Quality Systems Basics

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QSB Key Strategies

1. Fast Response
   - Communication
   - Problem Solving
   - Best Practices

2. Control of Non-Conforming Product

3. Standardized Operations
   - Work Place Organization – The 7 Wastes
   - Standardized Work Instructions – SOS
   - Operator Instructions – JES

4. Standardized Operator Training

5. Error Proofing Verification

6. Layered Process Audits

7. Risk Reduction

8. Contamination Control

9. Supply Chain Management

No Major Disruptions
No SQNs
+ 0 PPMs
= World Class Quality
4. Standardized Operator Training

- Standardized Operator Training
  - Standardized operator training shall be used to:
    - Define the minimum training content for each operation
    - Identify who in the organization will conduct training
    - Establish required documentation and tracking methods
  - Trainers shall monitor new operators’ activities and retrain if necessary to assure Standardized Work Instructions are being followed
  - Trainers shall instruct operators using the standard operation training record
  - The trainer shall notify downstream operations of potential defects
How Much We Tend to Remember

- 10% of what we READ
- 20% of what we HEAR
- 30% of what we SEE
- 50% of what we both HEAR and SEE
- 70% of what we SAY
- 90% of what we both SAY and DO

Our Level of Involvement

- Verbal receiving
- Visual receiving
- Receiving and Participating
- Doing

HOW WE LEARN
4. Standardized Operator Training

• The 4 Steps Of Operator Training
  – Step 1: Prepare Team Member
    • Put the team member at ease
    • Find out what the team member already knows about the job
    • Review safety documentation/information
    • State the job
      – Verbalize/explain using Standardized Operation Sheet
    • Review workstation documentation
    • Get the team member interested in learning the job
4. Standardized Operator Training

- The 4 Steps Of Operator Training
  - Step 2: Present Operation
    - Review the Job Element Sheets
    - Demonstrate the operation
      - Show and explain one element and its major steps (WHAT)
      - Show and explain one element and its major steps (WHAT) and key points (HOW)
      - Show and explain one element and its major steps (WHAT), key points (HOW) and reasons (WHY)
      - Instruct clearly and completely, and be patient
      - Do not teach more than the team member can master
4. Standardized Operator Training

• The 4 Steps Of Operator Training
  – Step 3: Try Out Performance
    • Select first set of elements based on job competency
    • Have team member do the job with team leader reading the major steps
    • Have team member explain each element and major steps while they perform the job
    • Have team member explain each major step and key points as they perform the job again
    • Have team member explain each major step, key points, and reasons why as they perform the job again
    • Add more elements and repeat job for understanding and correct performance
    • Continue performing job until you know the team member knows the job completely
4. Standardized Operator Training

- The 4 Steps Of Operator Training
  - Step 4: Prepare Team Member
    - Verify team member job competency (meeting quality standards in takt time)
    - Have team member demonstrate understanding and capability of:
      - Safety requirements
      - Standardized work
      - Quality requirements
    - Trainer completes quality checks
      - Minimum of 15 units/jobs or as appropriate
    - Leave team member to work on his/her own
    - Designate to whom the team member goes to for help
      - Supervisor
      - Problem solver
      - Process control manager
      - Quality network reps
      - Specs
    - Check frequently
    - Encourage questions
    - Give any necessary extra training needed
4. Standardized Operator Training

- The 4 Steps Of Operator Training – Summary
  - Step 1: Prepare Team Member
  - Step 2: Demonstration
  - Step 3: Try-Out Performance
  - Step 4: Follow Up

- Remember – Good Training Is The Key To Our Success!

- Take Time To Prepare And Train Right The First Time
## Job Instruction Certification Log

<table>
<thead>
<tr>
<th>Workstation / Job / Description</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Date</td>
<td>Date</td>
<td>Date</td>
<td>Team Member</td>
</tr>
<tr>
<td></td>
<td>Date</td>
<td>Date</td>
<td>Date</td>
<td>Trainer</td>
</tr>
<tr>
<td></td>
<td>Date</td>
<td>Date</td>
<td>Date</td>
<td>Supervisor</td>
</tr>
<tr>
<td></td>
<td>Date</td>
<td>Date</td>
<td>Date</td>
<td>Revision Level</td>
</tr>
</tbody>
</table>

### Example

- **Prepare Team Member**
  - Trainers:
    - Explain general safety and quality requirements.
    - State the job using the LBS / S.O.
    - Find current knowledge.
    - Motivate.

- **Demonstration**
  - Trainer performs job, explains KEY POINTS & REASONS.
  - Trainee observes the training process.

- **Try-Out Performance**
  - Trainer observes the Trainee, correct errors.
  - Give positive feedback.

