

Outcome of Shannon Aerospace Practical Problem Solving “Train the Trainer” Programme



Lean Flight Initiative 4
Using Lean to Climb through Turbulence
Date: 10th & 11th May 2011 | Locations: Four Seasons Hotel, Atlanta



Content

- **Who we are**
- **What we do**
- **Our Lean Journey**
- **PPS Introduction to SAL**
- **Case Study**
- **Outcomes**

NOTE:

All a/c photos are for illustration purposes only

All a/c registrations are fictitious



Who we are & what we do



Lufthansa Technik

More mobility for the world

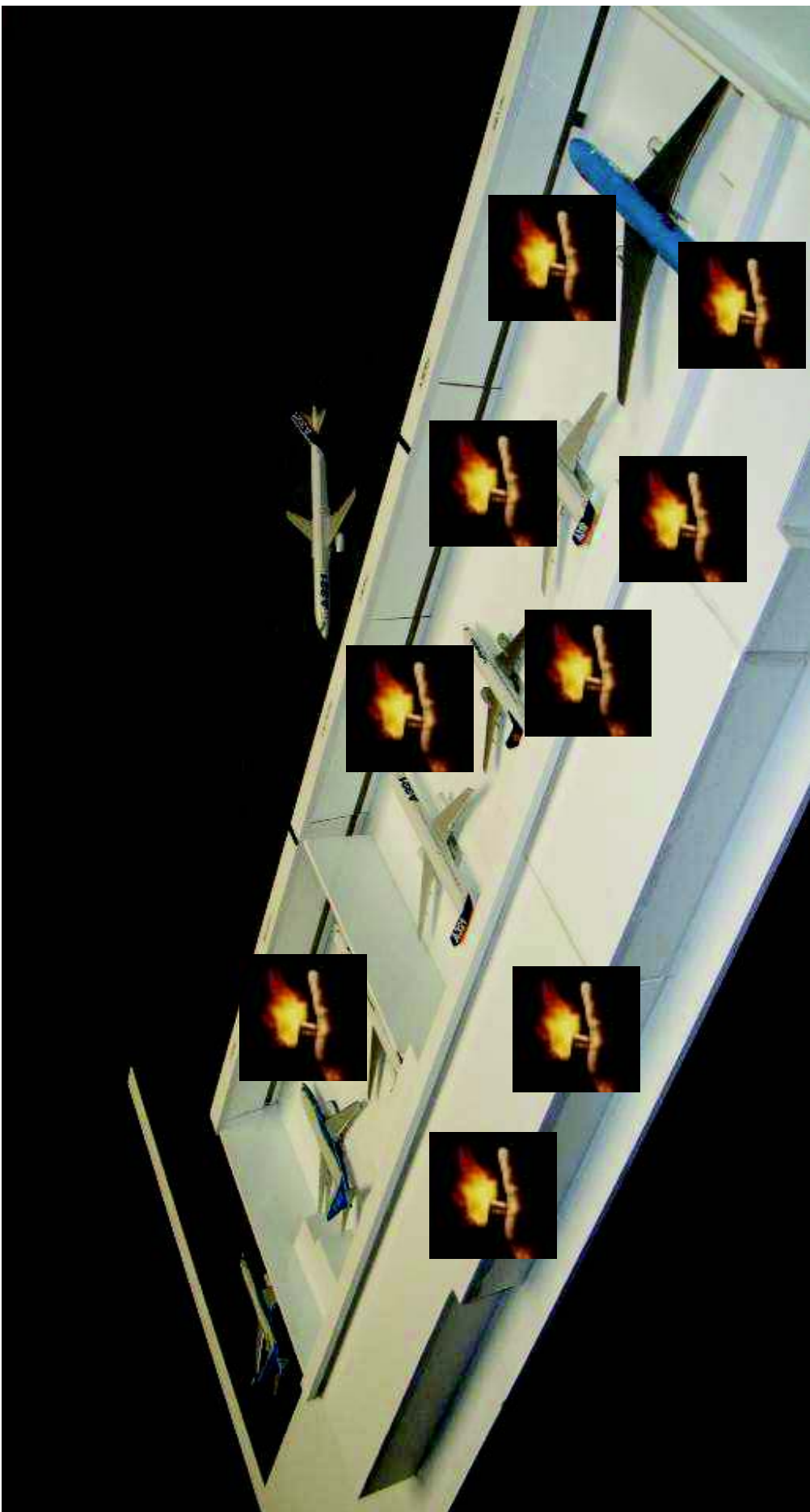


2005 Started Lean Journey
2005% Permanent Lean Team up

• 80 Rapid Improvement Events
• Lean Foundation Courses employees
2009 Policy Deployment



Problems Everywhere



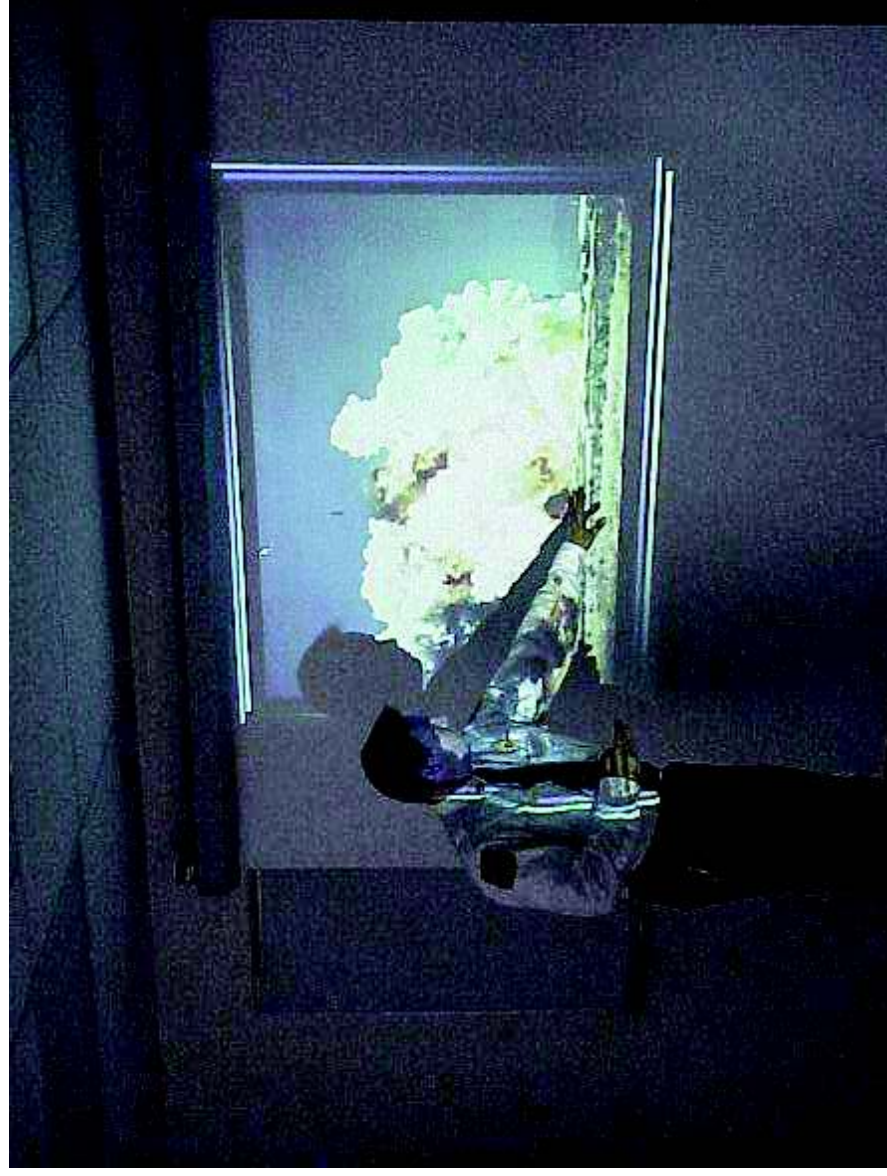
Introduction

FIRE FIGHTER... What we are today

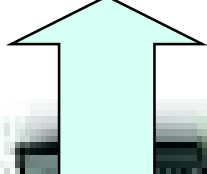
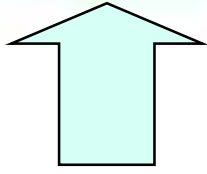
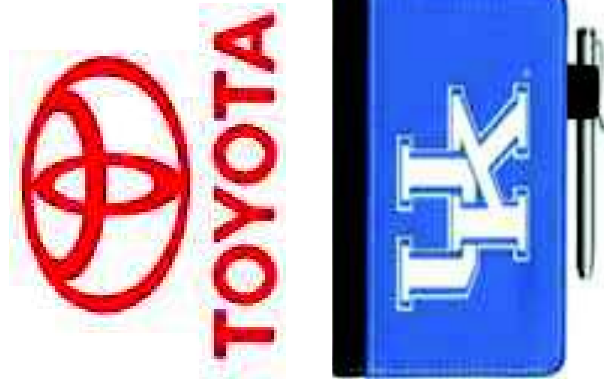


