.2. | you submit Four Steps to Standard Work Project meeting rubric standards |
|  | 4.3. | you submit Standardized Work Application Plan meeting rubric standards |
|  | Learning Objectives |
|  | 4.a. | Define standardized work |
|  | 4.b. | Develop standards |
|  | 4.c. | Apply standardization |
|  | 4.d. | Create Parts-Production Capacity Worktable |
|  | 4.e. | Create a Standard Operations Combination Chart |
|  | 4.f. | Create a Work Methods Chard |
|  | 4.g. | Create a Standard Operations Chart |
|  | 4.h. | Apply standardized work |
| 5. | Apply Total Production Maintenance (TPM)  |
|  | Linked Core Abilities |
|  | Solve ProblemsWork Cooperatively |
|  | Assessment Strategies |
|  | 5.1. | Report |
|  | 5.2. | Project |
|  | Criteria |
|  | Performance will be satisfactory when: |
|  | 5.1. | Introduction to TPM Worksheet meeting rubric standards |
|  | 5.2. | OEE Calculation Sheet meeting rubric standards |
|  | 5.3. | Quick Change Over Worksheet meeting rubric standards |
|  | 5.4. | TPM Project meeting rubric standards |
|  | Learning Objectives |
|  | 5.a. | Define TPM |
|  | 5.b. | Define the six major losses |
|  | 5.c. | Calculate Overall Equipment Effectiveness (OEE) |
|  | 5.d. | Implement autonomous maintenance |
|  | 5.e. | Reduce change over time |
|  | 5.f. | Implement a team maintenance program |
| 6. | Plan and Implement an Improvement Project Using A-3 Report  |
|  | Linked Core Abilities |
|  | Communicate ClearlySolve ProblemsWork Cooperatively |
|  | Assessment Strategies |
|  | 6.1. | Project |
|  | 6.2. | Report |
|  | Criteria |
|  | Performance will be satisfactory when you submit |
|  | 6.1. | A3 Tool Usage Worksheet meeting rubric standards |
|  | 6.2. | A3 Report meeting rubric standards |
|  | Learning Objectives |
|  | 6.a. | Define problem solving |
|  | 6.b. | Define the problem statement |
|  | 6.c. | Collect data on current condition |
|  | 6.d. | Create SMART goals |
|  | 6.e. | Analysis root cause |
|  | 6.f. | Determine countermeasures |
|  | 6.g. | Develop an implementation plan |
|  | 6.h. | Compare the goal with actual results |
|  | 6.i. | Develop a follow up plan |

### Course Learning Plans and Performance Assessment Tasks

Introduction to Lean Ideas

Overview/Purpose

Our lives are made of processes. Every process has suppliers, inputs, activities, outputs, and customers. It is our goal to give the customer want they want in the most efficient way. We do this by identifying waste in the process and using tools to reduce or eliminate it. This is the basic foundation of Lean. This unit will review the concept of value add and non-value added activities, and discuss the different types of wastes found in a process. Please take the time to be aware of and identify the different types of waste that are happening around you.

### Learning Activities

|  |  |
| --- | --- |
| 1. | Review Lean Principles Power Point |
|  | Learning Materials |
|  | Lean Principles PowerPoint | [Lean.Principles.PowerPoint.(SWTC).pptx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=52bcd696-3150-4359-a1bd-10475b1338d5) |
| 2. | Participate in the Class Introductions Discussion Board. You will be participating in the Class Introductions Discussion Board. Please be sure to read the discussion board requirements and make note of the due date. Late submissions will not be accepted. Requirements: Initial post and 3 responses to other classmates. Hello! Welcome to Lean Tools. I would like everyone to take a moment to introduce yourselves. Please consider including the following: •Name you prefer everyone to use when addressing you •Work experience •Experience with lean •Personal points of interest such as family, hobbies, interests and achievements This discussion board will be open for the first three weeks of class to give everyone an opportunity to create connections with other classmates. This is a graded item, and you are required to have an initial post and three responses on the board prior to the third week of class.  |
|  | Learning Materials |
|  | Rubric for Introduction Discussion Board | [Rubric for Introductory Discussion Board(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=bfdc52b3-31ef-456d-9f83-d42fab041c57) |
| 3. | Complete the Introduction to Lean Worksheet |
|  | Learning Materials |
|  | Lean Principles Review Sheet | [Lean Principles Review Sheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=25d55dad-a8bb-4992-a03c-e3fb97506286) |
|  | Rubric for Lean Principles Review Sheet | [Rubric.for.Lean.Priniciples.Review.Sheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=55d498bb-f4ce-439e-9a32-9004a82d019e) |

