3 Leg 5 Why Problem Solving

Suggested Use: Determining root cause of product/process related issues when the problem escapes to a downstream customer; meaning the current detection methods, internal (self-verification) or external (traditional inspection) to the process failed to detect the problem and other products or process rely on similar detection methodology.

Problem Description

- Why did the specific defect occur?
- Why did we not detect the defect?
- Why did our system allow the defect to occur?

Specific Root Cause

Detection Root Cause

Systemic Root Cause
5 Why Problem Solving

Why did the specific defect occur?

Specific Root Cause

**Damaged Wing Skin During Unload from Structure, CL46240**

Why did the skin get damaged?

- The wing skin hit protruding tool detail
  - The wing skin sprung
  - Skin was in tension
  - Sliders were not completely in retracted position
  - Tool design of fixture allows for protruding details
    - CA: Remove protruding details from the tool

- Skin hit the sliders
  - The inbd/lwr skin clamping tool was still engaged on the EOP of skin during move
  - Mechanics use sliders as holding fixture. Purposely do not retract fully.
  - Move Plan does not identify how many or which sliders to fully retract
    - CA: Revise Move Plan to specify exact sliders to retract and how far

- Move Plan does not specify number of clamps to unlock
  - The mechanic failed to disengage the clamp
    - Mechanic did not follow the existing Move Plan
      - CA: Investigate tool creation for holding skin in place instead of sliders
        - CA: Investigate SFM lockout feature for non-trained Critical Move personnel

- There is no tool available to hold the skin in place
  - CA: Revise Move Plan to specify number of clamps to unlock

- CA: Training for production personnel involved in Critical Move Plans
  - CA: Revise Move Plan to specify number of clamps to unlock
5 Why Problem Solving

Why did we not detect the defect?

Detection Root Cause

- Damaged Wing Skin During Unload from Structure, CL46240
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the cause and effect of releasing clamp not understood?
    - ORR did not identify need for "STOP ACTION" communication
      - CA: Revise Move Plan to include "Stop Action" awareness and issue POB for communication
  - Why were the unretracted sliders not detected?
    - Mechanics not aware of potential interference between the skin and sliders
      - Defect has never been identified
        - CA: Revise Move Plan address desired slider configuration
    - Mechanics are familiar with not having them in fully retracted position
      - Mechanics use sliders as holding fixture. Purposely do not retract fully.
        - There is no tool available to hold the skin in place
          - CA: Investigate tool creation for holding skin in place instead of sliders
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
    - Mechanic not experienced with operating crane and moving wing skin
      - Lack of training
        - CA: Training for production personnel involved in Critical Move Plans
  - Why was the resistance on the skin not detected?
5 Why Problem Solving

Why did our system allow the defect to occur?

Systemic Root Cause

- Damaged Wing Skin During Unload from Structure, CL46240
- Why did production not follow Critical Move Plan procedures?
  - Lack of product discipline
  - Move plan deemed "confusing" by production
    - Move plans contain obsolete instructions and diagrams
      - Not updated to reflect current shop floor practices
      - Lack of communication between ME and production
        - CA: Revise Move Plan to identify one clear process in Move Plan
        - CA: Issue WOB to communicate Critical Move Plan changes to production
        - CA: Revise Move Plan to clearly define roles of each person involved in move
    - ME failed to identify one clear process in Move Plan
      - CA: Revise Move Plan to identify one, clear process
  - Potential problems not identified during initial ORR
    - Slider locations not identified in the Move Plan or planning
      - Potential problem not identified during initial ORR
        - CA: Investigate possible need for multiple initial ORR reviews for Critical Moves
  - No distinction between Person In Charge (PIC) and safety agent personnel
    - Move Plan did not define roles
      - CA: Revise Move Plan to clearly define roles of each person involved in move
  - Potential problems not identified during initial ORR
    - CA: Investigate possible need for multiple initial ORR reviews for Critical Moves

Example
EFFECT = Damaged Wing Skin During Unload from Structure CL46240

Machine/Tooling
- Tool holding skin contains details that potentially obstruct a clear move path
- Unpadded details
- Proper lifting strap used
- Inbd skin stabilizing tool still engaged on the EOP of skin during move
- One hoist point on the wing
- Floor sliders not completely in retracted position

Methods
- Move Plan document is unclear
- No defined optimal positioning location of move personnel
- Training for Critical Move Process
- Planning Card open

Manpower
- Only one supervisor/safety agent for wing unload process
- 4 mechanics needed for move
- Lack of communication during move
- Personnel not badged into planning card

Material
- Proper ESH procedures followed

Environment
- Non-standard workday (weekend shift)

Management
- Proper ESH procedures followed
- No hard copy of move plan in hand
- Move Plan checklist was not succinctly followed by production