- **Follow-Up**
  - Trainer observes the Trainee until performance is satisfactory.
  - Encourage questions.
  - Practice on own.

### Dates of Training for the First Two Quadrants

- **Date & Signatures for the Third Quadrant**

### Team Member Name

**Revision Level of Job**

- **Workstation Description**
- **Dates of Training for the First Two Quadrants**
- **Date & Signatures for the Third Quadrant**
**STANDARDIZED OPERATION – TRAINING RECORD**

**Application:** The following shall be completed with any new operator (for any given operation).

**Review**

<table>
<thead>
<tr>
<th>Review</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety/ Equipment Operation</td>
<td></td>
</tr>
<tr>
<td>Review operator job instructions/ Discuss critical points</td>
<td></td>
</tr>
<tr>
<td>Explain and demonstrate Standardized Work Instructions</td>
<td></td>
</tr>
<tr>
<td>Quality records to be filled out (eg. Check sheets)</td>
<td></td>
</tr>
<tr>
<td>Part (product) function</td>
<td></td>
</tr>
<tr>
<td>Demonstrate the operation and answer questions</td>
<td></td>
</tr>
<tr>
<td>Demonstrate gaging and answer questions</td>
<td></td>
</tr>
<tr>
<td>Have new employee run operation and answer questions</td>
<td></td>
</tr>
<tr>
<td>Teach past problems (eg. FMEA, Top Problems List)</td>
<td></td>
</tr>
<tr>
<td>Verify first units produced, coach as needed</td>
<td></td>
</tr>
<tr>
<td>Return within the shift, verify std work &amp; product quality again</td>
<td></td>
</tr>
<tr>
<td>Return in approx. 1 day, verify std work &amp; product quality again</td>
<td></td>
</tr>
<tr>
<td>Notify downstream operations of potential defects</td>
<td></td>
</tr>
</tbody>
</table>

Employee Signature ________________    Trainer Signature ________________
4. Standardized Operator Training

• Operator Training Requirements
  – The trainer shall verify quality at a frequency determined necessary to assure all standards are met
    • At a minimum, the trainer shall return within the shift and again within approximately one day
  – Operator training shall be tracked on Trainer Operator Tracking Sheets
  – Operator Tracking Sheets shall be posted or easily accessible
  – Scheduling of refresher training for assigned operators is at local site discretion
  – Supplemental/temporary employees shall not perform the job unless they have been trained within the last three months
4. Standardized Operator Training

- **Flexibility Chart**
  - Outputs
    - Helps analyze job requirements
    - Illustrates the number of trained team members per job
  - Generates workforce capability picture
  - Identifies potential workforce problems/weaknesses
  - Helps plan job instruction training
  - Supports continuous improvement

---

<table>
<thead>
<tr>
<th>Name &amp; Position</th>
<th>Section</th>
<th>Job</th>
<th>Team</th>
<th>Date: 2/21/05</th>
<th>Number of processes per person</th>
<th>Plan</th>
<th>Act</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALAN TRAMMELL</td>
<td>LOOP 2</td>
<td>JOB</td>
<td>8</td>
<td></td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>BARRY SANDERS</td>
<td>LOOP 2</td>
<td>JOB</td>
<td>8</td>
<td></td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>FLORENCE JOINER</td>
<td>LOOP 2</td>
<td>JOB</td>
<td>8</td>
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<td>3</td>
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<tr>
<td>WYNONA JUDD</td>
<td>LOOP 2</td>
<td>JOB</td>
<td>8</td>
<td></td>
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<td>2</td>
<td>3</td>
</tr>
<tr>
<td>HANK WILLIAMS Jr</td>
<td>LOOP 2</td>
<td>JOB</td>
<td>8</td>
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<td>2</td>
<td>1</td>
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<td>JIET LI</td>
<td>LOOP 2</td>
<td>JOB</td>
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<td>W. FEDECOV</td>
<td>LOOP 2</td>
<td>JOB</td>
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<td>LOOP 2</td>
<td>JOB</td>
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<tr>
<td>YAO MING</td>
<td>LOOP 2</td>
<td>JOB</td>
<td>8</td>
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<td>2</td>
<td>3</td>
</tr>
<tr>
<td>JOE DUMARS</td>
<td>LOOP 2</td>
<td>JOB</td>
<td>8</td>
<td></td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

- **ATC:**

<table>
<thead>
<tr>
<th>Product Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
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</tbody>
</table>

- **Example**

  - **Plan-Act**
    - Knows steps (in training)
    - Knows Keypoints and Reasons but cannot do job in field time
    - Can perform quality job safely in field time without supervision
    - Can Train Job (Has received SCUAT training)
    - Is authorized to perform