### Assessment Activities

|  |  |
| --- | --- |
| 1. | Participate in Class Introduction Discussion Board |
|  | Learning Materials |
|  | Rubric for Introduction Discussion Board | [Rubric for Introductory Discussion Board(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=bfdc52b3-31ef-456d-9f83-d42fab041c57) |
| 2. | Submit Introduction to Lean Worksheet |
|  | Learning Materials |
|  | Rubric for Lean Principles Review Sheet | [Rubric.for.Lean.Priniciples.Review.Sheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=55d498bb-f4ce-439e-9a32-9004a82d019e) |

Maintain 5S Standards

Overview/Purpose

5S is a very powerful organizational tool. It is a great place to start when beginning a continuous improvement project, and can be combined with many of the other tools. It relies heavy on visual management, and if implemented correctly can eliminated and reduce many of the types of wastes discussed. The first three S's can often be easily completed, but the last two are the ones that make the change permanent. Standardize and sustain will be ongoing and need special attention for 5S to be successful.

Target Competencies

|  |  |
| --- | --- |
| 1. | Maintain 5S Standards  |
|  | Assessment Strategies |
|  | 1.1. | Project |
|  | Criteria |
|  | 1.1. | 5S Implementation Project is accepted for approval |
|  | Learning Objectives |
|  | 1.a. | Define five pillars of 5S |
|  | 1.b. | Understand cultural resistance to 5S |
|  | 1.c. | Define the scope of a 5S project |
|  | 1.d. | Create a red tagging procedure |
|  | 1.e. | Identify unwanted items |
|  | 1.f. | Implement a Sort |
|  | 1.g. | Determine appropriate location of tools, material and information |
|  | 1.h. | Identify location with appropriate markings |
|  | 1.i. | Implement a Set in Place |
|  | 1.j. | Create a cleaning procedure |
|  | 1.k. | Implement Shine |
|  | 1.l. | Address nonconformities by standardizing |
|  | 1.m. | Sustain 5S activities |

### Learning Activities

|  |  |
| --- | --- |
| 1. | Read Chapter 2: Introduction and Overview Text book: “5S for Operators: 5 Pillars of the Visual Work place” by Productivity Press |
| 2. | Review 5S Power Point |
|  | Learning Materials |
|  | 5S PowerPoint | [5S Power Point.(SWTC).pptx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=cfb28748-254d-48cd-834d-1745ea9a2272) |
| 3. | Complete 5S Before and After Web Search1. Search the internet and find a 5S project with before and after pictures. 2. Write 2-3 paragraphs that discuss why you chose this example, how it illustrates each of the 5 S's, and your opinion of the project. 3. Include the web link of where you found it. Submission- Attached a Word document that includes the example, its web link, and your 2-3 paragraph discussion.  |
|  | Learning Materials |
|  | Rubric for 5S Web Search | [Rubric for 5S Web Search(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=568663c4-6c48-44a9-b098-9c8a6cd146d7) |
| 4. | Read Chapters 3-5: Sort, Set-in-Place, Shine |
| 5. | Complete Phase I of the 5S ProjectOutput: Power point presentation or video telling a clear story of your 5S project. It should include pictures and a detailed description of your project. Directions: The power point or video should include the following items. Phase I- 1. Scope of Project 2. Before Picture 3. Red Tag Procedure 4. Evidence of the Sort completed 5. Discussion on how locations were determined 6. Pictures of how locations were marked and identified 7. Clearly defined cleaning schedule or procedure. Phase II- 8. Examples of standardization 9. Clearly defined sustain plan Submission: Power point or video can be attached to this assignment. A copy will also be attached to the 5S discussion board for peer evaluations.  |
|  | Learning Materials |
|  | Rubric for S5 Project | [Rubric for 5S Project(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=0486b441-c94b-40b4-9c40-389fa3396e88) |
| 6. | Read Chapters 6-7: Standardize and Sustain |
| 7. | Complete Phase II of the 5S Project |
| 8. | Complete Peer Evaluation of classmate’s 5S projects |
|  | Learning Materials |
|  | Rubric for 5S Peer Evaluation | [Rubric for 5S Peer Evaluation(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=0d5d45b6-f1fa-4d1b-ac15-86cf770c6c9d) |
|  | Peer Evaluation for 5S Project | [Peer Evaluation.5S.Project.Sheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=59a3599e-de7f-4390-bc48-f24abeabb79a) |
| 9. | POST in the 5S Projects Discussion Board |
|  | Learning Materials |
|  | Rubric for 5S Discussion Board | [Rubric for 5S Discussion Board Project Post(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=a56a92d8-4c9d-4313-a907-aa1385e9cde1) |

