



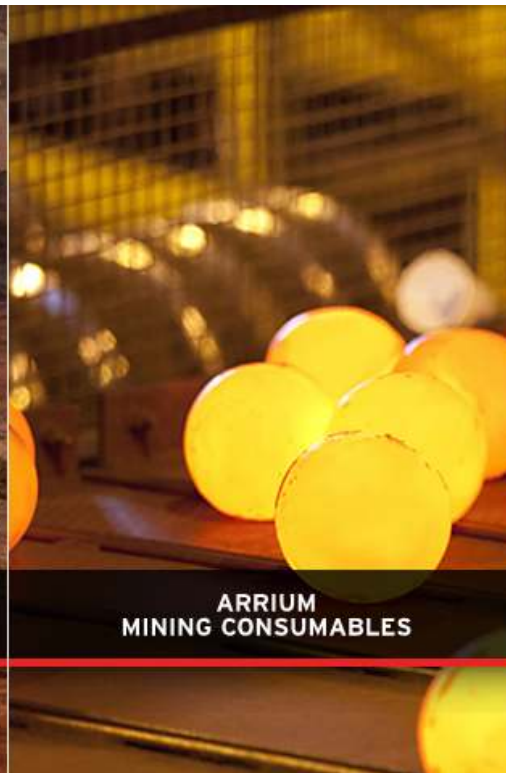
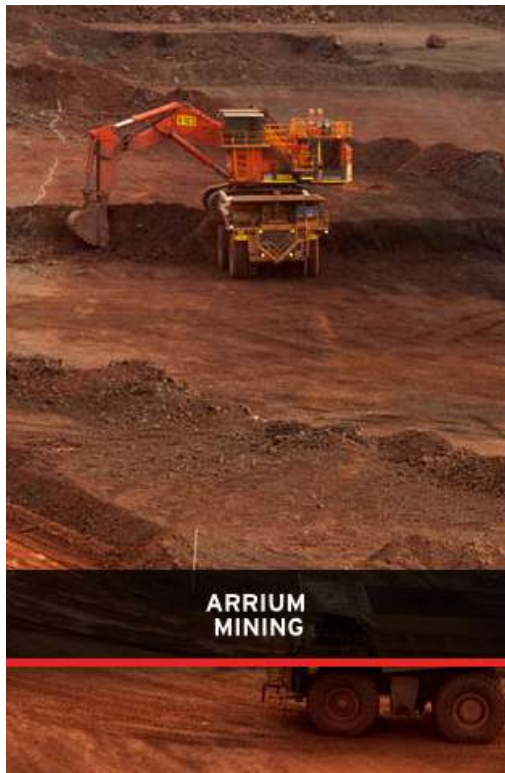
Developing Effective Reactive Improvement Supported by Frontline Problem Solving



- Brett Perrin – Onesteel - Australian Tube Mills
- September 2012



Who are we?





Australian Tube Mills

➤ Australian Tube Mills

- Onesteel – BHP Steel, Pipe & Tube – Tubemakers
- Smorgan Steel Tube – Palmer Tube Mills

➤ We have manufacturing facilities in;

- Acacia Ridge (Brisbane, Queensland) – Structural Tube
- Mayfield (Newcastle, New South Wales) – Structural Tube
- Somerton (Melbourne, Victoria) – Structural Tube
- Sunshine (Melbourne, Victoria) - Precision Tube
- Kwinana (Perth WA) - Precision Tube



Our Brands

PLATINUM
DuraGal®



OZ Lintel

DURAGAL®

OZ Profile

SupaGal®



Somerton Facility – 235 Hume Hwy, Somerton





Operation

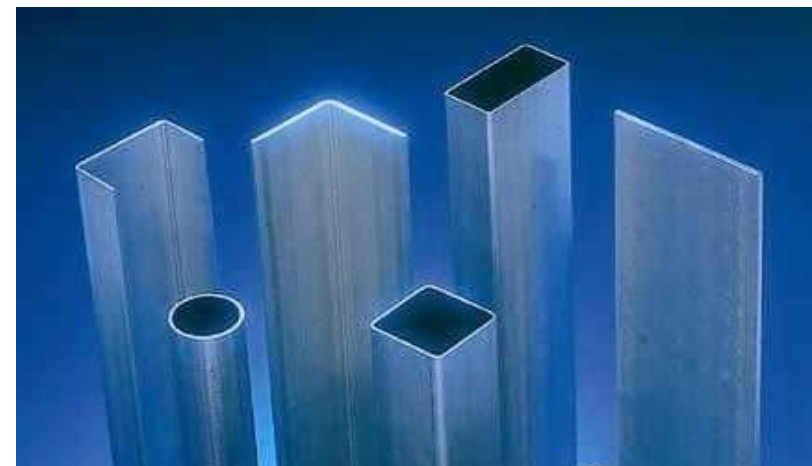
- Commenced Operation in 1997
- 2 Mills – Profile & Tube – in line galvanising
- Capacity 120,000 tonnes per annum

Employees

- 85 full time employees on site
 - 4 Mill Crews
 - 2 Slitter/Warehouse Crew
 - 15 Staff – production, dispatch, finance, engineering, maintenance & purchasing
- Self managed teams operating the slitter, mills and warehouse