Introduction

FIRE INSPECTOR . . . What we want to be tomorrow



Practical Problem Solving as the Basis for the SAL Business System:



Mindset and Behavior

Problems are Good

We learn much more from the mistakes we make and the problems we overcome, than if our life contained no problems and we never made any mistakes

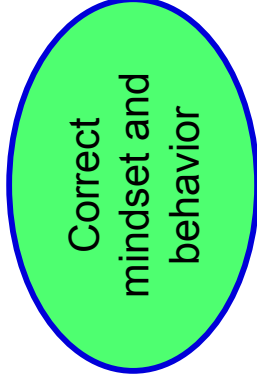
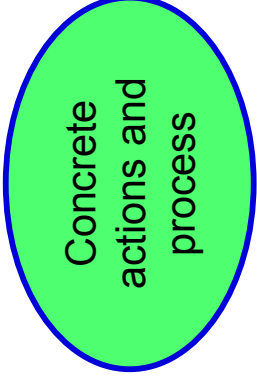
“No one has more problems than the person who claims to have no problems.”

Taiichi Ohno

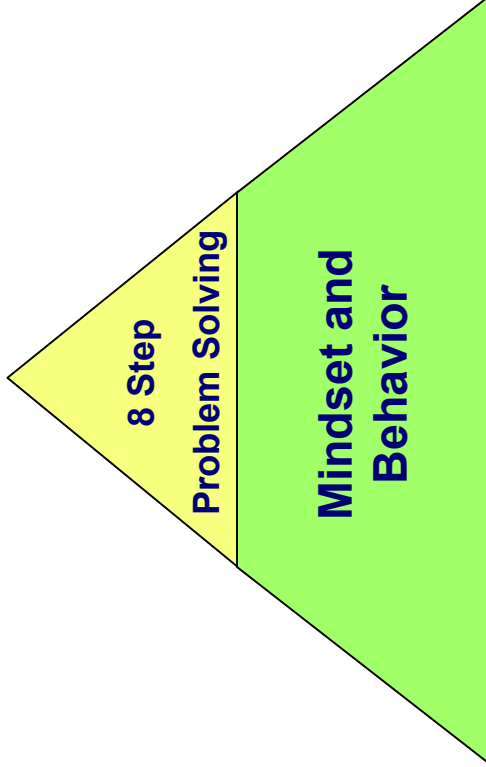


Mindset and Behavior

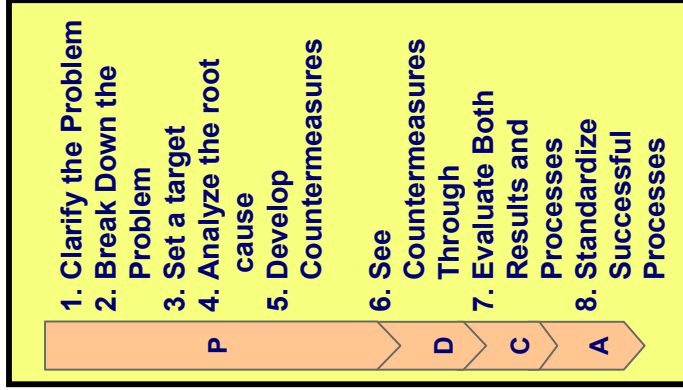
8 steps to solve problems effectively & efficiently



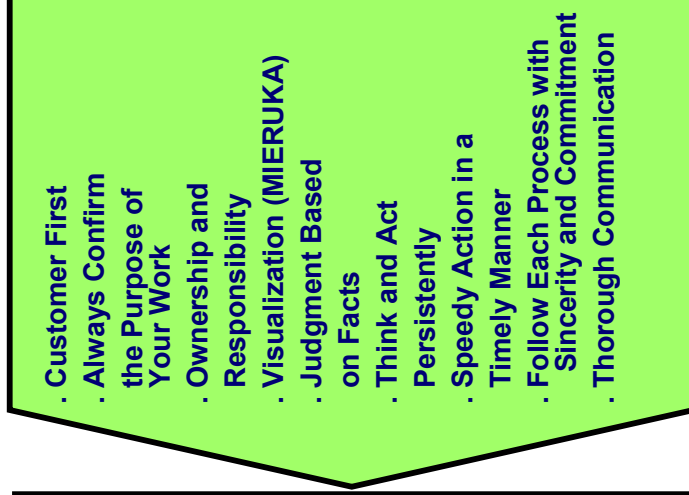
Correct Mindset and Behavior is the foundation



8 Step Problem Solving



Mindset and Behavior



Step 1 – Clarify the Problem

Sal's Case Study

Sal is a Team Leader and certifier on the Engine Workstation

The main tasks are:

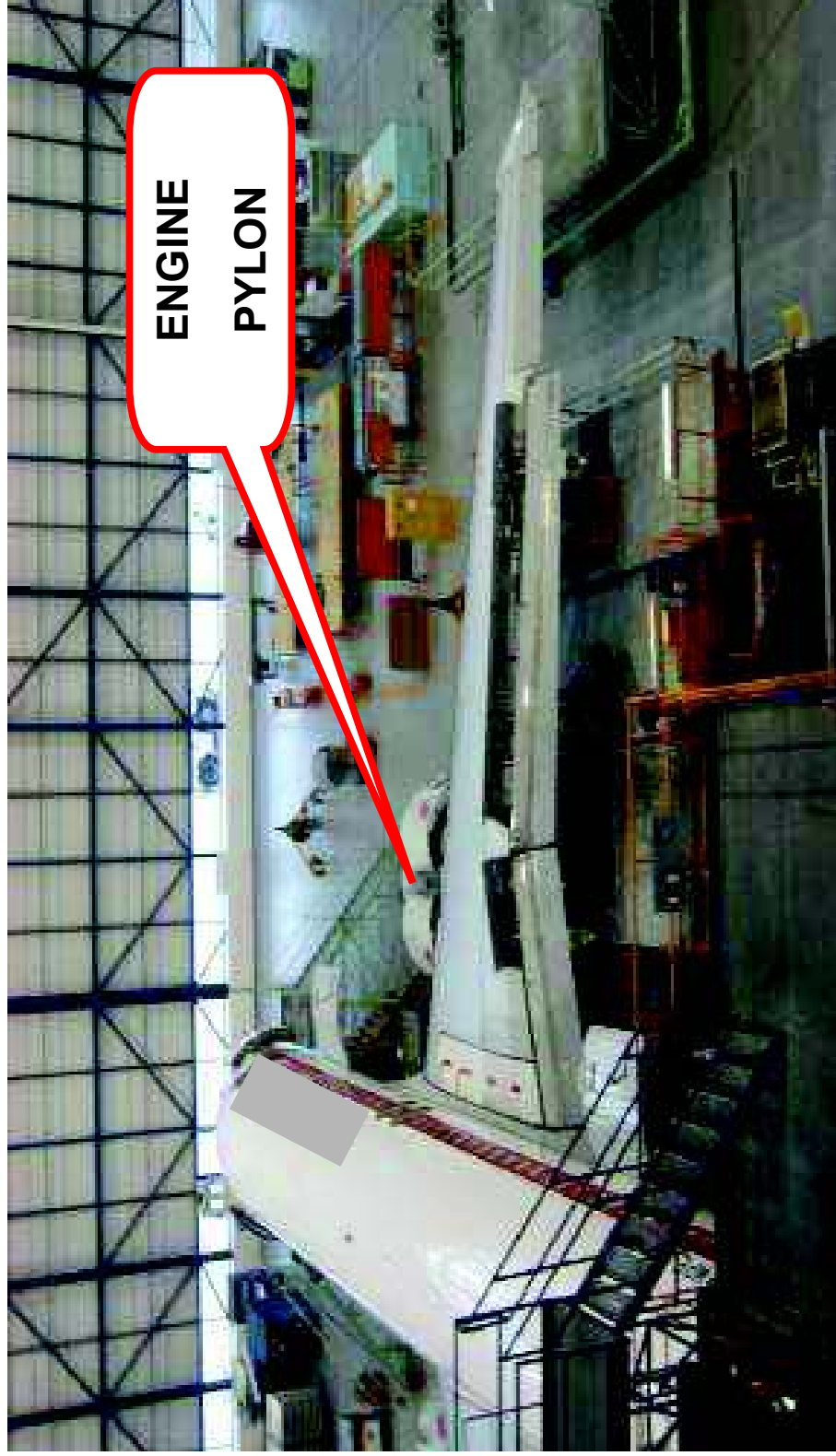
- Defect rectification
- Component replacement
- Engine Servicing
- Testing

The Team makeup is

- Lead Engineer
- Team Leader x 2
- Mechanic x 5
- Trainees

- The story begins when a mechanic tells Sal that a pre-cooler had been damaged while it was being installed on aircraft D-ABCX
- Sal immediately went to he damaged pre-cooler to confirm the location and type of damage.
- Sal asked the mechanic how the damage happened and was told that it was during installation.
- Sal checked what manuals were in use and found that the correct manuals were being used.

