



MACHINERY AUTOMATION & ROBOTICS



New Equipment Management *Robot Palletiser* Case Study

Sugar Australia – Croydon





Presentation Outline

- Overview of Sugar Australia – Croydon
- Overview of Machinery Automation Robotics
- Overview of New Equipment Management
- Initial Factory Acceptance Test
- “TPM³ Friendly” Initial Review
- “TPM³ Friendly” Improvements
- “TPM³ Friendly” Training
- Learning’s
- Robot Palletiser Video
- Questions





Sugar Australia - Croydon

No. of Employees:	20
No. of Shifts:	2
No. of SKU:	20
TPM³ Activity:	5 Cycles





Retail Products





Industrial Products



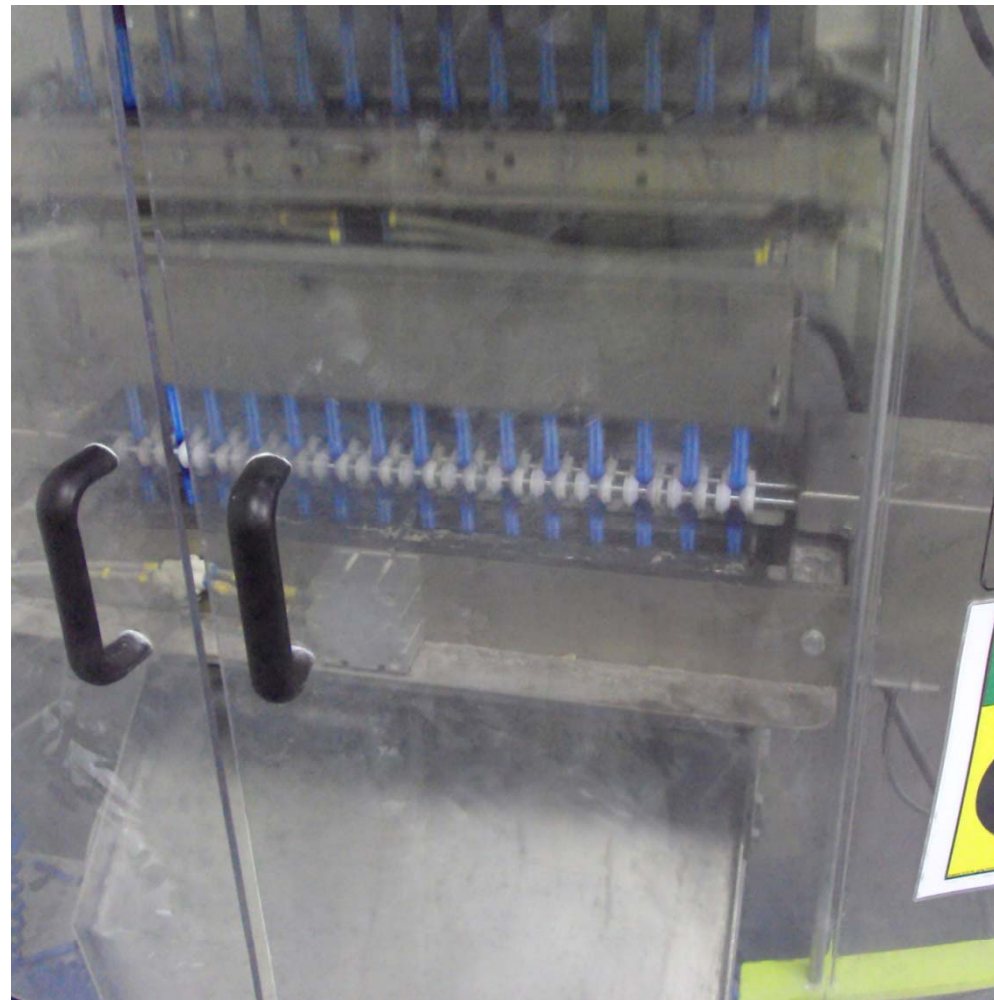


Industrial Products





Sticks





MACHINERY AUTOMATION & ROBOTICS

When the outcome has to be certain!



**2008 Telstra New South Wales
Business Of The Year**

Machinery Automation & Robotics

Local company

- 100% Australian company in business since 1987
- Strong Risk Management Processes: 30% of business in Innovation Projects
- 60 Staff in offices across Australia:



Machinery Automation & Robotics



Validation of solutions & involvement of client pre-award



24/7 Service
GUARANTEED 1 HOUR
RESPONSE!