Roster

- Slitter, Mills and Warehouse
 - 12 hour shifts, 6:30am to 6:30pm
 - Monday to Saturday operation





Our CI Strategy - What have we tried before?

onebest way

- CCC Strips (Concern, Contain, Corrective Action) – a Reactive Improvement Tool
 - Part of the Onesteel Lean Deployment
 - Driven by site leaders
 - Low engagement

- Communities of Practice (COMPRAC)
 - Was part of the Site culture
 - Good vehicle for Kaizen type activities

- Six Sigma
 - Great tools for Pro-active improvement – longer time horizon
 - Excellent Training
 - Site had good capability
 - Still a lot of low hanging fruit
 - Continue to build site capability



Why we chose Frontline Problem Solving

Target OEE

- Site was not supported for Onesteel Operating System deployment
- We wanted to get the right balance between Reactive Improvement and Pro-active Improvement
- Looking for one solution for our reactive problem solving that could also be used for proactive improvement projects.
- Wanted to encourage the engagement of our frontline employees
- Needed a methodology to allow them to work through the problem solving process
 - Avoid having them jump to “Solution Mode”
- Needed to improve OEE – big focus on Mill 7 Yield



Our Journey

- Ran two “waves” in parallel in the first half of 2012 – 30 employees trained
- Lead Team members leading projects – majority of participants from the frontline
- Weekly follow up with Paul Furtado supported the learning process – helped keep the teams on track
- Teams completed presentations to Leadership group and peers – shared learnings.
- Have commenced 3rd wave – will have over 50% of site trained.



Our Training Projects

- 6 Teams completed 2 to 3 projects each
- Diverse selection of problems
- In hindsight – some were too big
- All projects took the team on a learning journey
- Not all delivered a measurable financial return to the business
 - But that was OK



Example 1 – Mill 7 Raft Encoder Reliability



- Failure of our encoders on our forming rafts were extending Change Over Times by 20%
- Project selected by the Electrical Team



Example 1 – Mill 7 Raft Encoder Reliability

Problem Definition and Containment

TEAM ELECTRIC

Improvement Theme: ☐ Quality ☒ Cost ☐ Safety ☐ Environment

Australasia Department: ☒ Equipment / Process: ☒ Title: ☐ Prepared By: ☒

1. Define Problem (Plan)

Problem Statement ENCODERS ON MILL 7 Frequent (Random) Failures

Problem Description

	Is	Is Not
What	Encoder HU/SU/any other control aspect of Mech/maintenance/HSO	(Mech) pit, comms, vibration
Where	mill 7 & 2 on line	16 Encoders on mill 8
When	Raft movement / change & handling / setup	- never -
Size	7 fail / 2 months (1/week). numerous faults on single aft.	
Point of Occurrence	Post: pulcon raft movements / setup/handling & related issues.	

Problem Definition

Encoders on Falcon Pit & PM2 are faulting at a rate of 1 per week due to influences specific to Falcon

EXTENDING ONLINE CHANGEOVER TIMES BY 20% @ COST OF \$500 per online change.
 $= 2 \times 7 \times \$500 = \7000 per week

Is there any history of this problem?

2. Contain Problem – Detail the containment action required and completed (Plan)

Detail the containment action that has been taken:

Fix immediately when available, align Schedule with Raft movements, Align Customer requirements with Maint

Date Implemented: _____ Place Implemented: _____ Implemented by: _____ Verification of action by: _____