### Assessment Activities

|  |  |
| --- | --- |
| 1. | Submit 5S Before and After Web Search |
|  | Learning Materials |
|  | Rubric for 5S Web Search | [Rubric for 5S Web Search(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=568663c4-6c48-44a9-b098-9c8a6cd146d7) |
| 2. | Submit Phase I and Phase II 5S Project |
|  | Learning Materials |
|  | Rubric for S5 Project | [Rubric for 5S Project(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=0486b441-c94b-40b4-9c40-389fa3396e88) |
| 3. | Submit Peer Evaluations of 5S Projects |
|  | Learning Materials |
|  | Peer Evaluation for 5S Project | [Peer Evaluation.5S.Project.Sheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=59a3599e-de7f-4390-bc48-f24abeabb79a) |
|  | Rubric for 5S Peer Evaluation | [Rubric for 5S Peer Evaluation(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=0d5d45b6-f1fa-4d1b-ac15-86cf770c6c9d) |
| 4. | 5S Discussion Board Post |
|  | Learning Materials |
|  | Rubric for 5S Discussion Board | [Rubric for 5S Discussion Board Project Post(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=a56a92d8-4c9d-4313-a907-aa1385e9cde1) |

Implement Effective Mistake Proofing Devices

Overview/Purpose

Defects are types of waste. They cost a company time and money. The Lean tool to eliminate and reduce defects is mistake proofing. We can find a number of mistake proofing examples in our lives, and more are designed every day. Take the time to look around your home and your place of work and identify all the things that either do not allow you to make an error, or greatly reduces the possibility of making an error.

Target Competencies

|  |  |
| --- | --- |
| 1. | Implement Effective Mistake-Proofing Devices  |
|  | Assessment Strategies |
|  | 1.1. | Project |
|  | 1.2. | Peer Evaluation |
|  | Criteria |
|  | 1.1. | you complete the analysis of a student’s mistake proofing device |
|  | 1.2. | you submit your mistake-proofing device project |
|  | 1.3. | you complete the peer evaluation |
|  | Learning Objectives |
|  | 1.a. | Define Zero Quality Control |
|  | 1.b. | Define three approaches to product inspection |
|  | 1.c. | Analyze existing mistake-proofing device |
|  | 1.d. | Create a mistake proofing device |

### Learning Activities

|  |  |
| --- | --- |
| 1. | Read Chapters 2-6: Introduction and Overview Text book: “Mistake Proofing for Operators: The ZQC System ” by Productivity Press |
| 2. | Review Mistake Proofing Power Point |
|  | Learning Materials |
|  | Mistake Proofing PowerPoint | [Mistake.Proofing.PowerPoint(SWTC).pptx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=13a39056-0fff-48b2-a863-c54d642cfab6) |
| 3. | Complete the Mistake Proofing Overview WorksheetOutput- Introduction to Mistake Proofing Worksheet Directions- Complete the attached worksheet. Answer each question completely, and please use completed sentence when required. Submission- Attach Word Worksheet to this assignment.  |
|  | Learning Materials |
|  | Mistake Proofing Worksheet | [Mistake Proofing Worksheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=a1552324-148b-40e2-b1b8-b1d8af66b72e) |
|  | Rubric for Mistake Proofing Worksheet | [Rubric for Mistake Proofing Worksheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=5bb6c9bb-b9de-480e-9730-6b477bf88ad0) |
| 4. | Complete Existing Mistake Proof Device AnalysisOutput: Analyze an Existing Mistake Proof Device Directions: 1. Select an existing mistake proofing device. It can be found in your home, at work, or any place you may be, but make it something you use or observe. Use the Internet if needed to help select your device. 2. Clearly define the existing device. This should include a picture, a detailed explanation of how it works and the concepts used. 3. Evaluate the devices effectiveness. 4. Suggest possibilities for improvement if any exist. 5. Use complete sentences when required. Submission: This assignment may be completed using a Word document. Please attach the completed document to this assignment.  |
|  | Learning Materials |
|  | Rubric for Analysis of Mistake Proofing Device  | [Rubric for Analysis of Mistake Proofing Device Example(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=6d7c9a35-23d3-423b-b172-57a5292df823) |
| 5. | Complete Mistake Proof Design ProjectOutput: Design of a new mistake proofing device and describe the device using a Word document, power point or video. Directions: 1. Select a project personal to you that currently allows error. 2. Create a mistake-proofing device that will eliminate the possibility for error. 3. Create a Word or Presentation document that illustrates the device to include pictures and a detailed explanation of how the device will work. Please include specific concepts used. 4. Make sure the device is effective, user friendly, simple and cost effective. Submission: Please attach the word document, presentation or video to this assignment. Submit the final project to the Mistake Proofing Discussion Board for your classmates to review.  |
|  | Learning Materials |
|  | Rubric for Developing a Mistake Proof Device Project | [Rubric for Developing a Mistake Proof Device Project(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=21a6161a-6f87-4e48-b116-4525ef2a428b) |
| 6. | Discussion Board Please post your final Mistake Proofing project to this discussion board to share it with fellow classmates.  |
|  | Learning Materials |
|  | Rubric for Mistake Proof Project Discussion Board Post | [Rubric for Mistake Proof Project Discussion Board Post(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=0f233286-4f74-4484-904e-c95902caa2d4) |
| 7. | Complete Peer Evaluation of classmate’s Mistake Proofing projectsOutput- Evaluations of the Mistake Proof Device projects of 2 classmates. Direction- Please do the following: 1. Review 2 classmate Mistake Proof projects found on the Mistake Proof discussion board. 2. Complete the attached Peer Evaluation for the Mistake Proof projects of 2 classmates. Submission- Attached the completed evaluations to this assignment.  |
|  | Learning Materials |
|  | Rubric for Mistake Proof Peer Evaluation | [Rubric for Mistake Proof Peer Evaluation(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=252e5d5c-2b1c-4b5c-9570-5c296d838044) |
|  | Mistake Proofing Student Evaluation | [Mistake Proofing Student Evaluation(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=5e4a2636-1bb2-4a1e-b47d-4650cc3565cd) |