Sal's case study step 1



Step 1) Clarify the Problem

8 Steps

Step 1. Clarify the Problem

Processes

- (1) Clarify the Ultimate Goal of your responsibilities & work
- (2) Clarify the Current Situation and Ideal Situation of your work
- (3) Visualize the gap between the Current Situation and the Ideal Situation

Step 1 – Clarify the Problem

Sal's Case Study

Ultimate Goal: Service our customers A/c in the most efficient manner within allocated ground time

Ideal Situation: Zero accidental damage

Current Situation: LH pre-cooler damaged on D-ABCX

Extent: D-ABCX phase 3 – Engine Workstation

Rationale:. Sal's company pays the cost to repair accidental damage. Aircraft ground time may be affected.

Gap: Pre-cooler damaged on D-ABCX

Step 2) Break Down the Problem

8 Steps

Step 1.
Clarify the Problem

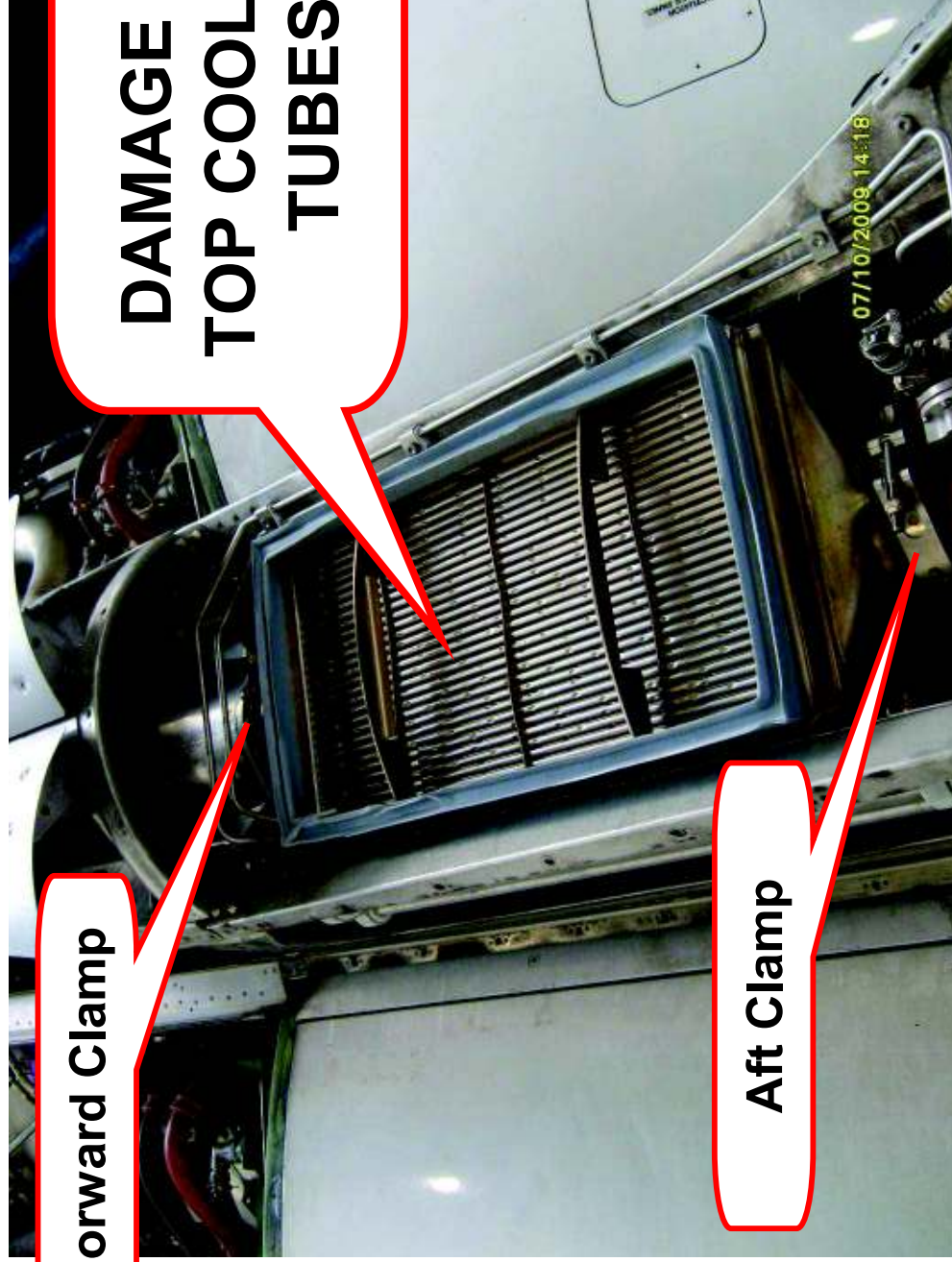
Step 2.
Break down
the Problem

Processes

- (1) Clarify the Ultimate Goal of your responsibilities & work
- (2) Clarify the Current Situation and Ideal Situation of your work
- (3) Visualize the gap between the Current Situation and Ideal Situation

- (1) Break down the problem
- (2) Identify the Prioritized Problem
- (3) Specify the point of occurrence by checking the process through Go Look See

Sal's case study step 2



Forward Clamp

DAMAGE TO
TOP COOLING
TUBES

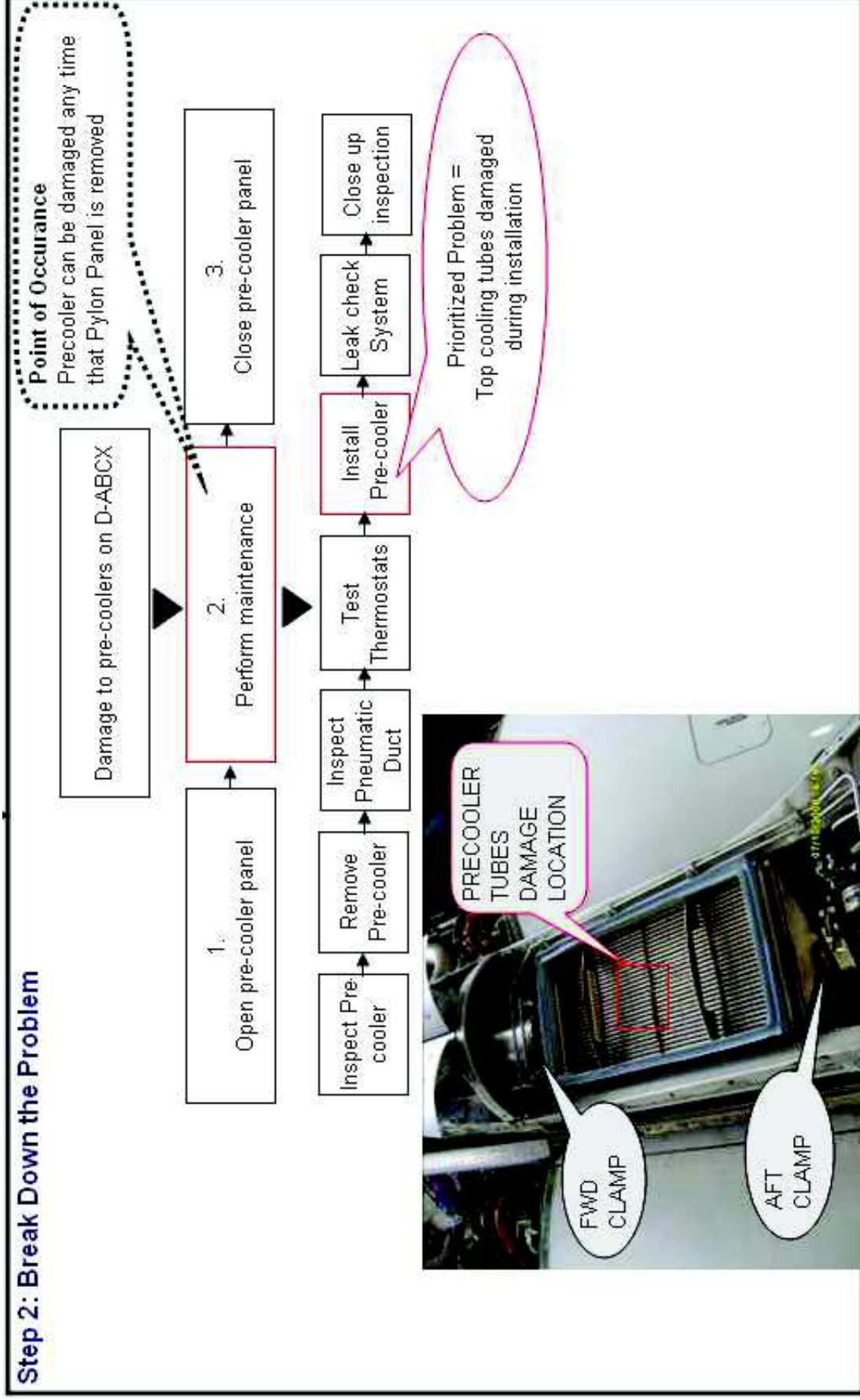
Aft Clamp

Step 2 – Break Down the Problem

In order to clarify the point of occurrence Sal identified all of the tasks that come in contact with the pre-cooler.