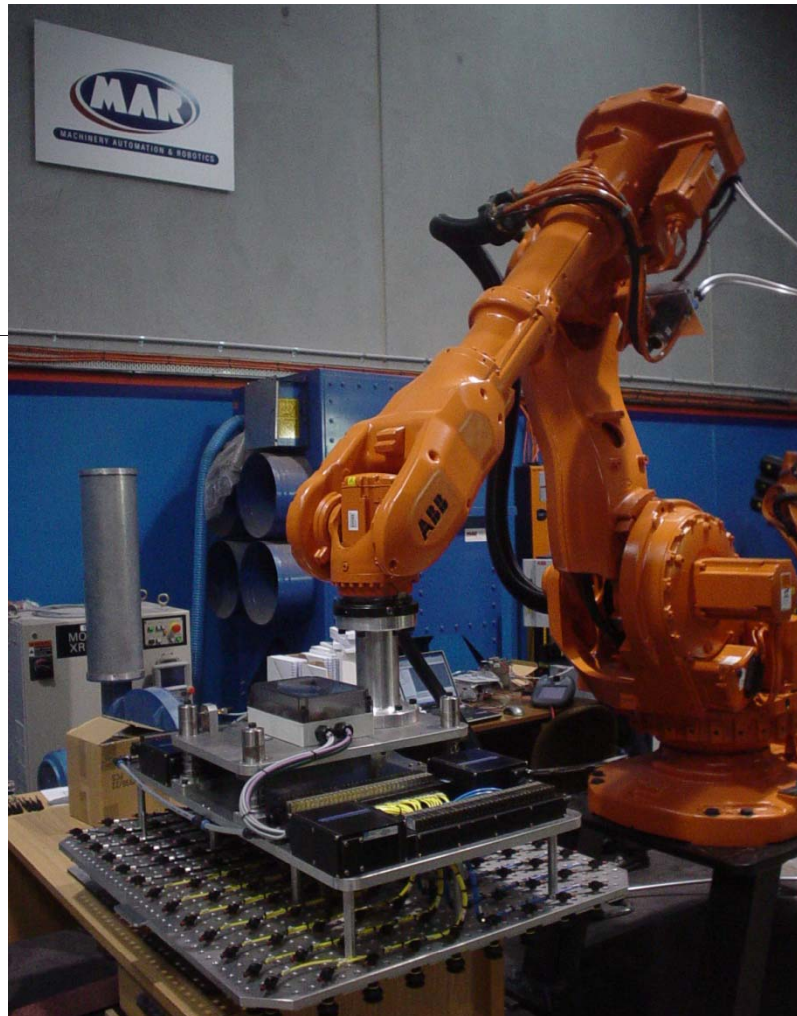
Solutions fully tested at our facilities



Site Images



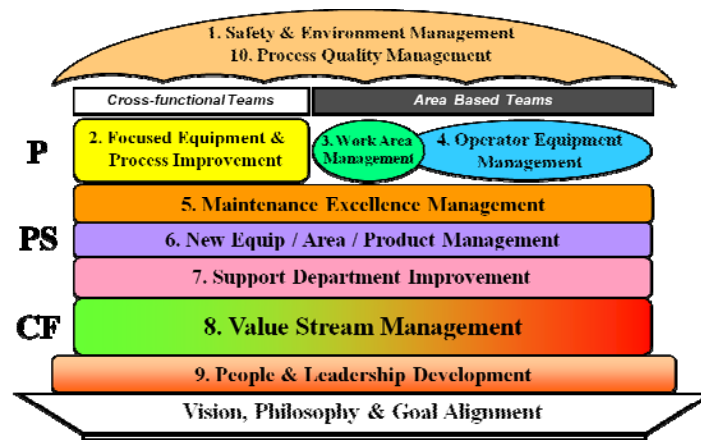
MAR Applications





The Objectives of New Equipment Management (NEM)

To apply the TPM³ field experience gained through



to new equipment / product designs so as to

minimise the Life Cycle Cost

through

Prevention at Source Design Activities



What do you need to consider to improve Life Cycle Cost?

Operability:

Aim: Make it easy to do right and difficult to do wrong:

Example: *Built in Quality through automatic stops & Mistake Proofing (Jidoka)*

Maintainability:

Aim: Try to eliminate maintenance or to make it easy, infrequent and low cost:

Example: *Automatic lubricating systems ?*

Standardisation:

Aim: Minimise spare parts, consumables, and especially training costs:

Example: *Standardisation of plant & equipment identification*





What is “TPM³ Friendly” Plant & Equipment?