### Assessment Activities

|  |  |
| --- | --- |
| 1. | Submit Mistake Proofing Worksheet |
|  | Learning Materials |
|  | Rubric for Mistake Proofing Worksheet | [Rubric for Mistake Proofing Worksheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=5bb6c9bb-b9de-480e-9730-6b477bf88ad0) |
| 2. | Submit Existing Mistake Proof Device Analysis |
|  | Learning Materials |
|  | Rubric for Analysis of Mistake Proofing Device  | [Rubric for Analysis of Mistake Proofing Device Example(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=6d7c9a35-23d3-423b-b172-57a5292df823) |
| 3. | Submit Mistake Proof Design Project |
|  | Learning Materials |
|  | Rubric for Developing a Mistake Proof Device Project | [Rubric for Developing a Mistake Proof Device Project(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=21a6161a-6f87-4e48-b116-4525ef2a428b) |
| 4. | Post Mistake Proof Discussion Board |
|  | Learning Materials |
|  | Rubric for Mistake Proof Project Discussion Board Post | [Rubric for Mistake Proof Project Discussion Board Post(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=0f233286-4f74-4484-904e-c95902caa2d4) |
| 5. | Submit Peer Evaluation of Mistake Proofing Projects |
|  | Learning Materials |
|  | Mistake Proofing Student Evaluation | [Mistake Proofing Student Evaluation(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=5e4a2636-1bb2-4a1e-b47d-4650cc3565cd) |
|  | Rubric for Mistake Proof Peer Evaluation | [Rubric for Mistake Proof Peer Evaluation(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=252e5d5c-2b1c-4b5c-9570-5c296d838044) |

Use Value Stream Mapping to Improve Flow

Overview/Purpose

Creating flow is an important part of continuous improvement. Our goal is always to try to create one piece flow and reduce and eliminated Work in Process (WIP). If that is not possible, we use FIFO lanes and Kanbans to create pull systems that are controlled by customer demand. Here is a quick review of the different methods of creating pull:

1. One Piece Flow- Work moves from one workstation to another one piece at a time. An assembly is a great example of this. The goal would always be to use one piece if possible. This option does not create Work In Process (WIP) inventory between stations as well as other advantages. That is why we want one piece if possible.

2. FIFO Lane- Sometimes we cannot use one piece flow due to processing times being different at each workstation, equipment that produces more than one part at a time or a setup is required. We then will use either FIFO or Kanban. A FIFO Lane is the second best option. Parts are produced in the same inventory location in small batches. An example of this would be if circuit boards were the product. Say we have a machine that cuts and crimps five wires in a minute, but it takes a worker 5 minutes to wire a board using 5 of those wires. We would create a FIFO lane between the wire cutter/crimper and the workers wiring the boards. Based on demand we would determine how many batches of groups of 5 wires we would want in the lane. When the lane is full, the wire cutter/crimper will not produce. Once a spot is opening in the lane he/she will produce another batch of wires.

3. Kanban- This is similar to a FIFO lane, but we use this when parts are produced in a different inventory location, for example in the machine shop. A popular Kanban Method is the two-bin system. Parts have two bins. The worker is using parts out of one while the other is being filled (produced). Once the bin is empty, the worker submits a new order to fill the empty bin of parts and uses the second bin that was just filled. Kanban can is defined as a visual ordering system controlled by the person using the parts.