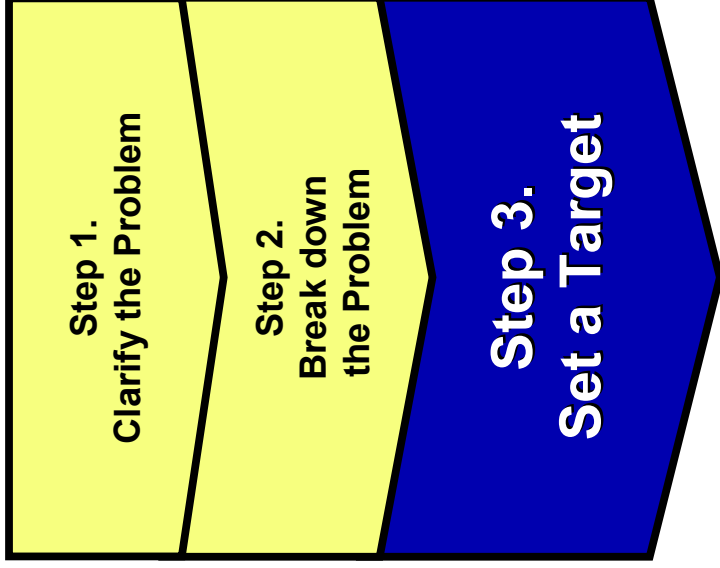
- Open Pylon Panel (413DL & 423DL)
 1. Insp Precooler
 2. Rem Precooler
 3. Ins Precooler
 4. Insp Pneumatic Duct
 5. Test Thermostats
 6. Rep Thermostats
 7. Leak check Pneumatics
 8. Close-up Inspections
 - Close Pylon Panel (413DL & 423DL)
- Sal asked the mechanics involved in the installation to explain each step of the process that they used. Sal checked with the process in the manual and found that the process used was in accordance with the manual.
- Sal asked other mechanics that were familiar with pre-cooler installation how they performed the installation. Sal found that the process used was slightly different but still allowable by the manual.

Step 2 – Break Down the Problem

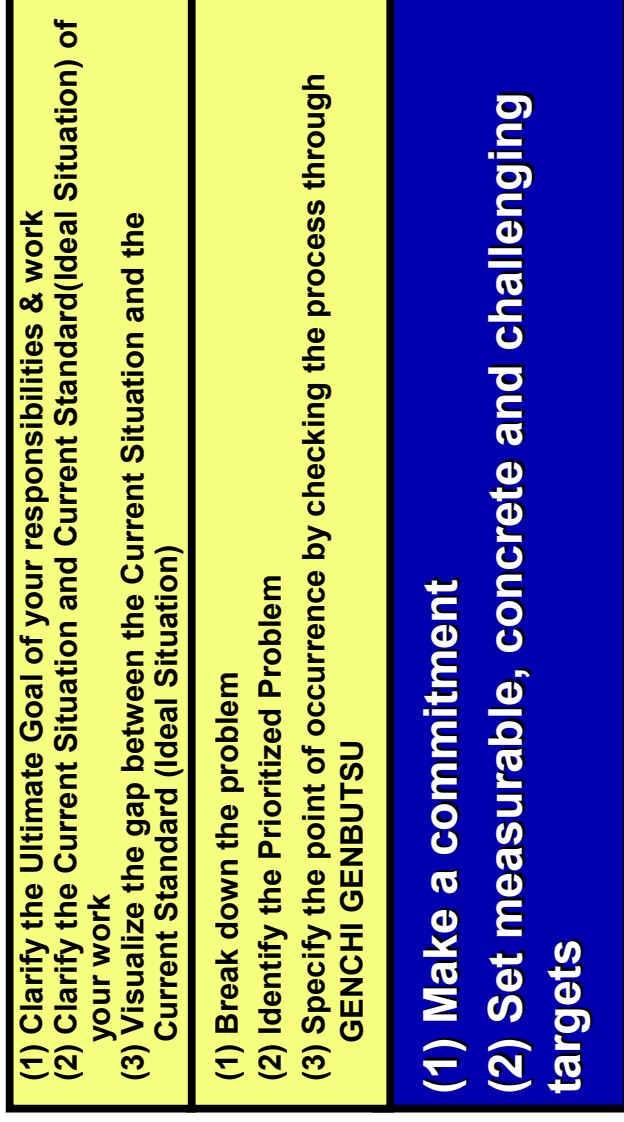


Step 3) Set a Target

8 Steps



Processes



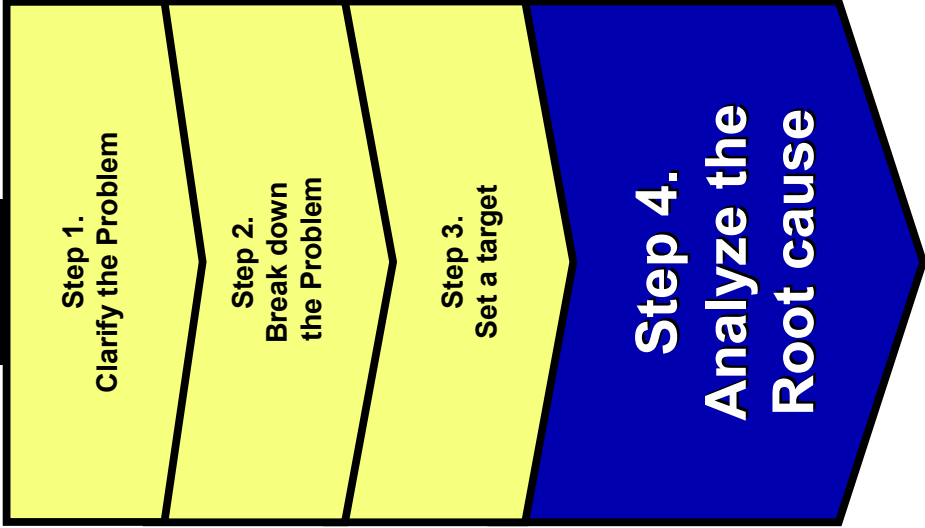
Sal's case study step 3

Step 3: Set Target

**Zero Accidental Damage to aircraft after
during installation on all aircraft after
D-ABCA**

Step 4) Analyze the Root Cause

8 Steps

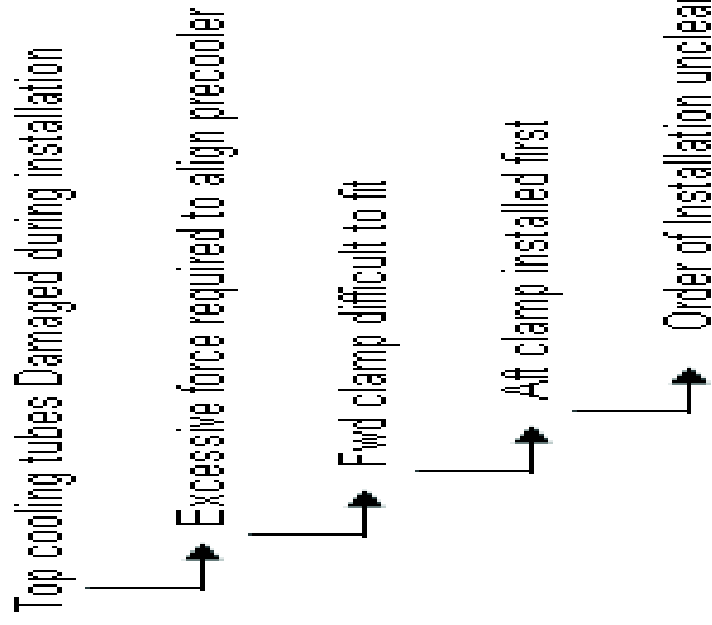


Processes

<p>(1) Clarify the Ultimate Goal of your responsibilities & work</p> <p>(2) Clarify the Current Situation and Current Standard(Ideal Situation) of your work</p> <p>(3) Visualize the gap between the Current Situation and the Current Standard(Ideal Situation)</p>
<p>(1) Break down the problem</p> <p>(2) Identify the Prioritized Problem</p> <p>(3) Specify the point of occurrence by checking the process through GENCHI GENBUTSU</p>
<p>(1) Make a commitment</p> <p>(2) Set measurable, concrete and challenging targets</p>
<p>(1) Examine the Point of Occurrence and think of possible causes without prejudice</p> <p>(2) Gather facts through GENCHI GENBUTSU and keep asking “Why?”</p> <p>(3) Specify the root cause</p>