  - **Evaluation**
    - Date: Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec
    - Evaluation: Good, Average, Needs Improvement, Poor

  - **Department Manager**
    - Approves, Recommends, Reviews, Supports, Utilizes, Analyzes, Plans, Improves
4. Standardized Operator Training

• Standardized Operator Training Summary
  – Benefits:
    • Assures all operators have adequate and similar training
    • Assures unqualified operators receive training prior to operating equipment
    • Reduces sort, rework, and containment activities
    • Communicates operator status to all stakeholders
  – Organizations shall:
    • Ensure operator training is being tracked on Trained Operator Tracking Sheets
    • Post operator Tracking sheets at each operation
    • Notify downstream operations of new operators
    • Train supplemental employees who have not performed the job within the last three months
5. Error Proofing Verification

- Error Proofing Verification
  - All error proofing/detection devices with the potential to fail, wear, misalign, or otherwise become out-of-adjustment shall be verified at a minimum of once per day
    - The preferred method is for a team member/leader to perform as part of start-up and throughout the shift
    - NOTE: this is not mastering a gage (ex: setting gage to zero); it is sending known good and bad parts through to confirm the device is operating correctly
  - Definitions:
    - Error proofing device (cannot make) – devices which prevent the manufacture or assembly of nonconforming product
    - Error detection device (cannot pass or cannot accept) – devices which prevent the transfer of nonconforming product (ex: 100% in-line inspection equipment
5. Error Proofing Verification

- Master Document of Error Proofing devices, with identification number and location
- Verification frequency
- Identify masters (Good/Bad) and defect being checked
- Clearly defined reaction plan if device fails to detect
- When/if shut down when device fails to detect bad part?
- Containment plan? (100% Inspection, etc.)
- Are suspect parts rerun thru Error Proofing device?
- How/when is Error Proofing device repaired?
- Lot size of parts run between Error Proofing verification
- History of process to determine verification frequency
- How robust is the process?
- How easy is it to contain suspect product?
- Develop Log of Error Proof Verification failures with reaction plan to nonconformities
- Develop form to notify of nonconformities and escalate reaction to nonconformities
- Document as Lessons Learned
- Method for getting information to management
- Determine how information is to be displayed
5. Error Proofing Verification

**ERROR PROOFING VERIFICATION CHECKLIST**

**SNAP RING PRESENCE**

<table>
<thead>
<tr>
<th>op#</th>
<th>THESE ITEMS ARE TO BE CHECKED DAILY</th>
<th>Code</th>
<th>YES</th>
<th>NO</th>
<th>PROBLEM</th>
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</thead>
<tbody>
<tr>
<td>OP 30</td>
<td>OPERATE L&amp;R SNAP RING INSTALLATION TOOL WITHOUT SNAP RING - IS PART REJECTED?</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OP 30</td>
<td>DID RED LIGHT ON LIGHT TREE TURN ON? (L&amp;R)</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OP 30</td>
<td>DID REJECTED PART STAY IN STATION? (L&amp;R)</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OP 30</td>
<td>DID ANDON ALARM SOUND? (L&amp;R)</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OP 40</td>
<td>OPERATE SMALL SNAP RING INSTALLATION TOOL WITHOUT SNAP RING - DID GAGE REJECT PART?</td>
<td>8</td>
<td></td>
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<tr>
<td></td>
<td>DID RED LIGHT ON LIGHT TREE TURN ON? (SMALL SNAP RING)?</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DID REJECTED PART STAY IN STATION? (SMALL SNAP RING)</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DID ANDON ALARM SOUND? (SMALL SNAP RING)?</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DOES PART STILL STAY IN STATION WHEN HAND VERIFICATION TOOL DISPLAYS A RED REJECT LIGHT?</td>
<td>12</td>
<td></td>
<td></td>
<td>182</td>
</tr>
<tr>
<td></td>
<td>IS SMALL SNAP RING VISUAL IN PLACE?</td>
<td>13</td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>IF SMALL SNAP RING TOOL IS DOWN, IS THE BACK-UP GAGE USED?</td>
<td>14</td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>DOES BACK-UP GAGE REJECT PART IF NO SNAP RING IS PRESENT?</td>
<td>15</td>
<td></td>
<td></td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>DOES THE LIGHT TURN RED? (SMALL SNAP RING BACK-UP)?</td>
<td>16</td>
<td></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td></td>
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</tbody>
</table>

**SUPERVISOR:** ______________________________  **AUDITOR:** ______________________________

**TOTAL # OF X’S IN EACH COLUMN**

ANY ITEM SHADEd NOT WORKING PROPERLY, THE SUPERVISOR MUST BE NOTIFIED IMMEDIATELY.