Target Competencies

|  |  |
| --- | --- |
| 1. | Improve Flow Using Value Stream Mapping  |
|  | Assessment Strategies |
|  | 1.1. | Case Study |
|  | 1.2. | Projects |
|  | Criteria |
|  | 1.1. | you submit your Introduction to VSM Worksheet correctly |
|  | 1.2. | you complete the Current State Case Study |
|  | 1.3. | you submit a Lean Value Stream Worksheet correctly |
|  | 1.4. | you complete the Future State Case Study |
|  | 1.5. | you submit a Yearly Value-Stream Plan |
|  | 1.6. | Optional: Current State Map and Future Stare Map at your facility |
|  | Learning Objectives |
|  | 1.a. | Define Value-Stream Mapping (VSM) |
|  | 1.b. | Identify material and information flow |
|  | 1.c. | Define and select a product family |
|  | 1.d. | Identify mapping icons |
|  | 1.e. | Create a current state map |
|  | 1.f. | Calculate takt time |
|  | 1.g. | Develop continuous flow |
|  | 1.h. | Create a supermarket |
|  | 1.i. | Use a First-In-First-Out Lane |
|  | 1.j. | Select a Pacemaker |
|  | 1.k. | Create a future state map |
|  | 1.l. | Implement a future state map |

### Learning Activities

|  |  |
| --- | --- |
| 1. | Read Part I: Getting Started Text book: “Learning to See” by Rother and Shook |
| 2. | Review VSM Icons found in Appendix C and on back book cover |
| 3. | Complete the VSM Getting Started WorksheetOutput: Completed Worksheet Directions: Please answer all questions completely. Use complete sentences when required. Submission: Please attach completed worksheet to this assignment.  |
|  | Learning Materials |
|  | Introduction to Value Stream Mapping | [Introduction to Value Stream Mapping Worksheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=92d430a3-567c-47c2-bec4-5a6e010f840f) |
| 4. | Read Part II: Current State Map |
| 5. | Complete the Current State Map for TWI IndustriesDirections: 1. Locate the Value Stream Mapping Data Set for TWI Industries found at the end of Part !!: Current State Map in 'Learning to See" by Rother and Shook (light blue pages). 2. Complete a current state map using the information provided and the icons from the back cover of the book. 3. Scan the map and attach it to this assignment. Please feel free to ask questions. You will find a completed map in the Appendix of this book, but please do not use that when doing your map. No value stream is mapped exactly the same by different people, and you should submit your version. Submission: Please attach scanned copy of the current state map to this assignment.  |
|  | Learning Materials |
|  | Rubric for Current State | [Rubric for Current State TWI(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=2d5de527-b3b1-4317-ba0f-659a9969e0c6) |
| 6. | Read Part III: Lean Value Stream |
| 7. | Complete the Lean Value Stream WorksheetOutput: Completed Worksheet Directions: Please answer all questions completely. Use complete sentences when required. Submission: Please attach completed worksheet to this assignment  |
|  | Learning Materials |
|  | Lean Value Stream Worksheet | [Lean Value Stream Worksheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=3b2b0dad-c249-4b5a-96f0-1a4c65160565) |
|  | Rubric for Value Stream Worksheet | [Rubric for VSM Worksheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=4b3521b3-5902-48f9-9fa0-aa0a60bd1bf5) |
| 8. | Read Part IV: Future State Map |
| 9. | Review TWI Industries Future State Map. Appendix C |
| 10. | Complete the ‘Contact Board’ current and future state maps activityThis assignment requires some thought and creativity. It is recommended that you set up the exercise and experience the process personally using the attached power point with product information.. This exercise is focused on flow so feel free to substitute different stickers, cards, or threads. The important thing is to recreate the flow of the process. There is also a discussion board for this assignment. Please use the board to ask questions, share ideas, or seek input from other students or the instructor. Value stream maps are best completed using a team so feel free to use other class members to complete this assignment. Output: A completed Current and Future State Map for the attached exercise and required discussion Directions: Use the information from the attached exercise to complete a current and future state map. Make sure you include the following on the future state map. 1. Calculated Takt Time 2. Pace Maker 3. Information and Material Flow 4. Use of one piece flow, FIFO lanes, and kanbans with supermarkets Submission: Attach the following to this assignment. 1. Scanned copy of current state map 2. Scanned copy of future state map 3. Page of discussion including calculations and responses to Q2 & Q3  |
|  | Learning Materials |
|  | Contact Board Assignment Information Sheet | [Contact Board Assignment InformationSheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=e84d3740-41a1-43fb-9e7d-4cdd120ff36c) |
|  | Value Stream Mapping PowerPoint | [Value Stream Mapping.PowerPoint(SWTC).pptx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=a7a6571e-eb07-4cef-9f33-faec8f69cd15) |
|  | Rubric for Contact Board Mapping Exercise | [Rubric for Contact Board Mapping Exercise(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=9ef3c7e1-39a2-4dbd-964a-88d2c03f9f6d) |
| 11. | VMS Contact Board Activity Discussion.  This forum is not graded. It is included to assist you in completing the contact board activity. Please use it to help with completing this challenging assignment. |
| 12. | Read Part V: Achieving the Future State |
| 13. | Complete the Yearly Value-Stream Plan for the ‘Contact Board’ activityOutput: Yearly Value Stream Map for Contact Board Exercise Directions: Use the current and future state maps for the previous assignment to create a Yearly Value Stream Pan. Submission: You may choose any appropriate software to include Word or Spreadsheet. The file will be attached to this assignment.  |
|  | Learning Materials |
|  | Rubric for Yearly VSM Plan | [Rubric for Yearly VSM Plan(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=3424d0fd-fd36-4994-9b7c-9ff06f7b3d68) |