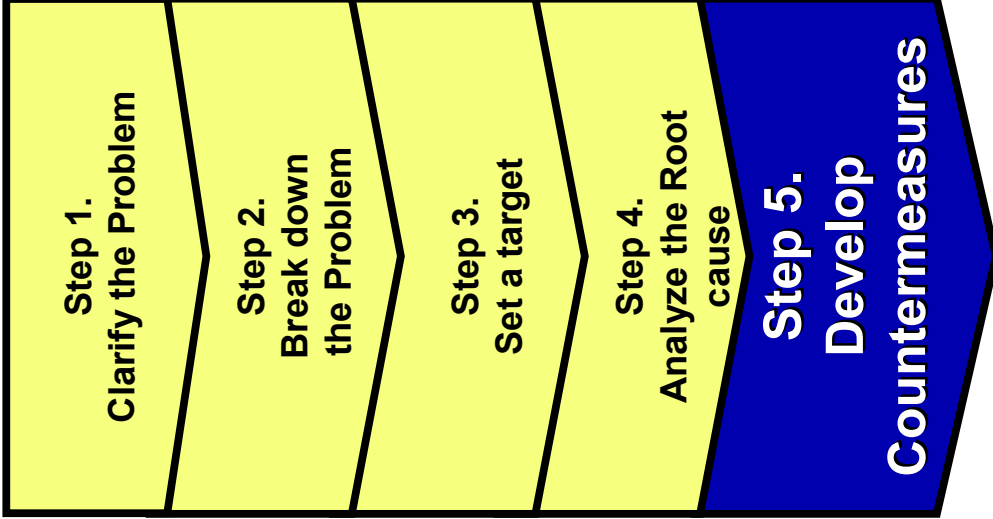
Sal's case study step 4

Step 4: Root Cause Analysis

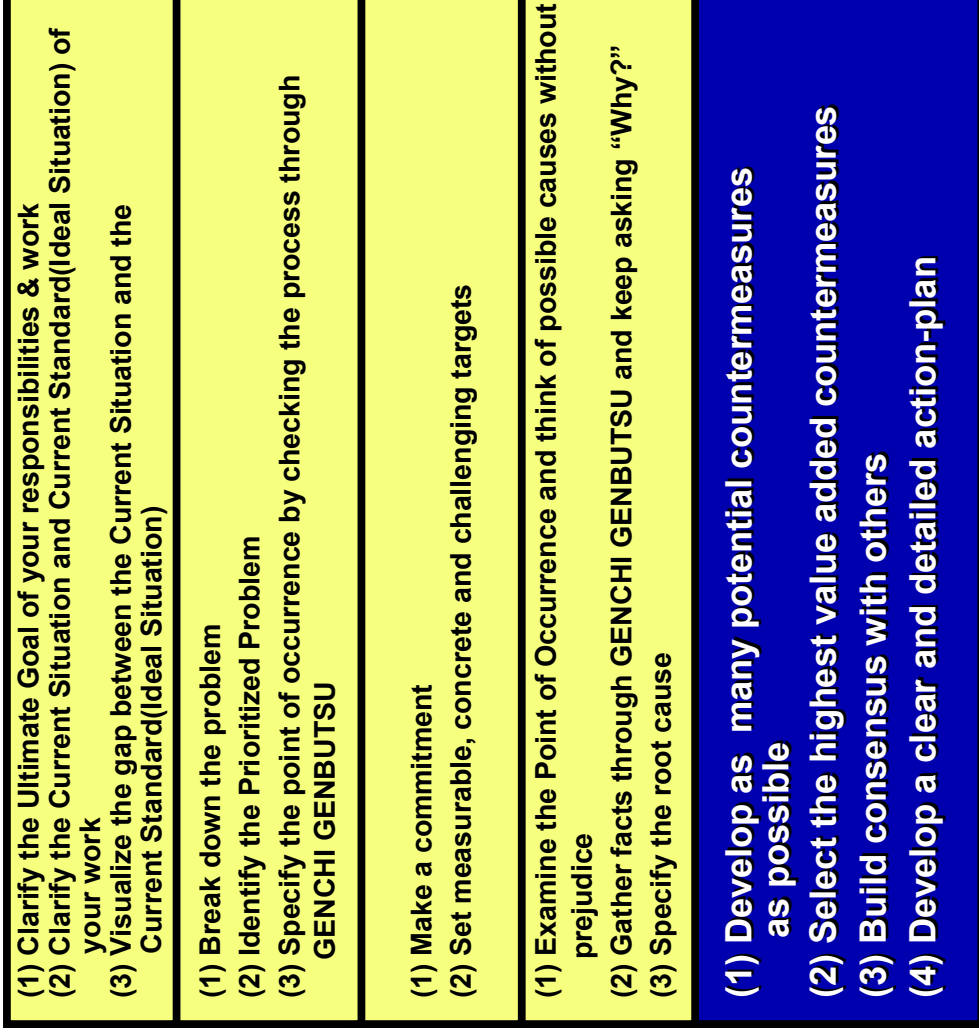


Step 5) Develop Countermeasures

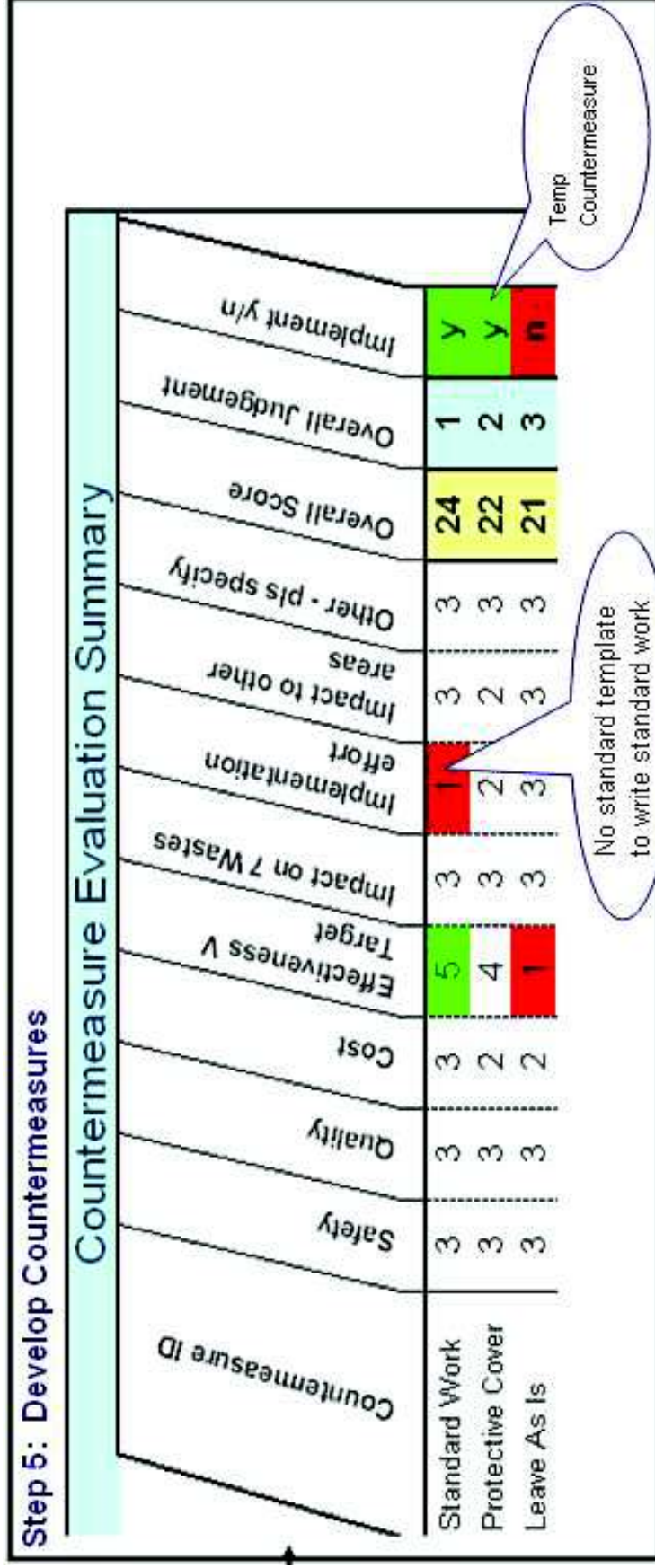
8 Steps



Processes



Sal's case study step 5

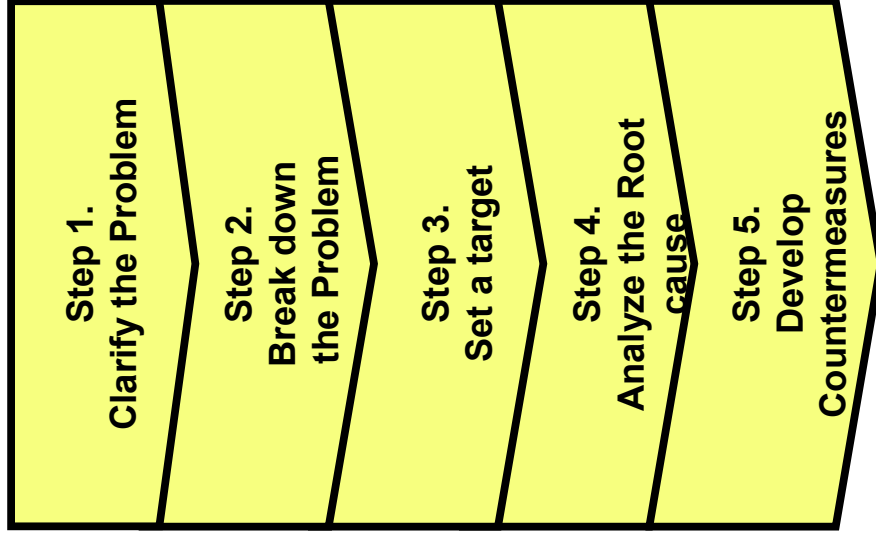


Protective Cover	Today	2 Days	D-ABCA	D-ABCB	D-ABCC	Who	%
Make Prototype						SAL	
Tooling Dept Signoff						TOO	
Engineering Signoff						ENG	
Quality Signoff						QUA	
Modify Jobcards						PLA	
Issue New Tool						TOO	
Trial New Tool						Bay 2	
Communicate						SAL	

Standard Work	D-ABCA	D-ABCB	D-ABCC	D-ABCD	D-ABCE	Who	%
Observe						SAL	
Write Standard Work						SAL	
Engineering Signoff						ENG	
Quality Signoff						QUA	
Trial Std Work						Bay 2	
Communicate						SAL	

Step 6 – See Countermeasures Through

8 Steps



Processes

<p>(1) Clarify the Ultimate Goal of your responsibilities & work</p> <p>(2) Clarify the Current Situation and Current Standard (Ideal Situation) of your work</p> <p>(3) Visualize the gap between the Current Situation and the Current Standard (Ideal Situation)</p>
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<p>(1) Develop as many potential countermeasures as possible</p> <p>(2) Narrow down the countermeasures to the most practical and effective</p> <p>(3) Build consensus with others</p> <p>(4) Develop a clear and detailed action-plan</p>

Step 6 – See Countermeasures Through

8 Steps

**Step 6.
See
Countermeasures
Through**

Processes

- (1) With all members united, implement countermeasures with speed and persistence
- (2) Share information with others by informing, reporting and consulting
- (3) Never give up, and proceed to the next step quickly

Step 6 – See Countermeasures Through



Sal's Case Study

Sal followed his plan and developed a protective cover that was ready for the next aircraft.

He also wrote new standard work based best practice and had this authorised and trialled. As the standard work developed Sal realised that the protective cover should be used as a permanent countermeasure.

Develop Standard Work	D-ABCA	D-ABCB	D-ABCC	D-ABCD	D-ABCE	Who	%