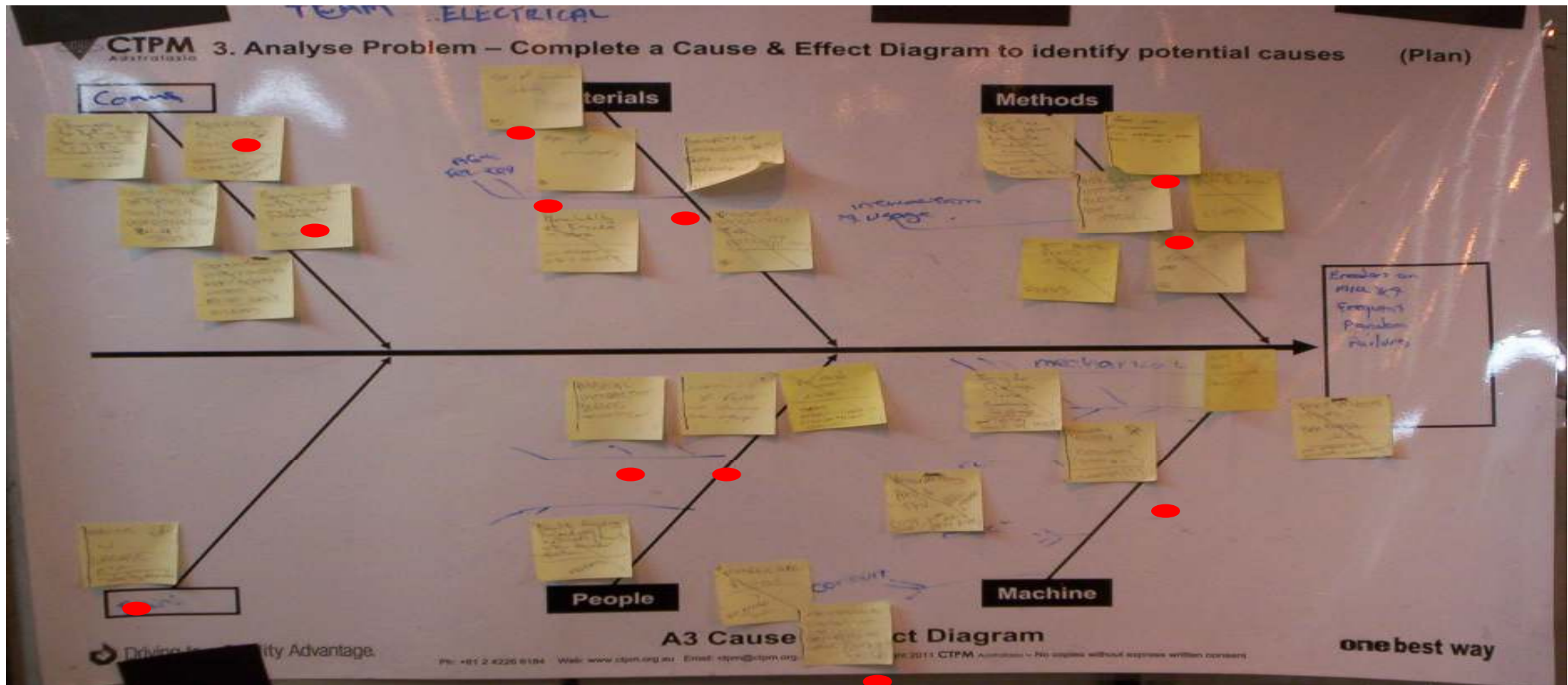
Problem valued at \$7000 per week
Return was closer to \$20,000 p.a.

Containment was key in stopping pain



Example 1 – Mill 7 Raft Encoder Reliability

Using Cause & Effect Diagram to identify potential causes



High engagement exercise !!



TEAM ELECTRICAL

Develop Root Cause Solutions - Construct the Why Why Diagram (Plan)

Helps solve this be a problem?

MECHANICAL DRIVING & ELECTRICAL LOAD

- SHAKED PMS

- SHAKED COILS

- WIRE VIBRATIONS

- H2 PMS

any loss sic pins

SC PLING COILS

TRAINING TO COMPONENTS

TEST RIG?

PHYSICAL DATA

CHANGE CABLE

CM - SURGE SUPPRESSORS

CM - LINE FILTERS & CHOKES

UPSTREAM POWER SUPPLY

HOW COULD THIS HAPPEN

FRIED TX TESTER

VOLTAGE SPIKES

WATER INGRESS

Problem Definition:

EXCITER LOOSELY MOUNTED

FREQUENT FAILURE

Process...

STEP 1: Define starting point(s) from Cause & Effect Diagram

STEP 2: Map out the starting why (what caused it to fail)