ANY ITEM OUT OF COMPLIANCE SHOULD BE REVIEWED WITH SUPERVISOR OR A COPY OF THE AUDIT GIVEN TO SUPERVISOR.

Completion Of The Verification Should Be Documented And Visually Displayed In The Workstation

The Device’s Verification Status Should Be Obvious To Everyone In The Area
5. Error Proofing Verification

• Error Proofing Verification Summary
  – Benefits:
    • Assures error proof/detection devices are working as intended
    • Prevents nonconforming product from being made or transferred
    • Establishes a history for each device
      – Indicates when preventive maintenance or repair is needed
    • Instills discipline within the process
  – Error proofing devices shall be verified at least once per day
  – Error proofing device locations shall be documented
  – Reaction plans to failures shall be developed
  – Verification results shall be recorded
  – Leadership shall review verification results
6. Layered Process Audits

• Layered Process Audits Provide A System To:
  – Verify compliance to the documented process
  – Instill discipline
  – Improve communication
  – Improve overall quality

• Layered Process Audits Are An Industry Standard And Must Be Owned By Manufacturing Leadership
  – Quality and other functions will participate and support the Layered Process Audits system
  – Layered Process Audits supplement ongoing control plan and job instruction checks
6. Layered Process Audits

- **Layered Process Audits**
  - **Definition:**
    - A standardized audit performed on a regular, frequent basis by all layers of the organization
    - Verifies adherence to operational standards and consistently reinforces the QSB vision for the organization
  - **Purpose:**
    - Ensures consistent application and execution of standards, improved built-in-quality and increased operator/leadership awareness facilitated by coaching/teaching interaction between leadership and operators
6. Layered Process Audits

- Layered Process Audits
  - Involve all levels of leadership in supporting the operator through coaching/teaching interaction on the shop floor
  - Ensure a high level of process control by identifying and controlling high risk/significant process elements
  - Maintains proper application of standards as defined and achieved through operational readiness process
  - Verify a robust audit process at lower levels
6. Layered Process Audits

- Frequent Assessments By All Layers Of The Organization (Team Leader-Plant Manager) Are Performed Using The Layered Process Audit Checklist
  - The Layered Process Audit system includes:
    - Evaluation against established standards
    - Introduction of correct actions (countermeasures)
    - Regular review process by senior management
    - Results and actions tracked/visualized in each area
  - The Layered Process Audit Check Sheet is comprised of 3 main sections:
    - Workstation – base list of checks applicable to all work stations
    - Quality Focused – checks are specific to operations and developed by plant, based on quality feedback, process knowledge, and problem solving
    - Production System – base list of checks applicable to all work stations
6. Layered Process Audits

• Layered Process Audit Form
  – Intent is to have a single page form with two common sections and one section (Section #2) customized to a specific product line or area of the plant

• The Layered Process Audit Is Entirely A Manual Format
  – The back side of the form is available to write down the non-compliance comments
  – It is recommended that you start this way so the users get an in-depth knowledge of the content and functionality of how the Layered Process Audits process supports QSB

• Users Then Transfer The Written Issues That Were Not Corrected Immediately Directly To A Blank Countermeasure Report For Assignment And Corrective Action
  – This progress review shall be conducted at least once per week
6. Layered Process Audits

• Section #1 – Common Workstation Questions
  – Tailor fit the questions in this section which are common across all work stations
  – Changes should be minimal here and should only require modification to descriptions of documents or procedures