Observe	done					SAL	100
Write Std Work		done				SAL	100
Trial Std Work		in use	in use	in use	in use	SAL	100
Communicate	done	done	done	done	done	SAL	100
Develop Protective Cover	Today	2 Days	D-ABCA	D-ABCB	D-ABCC	Who	%
Make Prototype	done					SAL	100
Tooling Dept Signoff		done				SAL	100
Engineering Signoff		done				SAL	100
Quality Signoff		done				SAL	100
Modify Jobcards		done				SAL	100
Issue New Tool		done				SAL	100
Trial New Tool			in use	in use	in use	SAL	100
Communicate	done	done	done	done	done	SAL	100

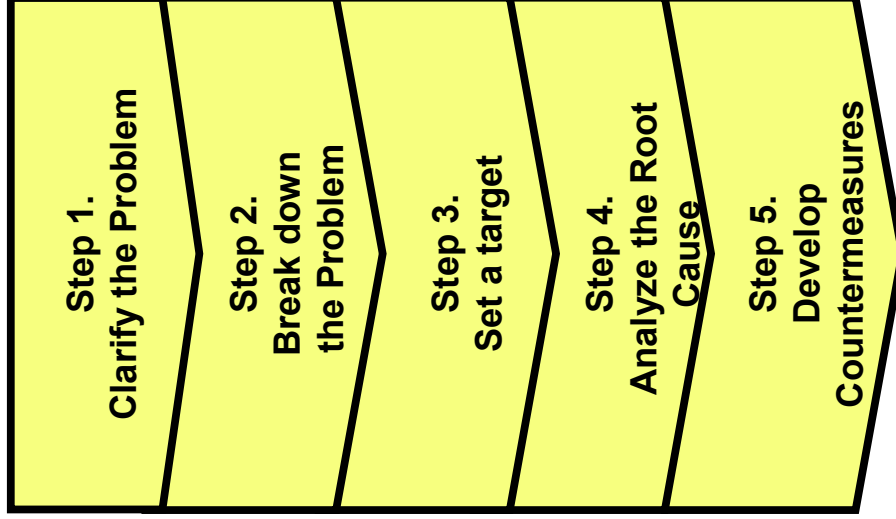
Sal's case study step 6

<p>INS protective cover</p>	 <p>FWD Clamp</p>
<p>NOTE: the following steps should be followed. This clarification is approved by SAL Q and Eng</p>	
<p>INS FWD clamp loosely (Ref A item 4)</p>	
<p>INS AFT clamp loosely (Ref A item 1)</p>	 <p>AFT Clamp</p>
<p>Torque FWD clamp (Req torque is etched onto clamp)</p>	
<p>Torque AFT clamp (Req torque is etched onto clamp)</p>	

Order of Installation Std

Step 7 – Evaluate Both Results and Processes

8 Steps



Processes

(1) Clarify the Ultimate Goal of your responsibilities & work (2) Clarify the Current Situation and Current Standard(Ideal Situation) of your work (3) Visualize the gap between the Current Situation and the Current Standard(Ideal Situation)
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Step 7 – Evaluate Both Results and Processes

8 Steps

Step 6.
See Countermeasures
Through

Step 7.
Evaluate Both
Results
and Processes

Processes

- (1) With all members united, implement countermeasures with speed and persistence
- (2) Share information with others by informing, reporting and consulting
- (3) Never give up, and proceed to the next step quickly

- (1) Evaluate the results and the processes, and share it with members involved
- (2) Evaluate from three key perspectives: Customer's, 8 Step's, and Your Own
- (3) Understand the reasons of success and failure

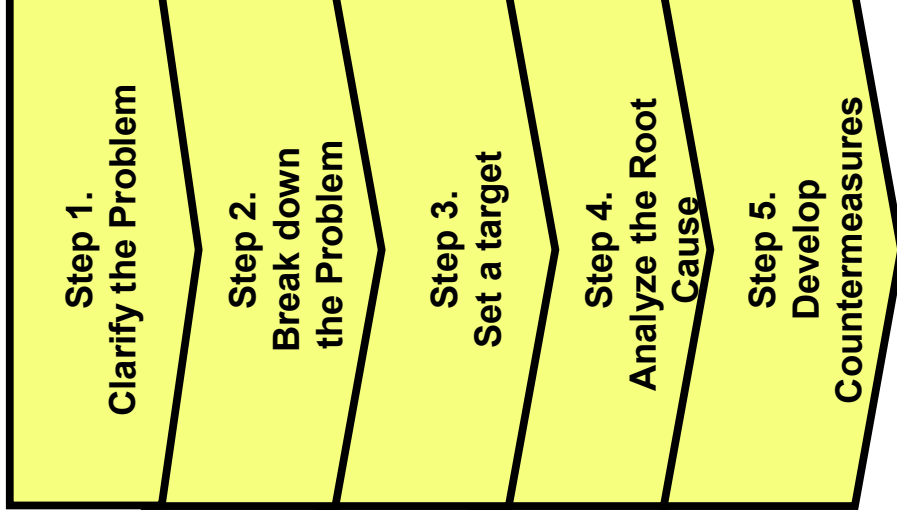
Sal's case study step 7

Sal tracked the countermeasures for the next 5 aircraft. He now felt that the new processes were being followed and would continue to be followed.