STEP 3: Construct chart

STEP 4: Repeat steps 2 & 3 until no more reasons why

STEP 5: Circle Root Causes to be addressed

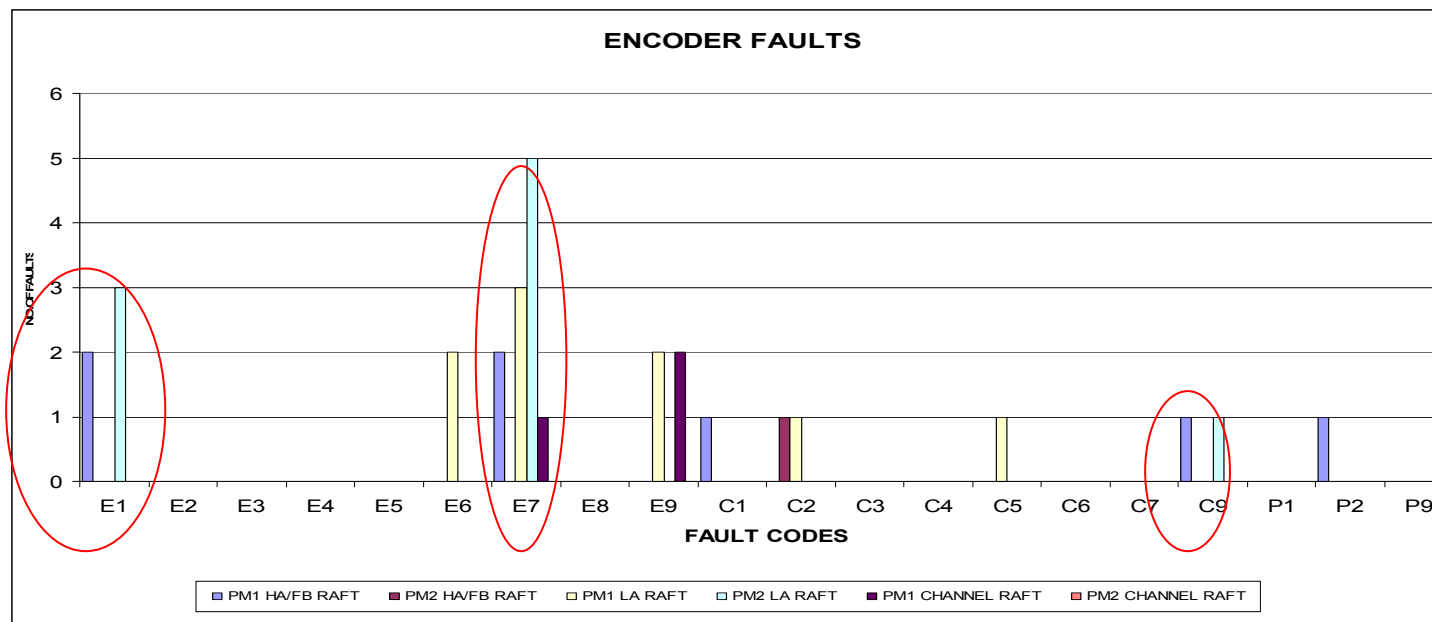
Why Diagram

one best way



Example 1 – Mill 7 Raft Encoder Reliability

The use of data to verify root cause

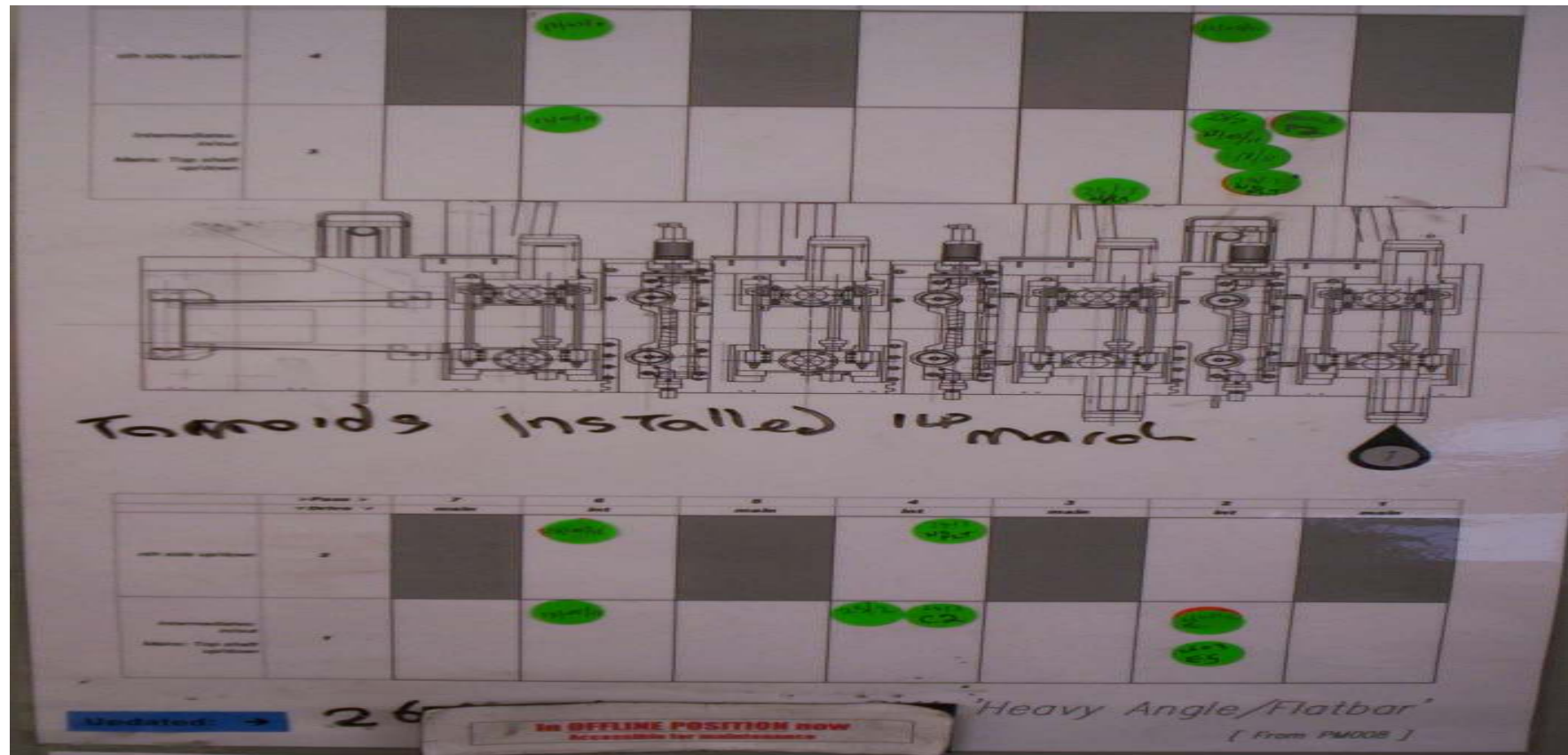


- **REPLACED ENCODER**
 - E1. Replaced Encoder - Unable to Program
 - E2. Replaced Encoder - Mechanical Damage to Encoder
 - E3. Replaced Encoder - Suspect Water Ingress
 - E4. Replaced Encoder - Keeps Loosing memory
 - E5. Replaced Encoder - Drags down all other encoders on that card
 - E6. Replaced Encoder - One or more outputs not working
 - E7. Replaced Encoder - Cannot 'PassSet'
 - E9. Replaced Encoder - Other Reason
- **REPAIRED or REPLACED CABLE**
 - C1. Repaired cable - Broken connection at plug
 - C2. Replaced Cable - Mechanical Damage to Cable
 - C3. Replaced Cable - Mechanical Damage to Plug
 - C4. Replaced Cable - Water Ingress at Plug
 - C5. Replaced Cable - Shorted conductors
 - C6. Replaced Cable - Broken/open circuit conductors
 - C7. Replaced Cable - Cannot fault encoder.
 - C9. Repaired or Replaced Cable - Other Reason
- **PROGRAMMED / RE-PROGRAMMED ENCODER**
 - P1. Programmed encoder - Encoder is new, never programmed
 - P2. Programmed encoder - Partial or complete memory loss
 - P9. Programmed encoder - Other Reason



Example 1 – Mill 7 Raft Encoder Reliability

Tracking of encoder issues using a rash chart



Example 1 – Mill 7 Raft Encoder Reliability

TEAM ELECTRIC

Improvement Theme:
 AUTOMATION Department

Equipment / Process:

Title:

Prepared By:

Date Initiated:

Date Completed:

Site:

Latest Update Date:

Latest Version:

1. Define Problem

Problem Statement: ERRORS ON ASSEMBLY FRAMES (RANDOM) FAILURES

Problem Description	What	Where	When	Size	Point of Occurrence
Is	Excessive soldering, many errors, causing delays in production / assembly / test	Is Not	Excessive on other PM1 & PM2 are faulting at a rate of 21 per week due to influences specific to frame		