### Assessment Activities

|  |  |
| --- | --- |
| 1. | Submit VSM Getting Started Worksheet |
|  | Learning Materials |
|  | Rubric for Value Stream Worksheet | [Rubric for VSM Worksheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=4b3521b3-5902-48f9-9fa0-aa0a60bd1bf5) |
| 2. | Submit Current State Map for TWI Industries |
|  | Learning Materials |
|  | Rubric for Current State | [Rubric for Current State TWI(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=2d5de527-b3b1-4317-ba0f-659a9969e0c6) |
| 3. | Submit Contact Board current and future state maps |
|  | Learning Materials |
|  | Rubric for Contact Board Mapping Exercise | [Rubric for Contact Board Mapping Exercise(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=9ef3c7e1-39a2-4dbd-964a-88d2c03f9f6d) |
| 4. | Submit Yearly Value-Stream Plan for the 'Contact Board' |
|  | Learning Materials |
|  | Rubric for Yearly VSM Plan | [Rubric for Yearly VSM Plan(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=3424d0fd-fd36-4994-9b7c-9ff06f7b3d68) |

Implement Standardized Work

Overview/Purpose

Standardized work is when we determine the 'the best known method' for a process and documenting it in a way that allows every user to complete it in that manner. We can use tools such as 5S and mistake proofing as well as some commonly used standardized work charts introduced in this lesson. Why do we standardized? Two main reasons is to be efficient and to control quality. A controlled process will be more likely to produce consistent product. Remember that standardized work is not set in stone and will continue to change as improvements are being made.

Target Competencies

|  |  |
| --- | --- |
| 1. | Implement Standardized Work  |
|  | Assessment Strategies |
|  | 1.1. | Projects |
|  | Criteria |
|  | 1.1. | you submit Introduction to Standardized Work Worksheet meeting rubric standards |
|  | 1.2. | you submit Four Steps to Standard Work Project meeting rubric standards |
|  | 1.3. | you submit Standardized Work Application Plan meeting rubric standards |
|  | Learning Objectives |
|  | 1.a. | Define standardized work |
|  | 1.b. | Develop standards |
|  | 1.c. | Apply standardization |
|  | 1.d. | Create Parts-Production Capacity Worktable |
|  | 1.e. | Create a Standard Operations Combination Chart |
|  | 1.f. | Create a Work Methods Chard |
|  | 1.g. | Create a Standard Operations Chart |
|  | 1.h. | Apply standardized work |

### Learning Activities

|  |  |
| --- | --- |
| 1. | Read Chapter 1-2: Introduction Textbook: Standard Work for the Shopfloor by Productivity Press |
| 2. | Complete the Introduction to Standardized Work WorksheetOutput: Completed Worksheet Directions: Please answer every question completely and use complete sentences. Submission: Attach completed worksheet to this assignment. It can be completed in Word document.  |
|  | Learning Materials |
|  | Rubric for Standard Work Worksheet | [Rubric for Standard Work Worksheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=80e8a88a-4c3e-4274-994b-28cd3a2738bf) |
| 3. | Read Chapters 3: Standard Work |
| 4. | Read Chapters 4-5: Application |
| 5. | Complete the Chocolate Chip Cookie Standard WorkOutput: Parts Production Capacity Worktable, Standard Operations Combination Chart, Work Methods Chart, Standard Operations Chart, and a Visual Display chart to be used by operators Directions: Create standardized work for making chocolate chip cookies. Use the 'Four Steps to Standard Work' found in CH 3 of the text. Directions and measurements should be very specific to reduce variation. Submission: Tables and charts can be handwritten or computer generated. Handwritten charts can be scanned. Work will be submitted as an attachment to this link.  |
|  | Learning Materials |
|  | Rubric for Cookie Standard Work | [Rubric for Cookie Standard Work(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=655626bf-9a6a-4300-82a8-dec0f62d3c38) |
| 6. | Application of Standard Work.  Complete the Four Steps to Standard Work ProjectOutput: Standard Work Application Plan Direction: Create a plan to apply standard work. It should include the following. 1.Purpose. 2.Audience. 3.Documentation method. 4.Training. 5.Improvement plan. 6.Plan to address cultural concerns. Please use complete sentences. Submission: The plan can be a Word document attached to this link.  |
|  | Learning Materials |
|  | Rubric for Standard Work Plan | [Rubric for Standard Work Plan(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=0487b0a7-4e13-47cf-bd24-acfafc517e20) |