	D-ABCA	D-ABCB	D-ABCC	D-ABCD	D-ABCE
Standard work in use			yes	yes	yes
Protective cover in use	yes	yes	yes	Not Checked	
Damage to precooler	NO	NO	NO	NO	NO

Step 8 – Standardize Successful Processes

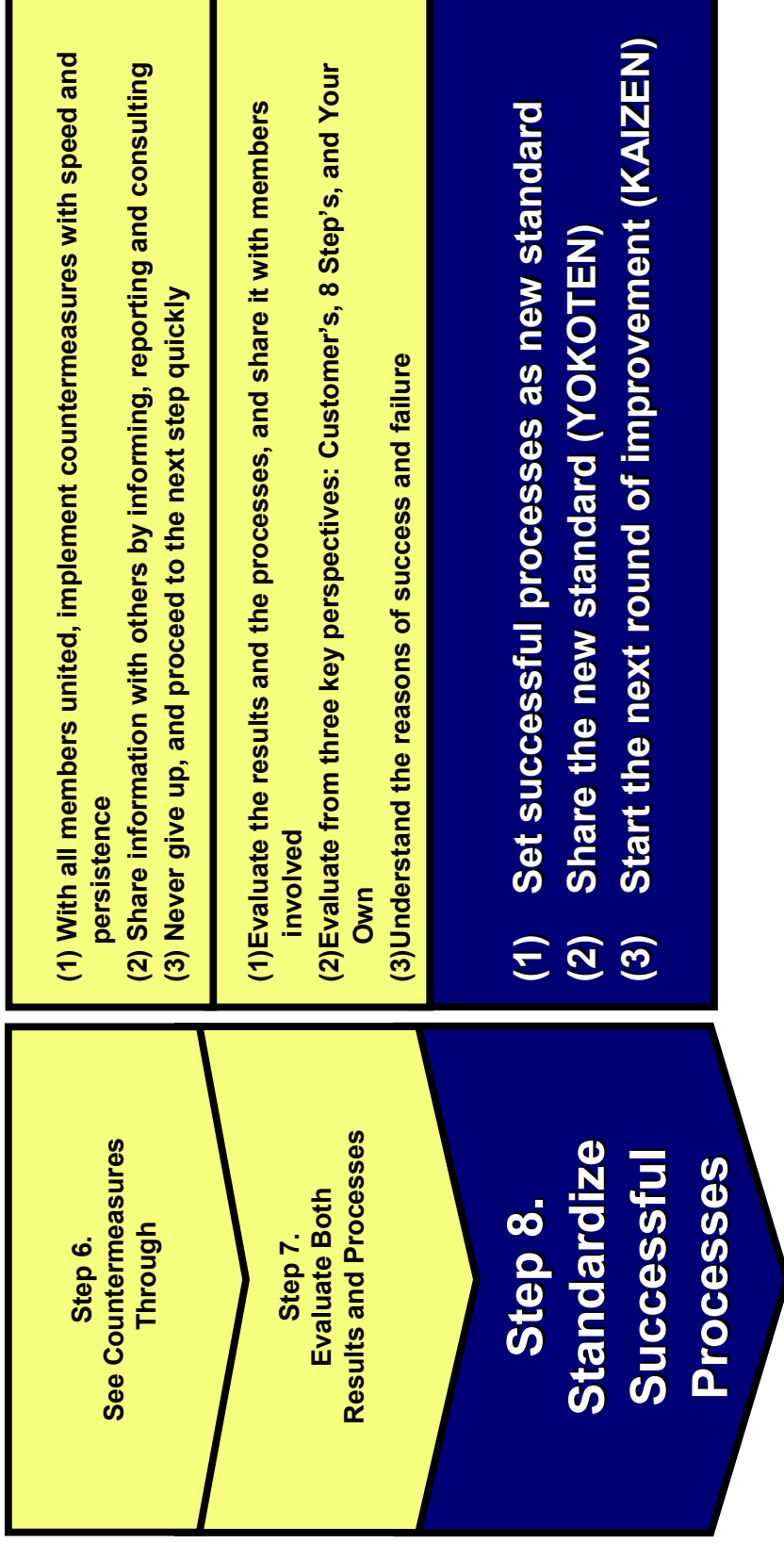
8 Steps



Processes

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Step 8 – Standardize Successful Processes



Step 8 – Standardize Successful Processes

Sal's Case Study

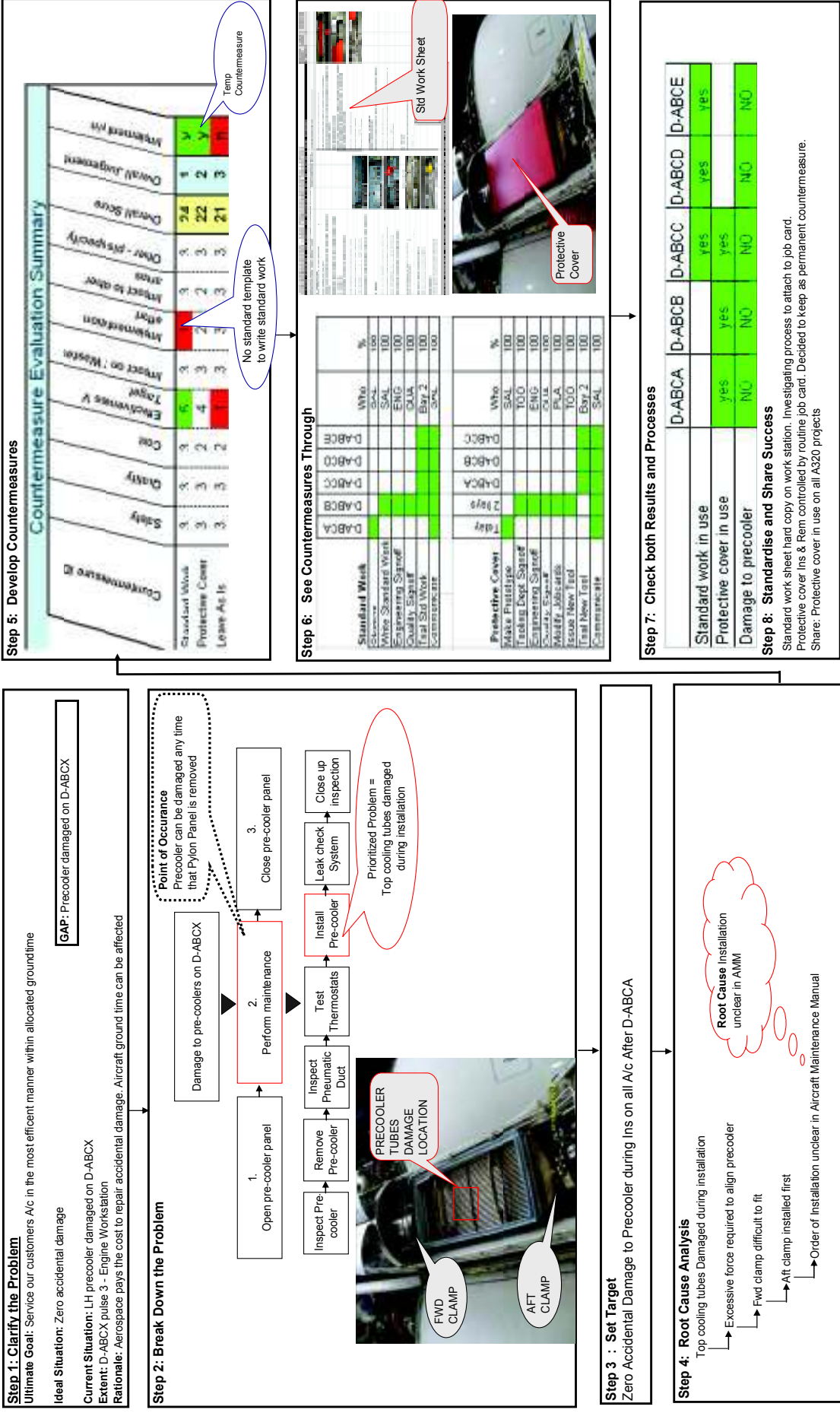
The installation and removal of the protective cover was controlled by routine job cards. A hard copy of the standard work was placed on the workstation while a process is developed to include it in the installation job card.