<table>
<thead>
<tr>
<th>Section #1:</th>
<th>WORK STATION SPECIFIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Is the team member using all the posted Personal Protective Equipment?</td>
</tr>
<tr>
<td>2</td>
<td>Is the Job rotation log present &amp; up to date? (Employee Station Shift Information)</td>
</tr>
<tr>
<td>3</td>
<td>Has the team member been qualified to requirements of the job and is this documented? (operator certification/training)</td>
</tr>
<tr>
<td>4</td>
<td>Is the work station safe, neat, clean &amp; orderly? (everything in it's place per work place organization standards, 5S-WPO)</td>
</tr>
<tr>
<td>5</td>
<td>Are all forms up to date at the workstation? (Standardized Work, Quality Alerts, etc.)</td>
</tr>
<tr>
<td>6</td>
<td>Is standardized work being followed as defined by the the Standardized Work Documents at Workstation, (LBS/PADS) and does the Team Member have a good understanding of the WHAT-HOW-Key-Points-Reasons WHY - minimum 3 cycles</td>
</tr>
<tr>
<td>7</td>
<td>Is the Pink Tag Process being used for ALL repairs?</td>
</tr>
<tr>
<td>8</td>
<td>Are the correct tools and gages present, in use and in Standardized Work?</td>
</tr>
<tr>
<td>9</td>
<td>Are the product quality standards clear, available &amp; followed? (Boundary samples, etc.)</td>
</tr>
<tr>
<td>10</td>
<td>Does the team member know the quality standards of the job, key points &amp; reasons for major steps?</td>
</tr>
<tr>
<td>11</td>
<td>Do you know what the customer concers are? (What are the O-stations checking for from your station)</td>
</tr>
<tr>
<td>12</td>
<td>Are Team Members working ahead out of footprint? (check for parts accumulating on the floor, racks etc)</td>
</tr>
<tr>
<td>13</td>
<td>Are all process checks being performed &amp; documented? (Error proofing, torque gun &amp; scanner validation)</td>
</tr>
<tr>
<td>14</td>
<td>Are Defective parts located in clearly visible containers (Taped or painted red all the way around the container, clearly tagged)</td>
</tr>
<tr>
<td>15</td>
<td>Are the material flow racks, risers, lift &amp; turn tables labeled with correct part numbers on the operator &amp; aisle side and is the correct part in the container?</td>
</tr>
<tr>
<td>16</td>
<td>Check for MINMAX conformance &amp; Is material being used in a FIFO (First In First Out) sequence?</td>
</tr>
<tr>
<td>17</td>
<td>Is the call for help (Andon) system working properly (e.g. station light, music, paging system, telephone, radio etc.)?</td>
</tr>
<tr>
<td>18</td>
<td>Are start up &amp; end of shift checks defined and performed?</td>
</tr>
</tbody>
</table>

GREY BOXES DENOTE QUESTIONS TO BE ASKED OF THE TEAM MEMBER WORKING IN THE STATION OR OPERATION BEING AUDITED
6. Layered Process Audits

• Section #1 – Work Station Specific
  – The Work Station section of the Layered Process Audits Check Sheet is used by the group leader and team leader to support the operator by:
    • Ensuring proper safety practices and PPE are being followed
    • Ensuring proper tools, gages, and materials are available and used
    • Ensuring standardized work and quality standards are understood and followed
    • Ensuring Andon system is function properly
    • Ensuring workplace organization and visual management standards are maintained (ex: according to the plan WPO standards and visual management policy)
    • Ensuring compliance to material processes
      – FIFO/min-max levels
6. Layered Process Audits

- Section #2 – Unique To A Product Line Or Area Of A Plant
  - Previous customer concerns
    - Establish and input questions on the Complete Audit worksheet that are specific to a product line or area of the plant in Section #2
    - This area is set up for a maximum of 10 questions
    - Enter specific items describing where in the process and what you would like to audit regarding correct action implementation to customer concerns
      - Ex: error proofing verification, use of fixtures add to complete standardized work
6. Layered Process Audits

• Develop A Checklist
  – A list of high risk items to be verified during Layered Process Audits shall be established
  – Possible elements to consider include:
    • Gages functioning and calibration confirmation
    • Stacking/packing techniques
    • Visual aids presence and content
    • Process parameters
    • Work instructions
    • Product identification
    • Torque monitoring (if applicable)
    • Documentation/record completion
    • Customer feedback
  – Layered Process Audits shall verify appropriate Quality documentation
6. Layered Process Audits

- Examples Of Previous Customer Concerns

Update Documentation after Quality Focused Audit items are developed

Update Standardized Work Documents

### Section #2: SYSTEM SPECIFIC (CUSTOMER & PROCESS HIGH RISK ISSUES driven by the FAST RESPONSE REVIEWS)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Marriage Station</strong> - Verify that the Tunnel bracket error proofing is working and being verified on both shifts?</td>
</tr>
<tr>
<td>2</td>
<td><strong>Station #4</strong> - Verify that the wire harnesses are being installed correctly? (is PUSH-CLICK-TUG being performed)</td>
</tr>
<tr>
<td>3</td>
<td><strong>Station #6</strong> - Verify that the GPS antenna Standardized work is being followed? (Customer has found missing antennas)</td>
</tr>
<tr>
<td>4</td>
<td><strong>Station #12</strong> - Verify that the installation of glove box is following Standardized Work? (is Sponge Bob &amp; force gage being used)</td>
</tr>
<tr>
<td>5</td>
<td><strong>Station #14</strong> - Verify that the Radio/harness connections are fully seated &amp; marked? (is PUSH-CLICK-TUG being performed)</td>
</tr>
<tr>
<td>6</td>
<td><strong>Station #15</strong> - Verify that the installation of Ashtray is following Standardized Work? (does it open easily)</td>
</tr>
<tr>
<td>7</td>
<td><strong>Station #22</strong> - Verify that the Installation of Center Stack is being installed correctly? (Cracks, gap, etc.)</td>
</tr>
</tbody>
</table>
6. Layered Process Audits