### Assessment Activities

|  |  |
| --- | --- |
| 1. | Submit Introduction to Standardized Work Worksheet |
|  | Learning Materials |
|  | Rubric for Standard Work Worksheet | [Rubric for Standard Work Worksheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=80e8a88a-4c3e-4274-994b-28cd3a2738bf) |
| 2. | Submit the Chocolate Chip Cookie Standard Work |
|  | Learning Materials |
|  | Rubric for Cookie Standard Work | [Rubric for Cookie Standard Work(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=655626bf-9a6a-4300-82a8-dec0f62d3c38) |

Apply Total Production Maintenance (TPM)

Overview/Purpose

TPM is a culture where everyone (operators, maintenance, engineers, management) works together to keep the equipment running and producing good product. A great measurement for determining the success of a TPM program is OEE which will be discussed in this lesson.

Target Competencies

|  |  |
| --- | --- |
| 1. | Apply Total Production Maintenance (TPM)  |
|  | Assessment Strategies |
|  | 1.1. | Report |
|  | 1.2. | Project |
|  | Criteria |
|  | Performance will be satisfactory when: |
|  | 1.1. | Introduction to TPM Worksheet meeting rubric standards |
|  | 1.2. | OEE Calculation Sheet meeting rubric standards |
|  | 1.3. | Quick Change Over Worksheet meeting rubric standards |
|  | 1.4. | TPM Project meeting rubric standards |
|  | Learning Objectives |
|  | 1.a. | Define TPM |
|  | 1.b. | Define the six major losses |
|  | 1.c. | Calculate Overall Equipment Effectiveness (OEE) |
|  | 1.d. | Implement autonomous maintenance |
|  | 1.e. | Reduce change over time |
|  | 1.f. | Implement a team maintenance program |

### Learning Activities

|  |  |
| --- | --- |
| 1. | Read Chapters 1-6 Text book: “TPM for Supervisors” by Productivity Press |
| 2. | Review TPM PowerPoint |
|  | Learning Materials |
|  | TPM PowerPoint | [TPM. PowerPoint(SWTC).pptx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=b9185f77-511a-4bfb-bea0-5ed164faca61) |
| 3. | Review the Quick Change Over Summary Sheet |
|  | Learning Materials |
|  | Quick Change Over Chart | [Quick Change Over Chart(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=f5c48c1f-327a-496b-a372-fc98bf9a7eda) |
| 4. | Complete the Quick Change Over Worksheet |
|  | Learning Materials |
|  | Change Over Worksheet | [Change Over Worksheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=a9acbdae-95bd-46f8-89ed-9e703ca3d64f) |
|  | Rubric for Change Over Worksheet | [Rubric for Change Over Worksheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=fec226af-12f9-4358-999b-fc742842a42e) |
| 5. | Review OOE PowerPoint Presentation |
|  | Learning Materials |
|  | OEE PowerPoint | [OEE PowerPoint(SWTC).pptx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=4a7a0275-20c2-4564-94be-0a0ddb15287e) |
| 6. | Complete the OEE Calculation Sheet |
|  | Learning Materials |
|  | Rubric for OEE Worksheet | [Rubric for OEE Worksheet Activity(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=7ad588e6-959a-41d4-b119-02793222d857) |
|  | OEE Worksheet | [OEE Worksheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=6a96febb-9f3b-48b7-9c85-7fa8df5cbf27) |
| 7. | Complete TPM Project AssignmentOutput: TPM Plan for your personal automobile Direction: Create a TPM plan for your personal automobile. 1. Address the eight basic pillars of TPM found in Chapter 1 of the text 2. Include the responsibilities of all team members (Owner, Drivers, Mechanic) 3. Explain how OEE will be measured and calculated Submission: Please attached a Word document to this assignment  |
|  | Learning Materials |
|  | Rubric for TPM Project | [Rubric for TPM Project(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=94ac33be-7c38-4ae4-8a75-5be7d8514a5f) |

### Assessment Activities

|  |  |
| --- | --- |
| 1. | Submit Quick Change Over Worksheet |
|  | Learning Materials |
|  | Rubric for Change Over Worksheet | [Rubric for Change Over Worksheet(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=fec226af-12f9-4358-999b-fc742842a42e) |
| 2. | Submit OOE Calculation Sheet |
|  | Learning Materials |
|  | Rubric for OEE Worksheet | [Rubric for OEE Worksheet Activity(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=7ad588e6-959a-41d4-b119-02793222d857) |
| 3. | Submit TPN Project |
|  | Learning Materials |
|  | Rubric for TPM Project | [Rubric for TPM Project(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=94ac33be-7c38-4ae4-8a75-5be7d8514a5f) |

Construct an Improvement Project Using A-3 Report

Overview/Purpose

Sometimes it is hard to know where to start. An A3 report is a great problem solving model that assists us in completing a continuous improvement project. It starts by defining the problem, collects data on the current state, sets a target, determines the root cause, selects appropriate countermeasures, implements the measures, compares actual to target to determine the successful of the project, and then follow ups with additional actions. It is a great way for applying the tools learned in this course.