What	Excessive soldering, many errors, causing delays in production / assembly / test	Where	Is excessive on PM1 & PM2		
Where	Is excessive on PM1 & PM2	When	Is excessive on PM1 & PM2		
When	Is excessive on PM1 & PM2	Size	Is excessive on PM1 & PM2		
Size	Is excessive on PM1 & PM2	Point of Occurrence	Is excessive on PM1 & PM2		
Point of Occurrence	Is excessive on PM1 & PM2				

Is there any history of this problem?

2. Contain Problem – Detail the containment action required and completed

Detail the containment action that has been taken

Fix immediately when available, align schedule with left over materials, Align Customer requests with team

Date Implemented:	Place Implemented:	Implemented by:	Verification of action by:

3. Analyse Problem – Summary of the Cause & Effect diagram

Materials: POWER SUPPLY COMPROMISED, GIVES SURGES, NOISE

Methods: NEED TRAINING TO SOLDER CORRECTLY, WATER INGRESS? 24/7 PM'S, CORRECT SOLDERING

Machine:

People:

4. Develop Root Cause Solutions – Summary Result of Root Cause Analysis

Cause 1:

Possible Solutions:	Possible Solutions:	Possible Solutions:	Possible Solutions:	Possible Solutions:
NEED TRAINING TO SOLDER CORRECTLY	NEED TRAINING TO SOLDER CORRECTLY	NEED TRAINING TO SOLDER CORRECTLY	NEED TRAINING TO SOLDER CORRECTLY	NEED TRAINING TO SOLDER CORRECTLY

Cause 2:

Possible Solutions:	Possible Solutions:	Possible Solutions:	Possible Solutions:	Possible Solutions:
NEED TRAINING TO SOLDER CORRECTLY	NEED TRAINING TO SOLDER CORRECTLY	NEED TRAINING TO SOLDER CORRECTLY	NEED TRAINING TO SOLDER CORRECTLY	NEED TRAINING TO SOLDER CORRECTLY

5. Implement Solutions – Summary of action completed

Proposed Action / Approved Action

Who	Proposed Date	Completed Date
ASSEMBLY TEAM	21 MAR	21 MAR
ASSEMBLY TEAM	21 MAR	21 MAR

6. Evaluate Results – Evaluate the results of the improvements made

ASSEMBLY TEAM HAS BEEN TRAINED

ASSEMBLY TEAM HAS BEEN TRAINED

ASSEMBLY TEAM HAS BEEN TRAINED

7. List Future Actions

ASSEMBLY TEAM HAS BEEN TRAINED

ASSEMBLY TEAM HAS BEEN TRAINED

ASSEMBLY TEAM HAS BEEN TRAINED

Approved Solutions:
 Leader Signature:

Approved A3 Summary Sheet:
 Leader Signature:

Frontline Problem Solving A3 Summary Sheet

one best way



Example 1 – Mill 7 Raft Encoder Reliability

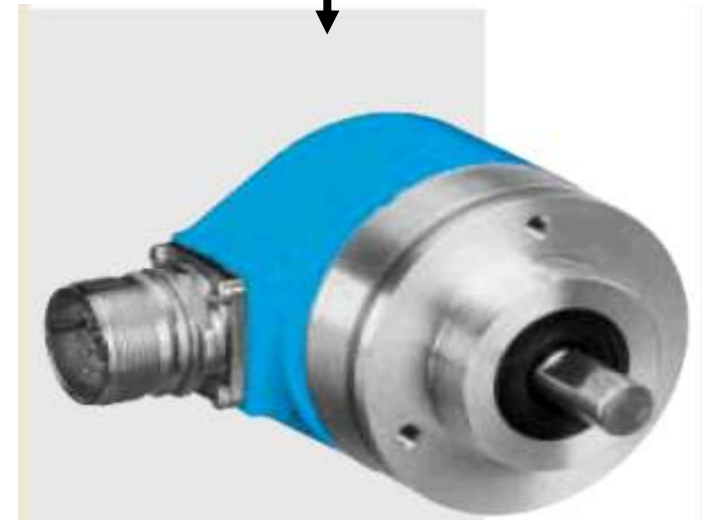
Root Causes

1. Water ingress due to damage to the encoder

ACTION – Trial alternate design

2. Power supply surges

ACTION – Install line filters and Surge Suppressors





Example 1 – Mill 7 Raft Encoder Reliability

- **20% improvement in change over times realised to date.**
- **Has contributed to Mill 7 Availability improvement**
- **Availability savings of \$20,000 per annum**
- **A more cohesive Electrical Team**



Example 2 – Reduce Wet Bore Rejects on No.8 Mill

1. Define Problem

(Plan)

Problem Statement
Wet Bore due to Mill Coolant from Forming Raft

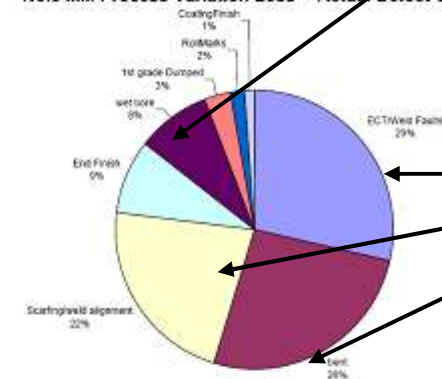
Problem Description

	Is	Is Not
What	Wet bore	Dry bore
Where	Forming/Welding Process	After Forming
When	Speed increase Blown impeder Hole in weld coil Teflon	Low Mill Speed During Mill Stoppage or C/O
Size	8% of the total yield loss	
Point of Occurrence	Forming/Welding Process -- Mill Coolant Spray Impeder Weld Coil	

Is there any history of this problem? Since Start-up

Problem Definition
Mill coolant get into bore during production – Yield Loss

No.8 Mill Process Variation Loss -- Actual Defect Count



➤ 8 % of Total Yield Loss

Active Six Sigma Projects

2. Contain Problem – Detail the containment action required and completed

Detail the containment action that has been taken:

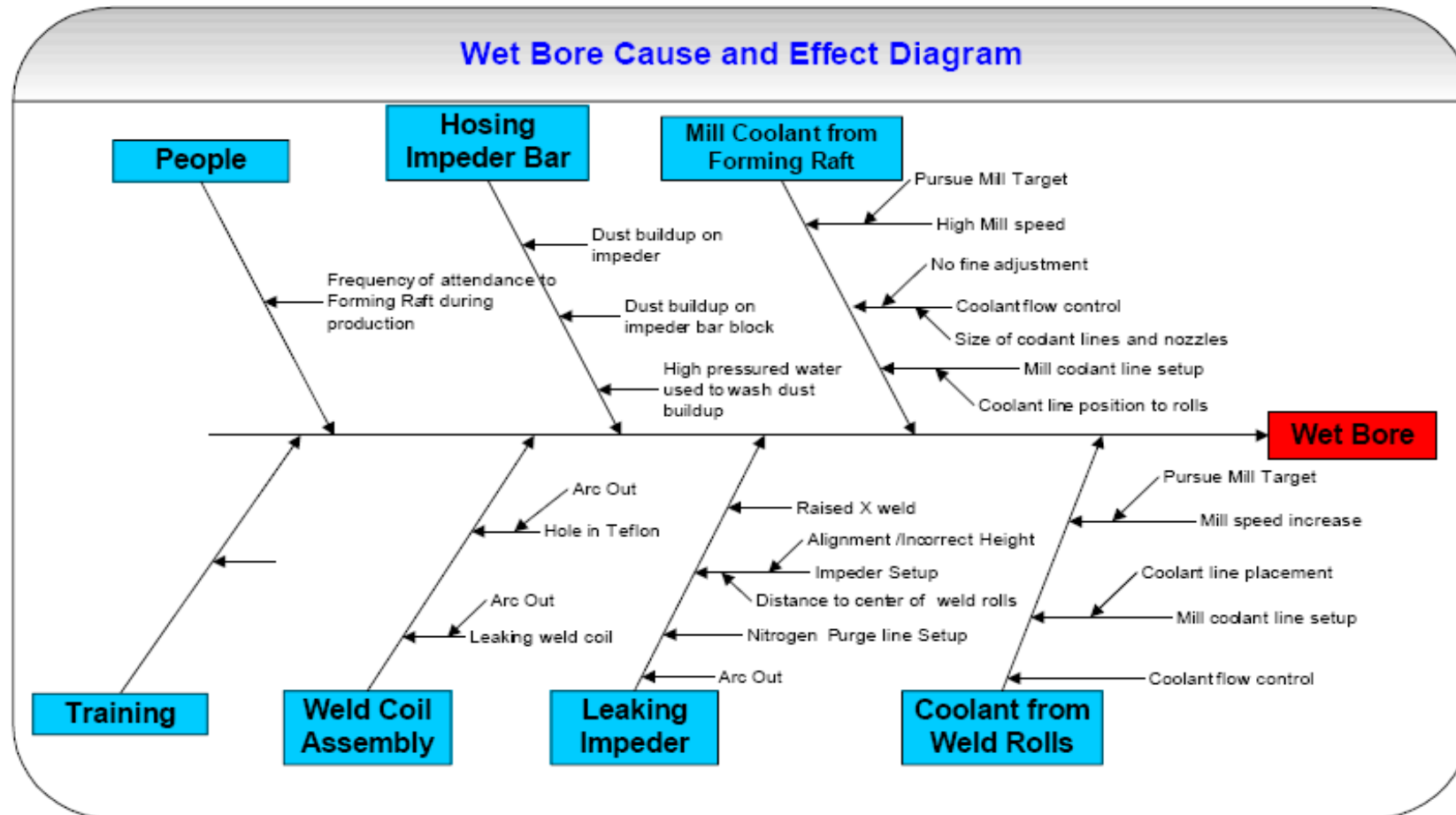
1. RunOut Inspection + Bundler & Product Handler – to check bore preventing wet bore product sent to customers.
2. Reduce mill speed if wet bore occurs
3. Adjust coolant flow at Forming/Welding if wet bore occurs