• Station #2 – Quality System Specific
  – The Quality Focused section covers the entire team or group and is also audited by the team leader and group leader to support the operator by:
    • Ensuring error proofing is functioning properly
    • Ensuring identified high risk/significant process elements are controlled to prevent known problems from reoccurring
    • Ensuring required quality inspection and/or documentation are being completed
6. Layered Process Audits

- Quality Focus Check
  - In addition to customer concerns, consider the following as you validate the quality focused items for the audit:
    - What is the root cause of the quality issue?
    - Is the item process related?
    - Is the item plant controllable?
    - Are there specific quality inspections or documentation requirements for higher risk operations?
    - Are error proofing devices present?
  - A positive response to any of these questions indicates the item should be considered for inclusion in the audit plan
6. Layered Process Audits

- **Section #3 – Common Systems Questions**
  - Tailor fit the questions in this section which are common across all work areas
  - As in Section #1, changes should be minimal here and should only require modification to descriptions of documents or procedures

<table>
<thead>
<tr>
<th>Section #3</th>
<th>MANUFACTURING SYSTEM SPECIFIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STD PI</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Are the flexibility charts up to date? (Training Matrix)</td>
</tr>
<tr>
<td>2</td>
<td>Are the Layered Audits being performed by all levels of the organization?</td>
</tr>
<tr>
<td>3</td>
<td>Are work place organization standards being followed (e.g. all parts/tools/jigs in station have a designated space)?</td>
</tr>
<tr>
<td><strong>BIQ</strong></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Are the process control plans up to date &amp; followed?</td>
</tr>
<tr>
<td>5</td>
<td>Randomly Audit past closed PR&amp;R for corrective action implementation (Document PR&amp;R#)</td>
</tr>
<tr>
<td>6</td>
<td>Is material properly identified in the work area with suspect/non-conforming material isolated?</td>
</tr>
<tr>
<td>7</td>
<td>Are <strong>Fast Response meetings</strong> taking place and all records up to date?</td>
</tr>
<tr>
<td>8</td>
<td>Does evidence (sign in sheet, data charts, etc) at the <strong>verification station board</strong> indicate that meetings are taking place as scheduled and that appropriate assignments / follow up is taking place?</td>
</tr>
<tr>
<td><strong>SLT</strong></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Is FIFO (First In First Out) material management being followed?</td>
</tr>
<tr>
<td>10</td>
<td>Are the minimum/maximum direct material quantities in compliance?</td>
</tr>
<tr>
<td><strong>CI</strong></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Is the call for help (Andon) system implemented to achieve communication of manufacturing problems?</td>
</tr>
<tr>
<td>12</td>
<td>Do people respond accordingly to the escalation process, and are VS station Immediate Response Logs being used?</td>
</tr>
<tr>
<td>13</td>
<td>Are call for help (Andon) system data posted &amp; utilized in the problem solving process?</td>
</tr>
<tr>
<td>14</td>
<td>Are Business metrics on the Shop Floor properly marked &amp; up to date (specify area that was audited)?</td>
</tr>
<tr>
<td>15</td>
<td>Do Business metrics countermeasures correspond to red items and are they tracked &amp; show appropriate follow up?</td>
</tr>
<tr>
<td>16</td>
<td>Are problem solving forms posted, has team developed corrective actions &amp; do forms show appropriate follow up?</td>
</tr>
<tr>
<td>17</td>
<td>Are layered audit results incorporated into the layered audit countermeasure process?</td>
</tr>
</tbody>
</table>
6. Layered Process Audits

• Section #3 – Manufacturing System Specific
  – Plant staff and shift leaders/managers review the same items at a workstation level and, in addition, review a group leader’s area using the Layered Process Audit for:
    • Completion of safety talks and tours
    • Compliance to process control plans
    • Conformance to workplace organization standards
    • Proper use of the Andon system
    • Effective use of Layered Process Audits process for control and follow up
6. Layered Process Audits

• Create A Master Layered Process Audit Form For Each Unique Processing Area
  – In this example, the manufacturer would have 4 unique one-page audit forms/files to cover all processes
### HEADER: Enter the System Name
Product line or an area of the Plant
1. Molding
2. Paint/Coating
3. Assembly
4. Warehouse/Shipping

### Section #1: COMMON Workstation Questions

### Section #2: Unique to a Product line or Area of the Plant
Previous Customer Concerns

### Section #3: COMMON Systems Questions
6. Layered Process Audits

**What Is Expected From You:**
- Describe things as they are
- Follow your usual routine
  - Let auditors catch the actual, current status of your workstation
- If you deviate from the standard, provide actual reasons why as you understand them
- Help implement actions to remove deviations