Target Competencies

|  |  |
| --- | --- |
| 1. | Plan and Implement an Improvement Project Using A-3 Report  |
|  | Assessment Strategies |
|  | 1.1. | Project |
|  | 1.2. | Report |
|  | Criteria |
|  | Performance will be satisfactory when you submit |
|  | 1.1. | A3 Tool Usage Worksheet meeting rubric standards |
|  | 1.2. | A3 Report meeting rubric standards |
|  | Learning Objectives |
|  | 1.a. | Define problem solving |
|  | 1.b. | Define the problem statement |
|  | 1.c. | Collect data on current condition |
|  | 1.d. | Create SMART goals |
|  | 1.e. | Analysis root cause |
|  | 1.f. | Determine countermeasures |
|  | 1.g. | Develop an implementation plan |
|  | 1.h. | Compare the goal with actual results |
|  | 1.i. | Develop a follow up plan |

### Learning Activities

|  |  |
| --- | --- |
| 1. | Review the A3 templates include in this module.Toyota-Style Problem-solving A3 Reports Adapted by Durward K. Sobek, II Assistant Professor Dept. of Mechanical and Industrial Engineering This is a PDF document.  Additional support may be needed to make accessible for all students.This material is based upon work supported by the National Science Foundation under Grant No. SES-0115352.<http://createvalue.org/wp-content/uploads/2013/11/Toyota_A3_template.pdf>   |
|  | Learning Materials |
|  | Toyota-Style Problem-solving A3 Reports | <http://createvalue.org/wp-content/uploads/2013/11/Toyota_A3_template.pdf>  |
| 2. | Research A3 reports on the internet and review a number of different examples. |
| 3. | Complete the A3 Tools assignment.Output- Use the 'A3 Template File" Directions- Review the list of lean tools attached. List the appropriate tools in the correct box on the A3 template. For example, 5 Why can be listed under root cause analysis. Submission- A3 template with the appropriate tools listed in each section can be attached to this assignment.  |
|  | Learning Materials |
|  | Rubric for A3 Tools Worksheet Assignment | [Rubric for A3 Tools Worksheet Assignment(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=887591e9-9120-4e74-a1e2-d1a90e210a01) |
|  | A3 Template | [A3 Template(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=85500c4a-2e47-42a8-8f57-d0cde9693944) |
|  | List of Tools for A3 Tools Assignment | [List of Tools for A3 Tools Assignment(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=1f90edd5-2b51-480c-bb1e-dee732fbe3dd) |
| 4. | Complete the A3 Project.Output- Complete an A3 report Directions- Please use the 'A3 Template File' to complete this assignment. Contact the instructor if you are having trouble finding a subject. Make sure to use the appropriate lean tools when completing this assignment. Submission- Submit a completed A3 report to this assignment. Make sure each section is detailed and specific.  |
|  | Learning Materials |
|  | Rubric for A3 Report | [Rubric for A3 Report(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=dbeacb84-dc31-40cc-b6c5-fb3db4abc352) |
|  | A3 Template | [A3 Template(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=85500c4a-2e47-42a8-8f57-d0cde9693944) |
| 5. | Submit the A3 Report to the discussion board.Please post a final copy of your A3 report here to share with fellow classmates. You must also comment on at least three reports submitted by fellow classmates.  |
|  | Learning Materials |
|  | Rubric for A3 Discussion Board | [Rubric for A3 Report Discussion Board(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=50b47a37-d353-4abf-9a99-b40e0e70b944) |

### Assessment Activities

|  |  |
| --- | --- |
| 1. | Submit A3 Tools Assignment |
|  | Learning Materials |
|  | Rubric for A3 Tools Worksheet Assignment | [Rubric for A3 Tools Worksheet Assignment(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=887591e9-9120-4e74-a1e2-d1a90e210a01) |
| 2. | Submit A3 Project |
|  | Learning Materials |
|  | Rubric for A3 Report | [Rubric for A3 Report(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=dbeacb84-dc31-40cc-b6c5-fb3db4abc352) |
| 3. | Submit Report on Discussion Board and Post to fellow classmates |
|  | Learning Materials |
|  | Rubric for A3 Discussion Board | [Rubric for A3 Report Discussion Board(SWTC).docx](https://swtc.wids.org//PublicDocuments.axd?DocumentID=50b47a37-d353-4abf-9a99-b40e0e70b944) |

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