Date Implemented:	Place Implemented:	Implemented by:	Verification of action
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Example 2 – Reduce Wet Bore Rejects on No.8 Mill





Example 2 – Reduce Wet Bore Rejects on No.8 Mill

Root Causes

1. Unable to control flow due to no valves

ACTION – Install valves in lines

2. Unsuitable size of loclines

ACTION – Install loclines of suitable size.





Example 2 – Reduce Wet Bore Rejects on No.8 Mill

- Reduction in wet bore losses have improved underlying yield performance
- This has been impacted by new products
- Estimated annual benefit of over \$50,000
- Additional improvement to Availability not measured but would be attributed to this project



Making it Part of our Daily Activity

➤ Clear Triggers Defined

Triggers

- Any multiple stops of the same reason that equal, or are greater than 60 min.
- Any single delay that stops the line for greater than 60 min
- Any day where rate is 10% below target rate.
- Any rolling where yield is below target.
- Any injury
- Any Level 3 potential incident
- Any Quality Complaint

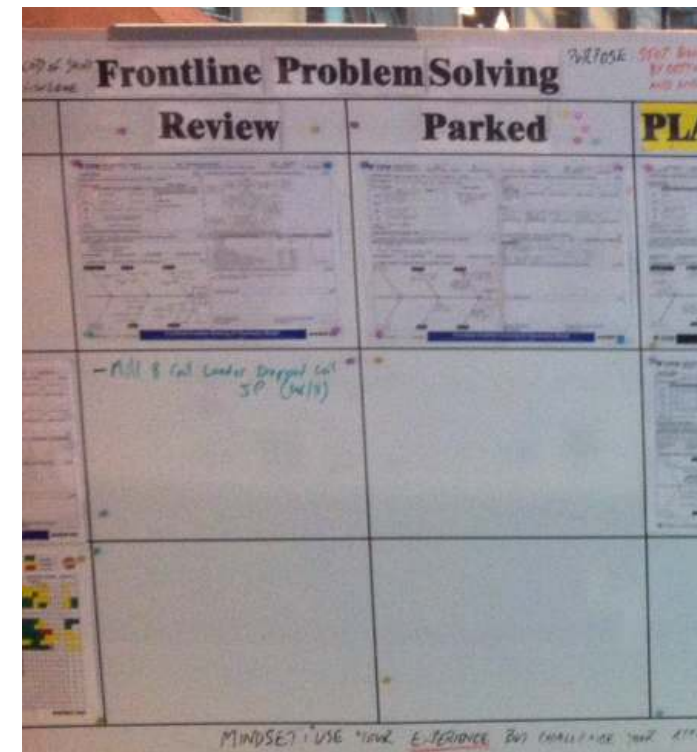
Minimum Quality to present at Info Centre

- Steps 1 , 2 and 3 on the problem solving sheet by end of shift
- Define ,Contain, Fishbone