**What You Can Expect:**
- To be informed about the findings of the audit in your team
- To see/be involved in actions on any deviations found
- To be informed/able to follow progress of the process on the tracking sheets

---

**Choose the Workstation**

**Conduct the Audit**

**Give Feedback & Document Results**

**Follow-Up**

**Layered Process Audits**

- Pick the station that has not been recently audited
- Follow standardized checklist
- Always study and compare to the standard
- Immediately inform all TMs concerned about the audit results
- Record all deviations on standardized problem tracking sheet
- Implement suggested countermeasures as soon as possible
- Follow up on open items
- Make sure to close in one week
- Elevate problem to higher level after target date
6. Layered Process Audits

- Layered Process Audit Tracking
  - This example is another way to ensure each station within a work area is evaluated on a monthly basis at a minimum
  - Chart is used by all auditors to determine which stations have not yet been audited
  - Requires the auditor to write down his/her name, date, and shift for the stations they chose for the audit
6. Layered Process Audits

- Layered Process Audits Tracking
  - Identifying audits to be completed by the leadership staff is essential to ensure all areas on the shop floor interact with the management team.
  - This example schedule addresses both the required frequency by manager and the status of this interaction.

![Diagram showing Leadership Staff Layered Audit Schedule and Status]

Legend:
- Shaded in Green: Audit is Completed
- Shaded in Red: Not Completed
- Shaded in as Audit is Completed
- Shaded in Red if Not Completed
6. Layered Process Audits

- Layered Process Audits Frequency
  - High risk items shall be verified a minimum of once per shift
  - The manufacturing supervisor shall verify and audit (daily) Quality documentation to ensure that it is being completed by the operators
  - The manufacturing area manager shall verify and audit (weekly) that supervisor verification is being completed
  - Leadership shall conduct Process Layered Process Audits assessments periodically (monthly/quarterly)
6. Layered Process Audits

- Example

```
Supervisor / Team Leader - Daily
Manager / Engineers - 1 time/week
Plant Manager - 1 time/month
Executive Managers / Directors - Quarterly / minimum
```
6. Layered Process Audits

- Checklist Evaluation
  - Three Results Can Come Out Of Each Check
    - Y (no deviations are found)
    - N (deviation found)
    - NC (corrected during audit; drive this behavior)
    - N/A (not applicable; established at plant/shift leader level)
  - All deviations shall be recorded on the Layered Process Audit Checklist and described in the results sheet “details” section
  - Any deviations that can be corrected immediately will have a letter “C” next to it
  - Any deviations that cannot be immediately corrected must have additional detail written and transferred to a countermeasure
  - Reasons for non-compliance should be understood
### 6. Layered Process Audits

**FILLING IN THE AUDIT RESULTS**

<table>
<thead>
<tr>
<th>SYSTEM:</th>
<th>INSTRUMENT PANELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reviewer:</td>
<td>Supervisor/Mgr.</td>
</tr>
<tr>
<td>Workstation:</td>
<td>Team Leader</td>
</tr>
</tbody>
</table>

### Header Information:
- **Fill Out the Entire Top of the Form**

### Section #1: COMMON Workstation Questions

- **Y** = Meets Standard
- **N** = Deviation Found
- **NC** = Not Corrected

**If The Item Is Corrected Immediately**

### Section #2: Unique to a Product Line or Area of the Plant

**Previous Customer Concerns**

When **X** items are identified place a Letter **XC** if corrected immediately otherwise write a Letter **X** and comments on back for Countermeasure

**Rating:**
- **O** - Meets Standard
- **X** - Deviation found
- **N/A** - Not Applicable

**Total Deviations:**
6. Layered Process Audits

• **Section #1: Work Station Specific**
  – Question #8 asks, “Are the correct tools and gages present, in use, and in Standardized Work?”

<table>
<thead>
<tr>
<th>No.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-8</td>
<td><strong>Boundary samples referenced in the JES not available in station to the team member.</strong></td>
</tr>
<tr>
<td></td>
<td>Quality Engineer was notified.</td>
</tr>
</tbody>
</table>

*(Write down the Non-Compliance Issue Detail)*

*(Write down the Section #-Question#)*
6. Layered Process Audits

• After you complete the audit, review the results with the area’s manager or supervisor and have them sign and date the audit.
  – All questions answered “N” on the Audit Check Sheet that cannot be resolved immediately will be entered on the Countermeasure sheet as an open item.