All information was shared and publicised with all teams that could be effected by this problem and included in internal newsletter.

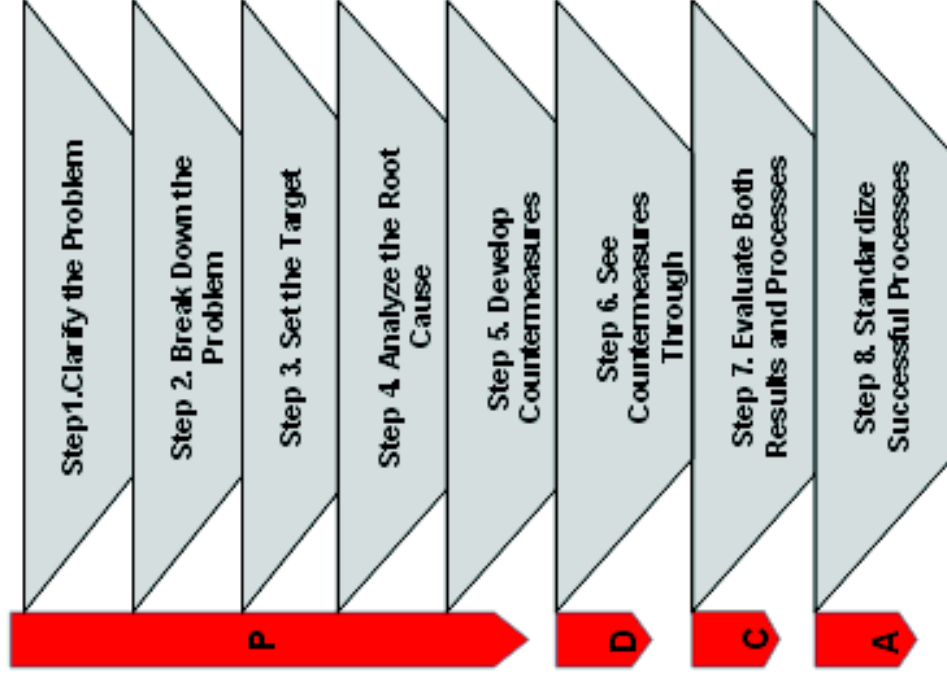
Step 8: Standardise and Share Success

Standard work sheet hard copy on work station. Investigating process to attach to job card.
Protective cover Ins & Rem controlled by routine job card. Decided to keep as permanent countermeasure.
Share: Protective cover in use on all A320 projects

Example – Sal's Case Study



8 Step Problem Solving Method



Doing 8 Step PPS correctly requires:



Deep Thought



Discipline



**Use Practical Problem
Solving to Understand
Root Cause and Identify
and Implement
Countermeasures.**

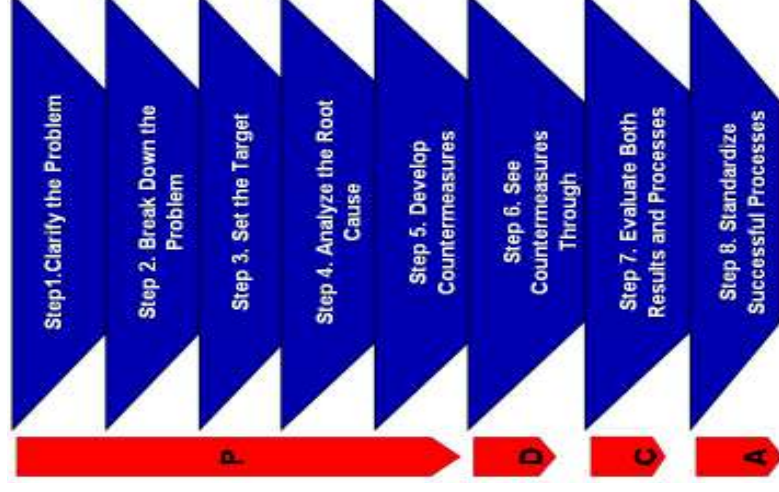
2009 Practical Problem Solving Rollout

- First company outside Toyota to be Certified as PPS Practitioners
- 11 Practitioners now trained & certified
- ET trained
- 16 Days training over 4 months including, 1 Team PPS 1 Individual PPS
- 24 PPS A3's currently in progress



Since 2009 Initial Rollout

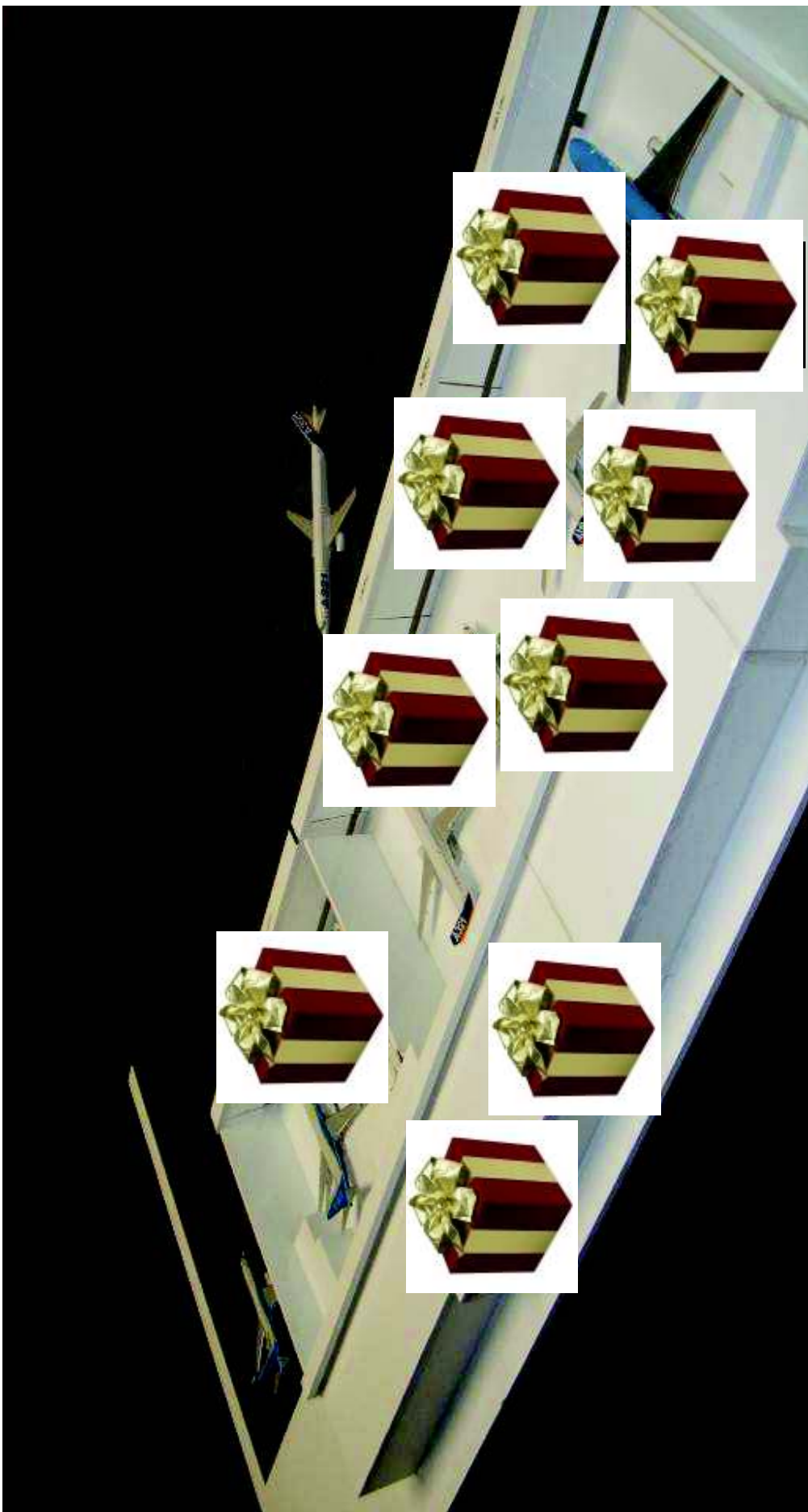
- **1/2 Day Training Course developed and delivered internally in 2010 (26 trained)**
- **2 Day Training Module developed and delivered for Lufthansa Technik Group Lean Academy**
- **2 Hour Training Course delivered externally to jobseekers (8 sessions to date)**



Don't be afraid of Problem Solving



Convert Fires to Gifts



Shannon Aerospace Practical Problem Solving “Train the Trainer” Programme

Lean Flight Initiative 4

Using Lean to Climb through Turbulence

Date: 10th & 11th May 2011 | Location: Four Seasons Hotel, Atlanta



Questions?