Making it Part of our Daily Activity

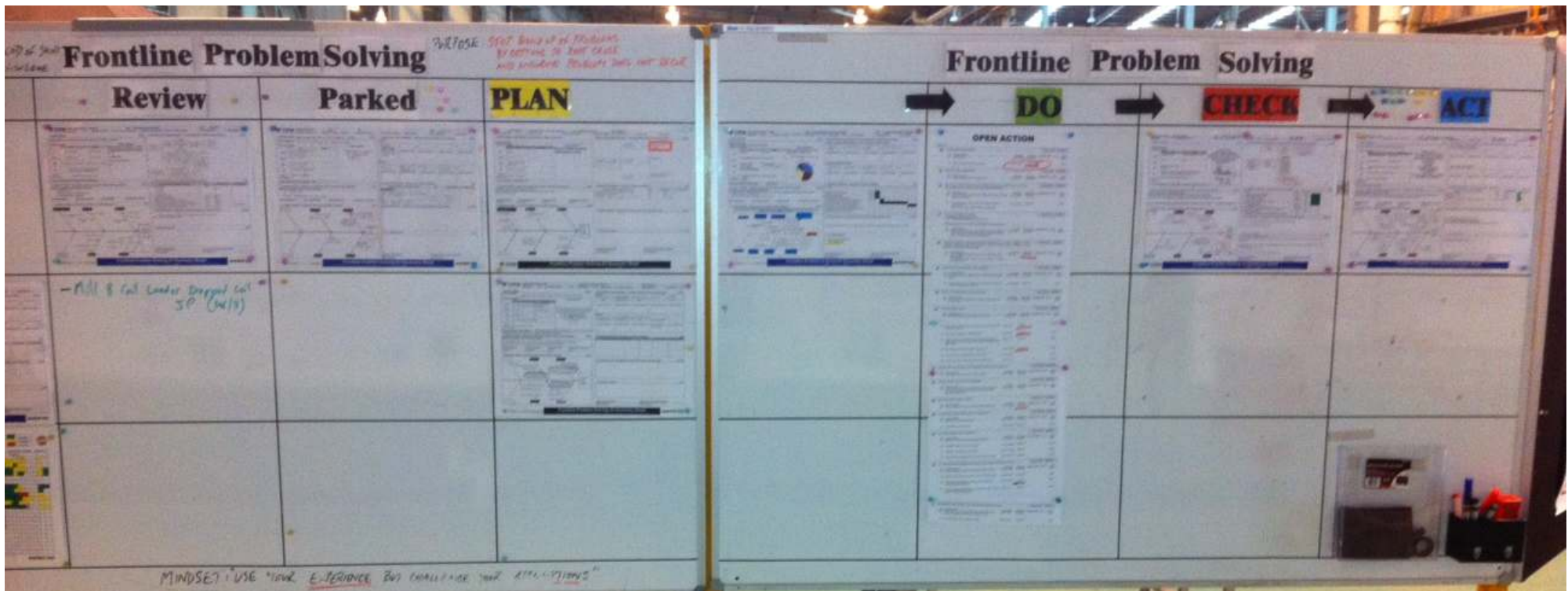
- Clear Triggers Defined
- Review at Info Centre
- Parked and Prioritised





Making it Part of our Daily Activity

- Clear Triggers Defined
- Review at Info Centre
- Parked and Prioritised
- Use of Visual Management to Track Projects





Making it Part of our Daily Activity

- Clear Triggers Defined
- Review at Info Centre
- Parked and Prioritised
- Use of Visual Management to Track Projects
- Review Process is part of Leaders Standard Work

DAILY	TASK / ACTIVITY	M	T	W	T	F
	Morning Mill Walk – vary Mill positions to review – visit Prod or Despatch (30)					
	Review email and task list (15)					
	Review Delivery & Production Numbers (30)					
	Production Meeting (30)					
	Detailed Review email and actioning task list (60)					
	Release Workflow – 11am					
	Afternoon Mill Walk – focus on Area of concern for the day (60)					
WEEKLY	Daily review, email & task list (30)					
	TASK / ACTIVITY					
	Lead Team Meeting					
	Scheduled Safety Observation – part of walk schedule					
	DIFOT Review					
	Review Stock Availability & Nose to Tail					
	Mill / Site Walk with Direct Report "Raise the Bar" – part of walk schedule					
	Structural Lead Team Meeting – review and send info					
	Structural Lead Team Meeting					
	Review Standard Work for Direct Reports (30) – part of walk schedule					
	Schedule Lead Team Agenda and send reminder (30)					
	Review FLPS – Stage 5 & 6 (60)					
	Review and Action Corrective Actions – follow up with Direct Reports (30)					
	Incident Close Out and Review (60)					
MONTHLY	Weekly Review & Plan for next week (120)					
	TASK / ACTIVITY					
	Review Monthly Pack – Week 1					
	Safety Observation Quality Review – Week 2					
	Spendvision – Week 3					
	Review Enviro Corrective Action Status with Song – Week 3					
	Attend Wealth Creation Focus Point – prep work					
	Attend Safety Focus Point					
	STIP Review for Techs – final review – Week 1					
	Publish STIP – Week 1					
	45/90 Day Reviews with Direct Reports					
	Review CAPEX					
	Review Hopper					
	Supply Plan Meeting (30)					
	Review LMA HPM – Craig (30)					
	Review LMA HPM – Sud (30)					
	Core Value Awards					



The Early Returns

➤ Financial Gains

- Individually training projects have yielded significant in annualised savings
- Similar returns from the daily reactive problem solving

➤ The Intangibles

- Greater engagement from the frontline regarding the problem solving process.
- Improved relationships between leaders and frontline.
- An aligned process for the whole site.
- Increased accountability and ownership
- Becoming embedded culturally





Key Learnings

- Ensure key roles are trained and lead projects
- Make their involvement a measurable outcome for their annual goals
- Be true to the process
- Be prepared to stick it out
- Frontline involvement is mandatory
- Don't take on too much
 - Adjust triggers
 - Be prepared to accept containment on some problems.
- Leadership owns the results
 - Projects
 - Process

Thank You – Questions?