<table>
<thead>
<tr>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comments</td>
</tr>
<tr>
<td>[ ] - Grey boxes denote questions to be asked of team members</td>
</tr>
<tr>
<td>Supervisor/Mgr. Review and sign off - Date:</td>
</tr>
</tbody>
</table>

PL - People Involvement, STD - Standardization, BIQ - Built-In-Quality, SLT - Short Lead Time, Cl - Control
6. Layered Process Audits

• Layered Process Audit Countermeasure Sheet
  – The Countermeasure sheet tracks the specific open issues on an operation/workstation for each group and is posted in a visible location in the group area
  – All questions answered “N” on the Operation Check Sheet that cannot be resolve immediately will be entered on the Countermeasure sheet as an open item
  – The countermeasure sheet will be updated and signed off as issues are resolved
6. Layered Process Audits

- Layered Process Audit Countermeasure Sheet
  - Open discrepancies (those issues not immediately correct during the audit) are tracked to closure using a Countermeasure process
  - The Countermeasure sheet is updated and signed as issues are resolved
  - At the user’s discretion, they may also choose to track total number of discrepancies found over time
    - This can be done at an aggregate or line item level of detail as required to meet their needs
- Support groups should be invited to participate in the audit process
- All levels of the organization should be involved when leadership audits their area to support proper coaching/positive reinforcement

<table>
<thead>
<tr>
<th>Item #</th>
<th>Date</th>
<th>Location</th>
<th>Problem Description</th>
<th>Owner</th>
<th>Countermeasure</th>
<th>Target Date</th>
<th>Initials</th>
<th>Complete Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>7/7/03</td>
<td>005R</td>
<td>Tape missing on floor</td>
<td>TL1</td>
<td>Replace tape</td>
<td>7/7/03</td>
<td>RS</td>
<td>7/8/03</td>
</tr>
<tr>
<td>6</td>
<td>7/7/03</td>
<td>005R</td>
<td>Tool for installing drainplugs is different from standard, TM used replacement without informing TL</td>
<td>TL1</td>
<td>get standard tool from store, replace at workstation</td>
<td>7/8/03</td>
<td>RS</td>
<td>7/8/03</td>
</tr>
</tbody>
</table>
6. Layered Process Audits

• Layered Process Audit Countermeasure Sheet
  – Review process
    • Shift leader is process owner
    • Regularly scheduled review meeting (recommend weekly)
    • Review compliance and completion performance
    • Elevate past due countermeasure to next level
    • Review audit questions for continuous improvement (add, delete, revise as needed)
  – Visualize results in work area
    • Post audit results and Countermeasure Chart
    • Post compliance and completion performance
  – When appropriate, the Layered Process Audit nonconformance shall be added to the Fast Response system and/or the CARE checklist
  – Layered Process Audit results shall be added to the Lessons Learned database when appropriate
  – Audit results shall be summarized and reviewed by the manufacturing site leadership
6. Layered Process Audits

Layered Process Audit Board (Example)
6. Layered Process Audits

<table>
<thead>
<tr>
<th>DEPT. ________________</th>
<th>LAYERED PROCESS AUDIT RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>JAN</td>
</tr>
<tr>
<td>% IN COMPLIANCE</td>
<td>88%</td>
</tr>
<tr>
<td># OF ITEMS ON ASSESSMENT</td>
<td>20</td>
</tr>
<tr>
<td># OF ASSESSMENTS</td>
<td>20</td>
</tr>
<tr>
<td>TOTAL # OF ITEMS ASSESSED</td>
<td>400</td>
</tr>
<tr>
<td># OF ITEMS IN COMPLIANCE</td>
<td>353</td>
</tr>
<tr>
<td>NON CONFORMANCES</td>
<td>47</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NON CONFORMANCES</th>
<th>NUMBER OF ITEMS NOT IN COMPLIANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>10</td>
</tr>
<tr>
<td>Missed Audits</td>
<td>10</td>
</tr>
<tr>
<td>5S Related</td>
<td>2</td>
</tr>
<tr>
<td>Product</td>
<td>10</td>
</tr>
<tr>
<td>Voice of Customer</td>
<td>6</td>
</tr>
<tr>
<td>Systemic</td>
<td>9</td>
</tr>
<tr>
<td>Gage Calibration</td>
<td>5</td>
</tr>
<tr>
<td>Poke Yoke</td>
<td>5</td>
</tr>
</tbody>
</table>
6. Layered Process Audits

• Layered Process Audit Summary
  – Organizations shall:
    • Designate manufacturing to own and conduct Layered Audits
    • Develop a checklist of high risk items to be verified during audit process
    • Establish frequency of audits
      – High risk items to be audited at a minimum of once per shift
    • Verify appropriate Quality documentation
    • Track and review the results of Layered Process Audits