Making plant & equipment so it is easy for:

1. Operators to identify **process and quality problems at the earliest possible time** - *“Tyranny of Time in addressing problem”*
2. Operators to identify **equipment condition abnormalities** (*Equipment Defects*) – *“Prevention at Source for Equipment”*



Acceptance Testing

Acceptance Testing consists of four Steps:

1. ***Factory Acceptance Testing*** — performed before equipment is shipped to identify any design and manufacturing failings
2. ***Testing Upon Receipt*** — performed after delivery but before the equipment is signed off to ensure the shipment has arrived intact and not damaged.
3. ***Installation Acceptance Testing*** — performed immediately after installation to identify installation errors
4. ***Start-Up & Commissioning Testing*** — the initial start-up, performing all functions of the equipment. Running equipment to the required production conditions and speeds.



Initial Factory Acceptance Test @ MAR



Robot Bag Head Inspection





Initial Factory Acceptance Test @ MAR



Pallet Dispenser Test





Initial Factory Acceptance Test @ MAR



Bag Conveyor Test





Full Factory Acceptance Test @ MAR



Full Acceptance Testing





Full Factory Acceptance Test @ MAR







Getting Bag Stacking Right!





Initial “TPM³ Friendly” Review Sample

No.	Item	Proposed Improvement	Photo
Fasteners & Fittings			
1.	Match marking of nuts/bolts	Example Match marking of Robot Base Plate and Floor mounting bolts to allow for quick inspection	
Electrics & Controls			
1.	Labelling of all switches, buttons, lamps, lights etc	<ul style="list-style-type: none"> For example - Blue & Yellow buttons on Pallet Dispenser. Need on/off control for B&B conveyors on operator side. 	
2.	Labelling of sensors,	Labelling of all PE sensors, proximity and limit switches to allow easier fault finding and defect identification	
3.	Electric Motors	Labelling of all electric motors allow easier fault finding and defect identification	

AUSTRALIA'S FAVOURITE



"TPM³ Friendly" Improvement



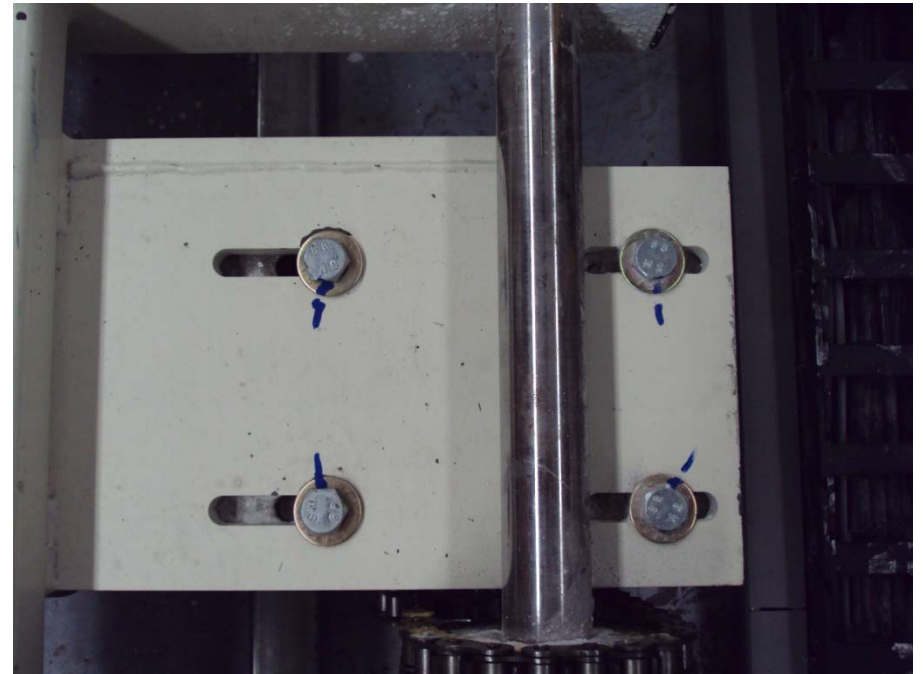


Location of Air Service Unit

AUSTRALIA'S FAVOURITE
CSR

Equal

"TPM³ Friendly" Improvement



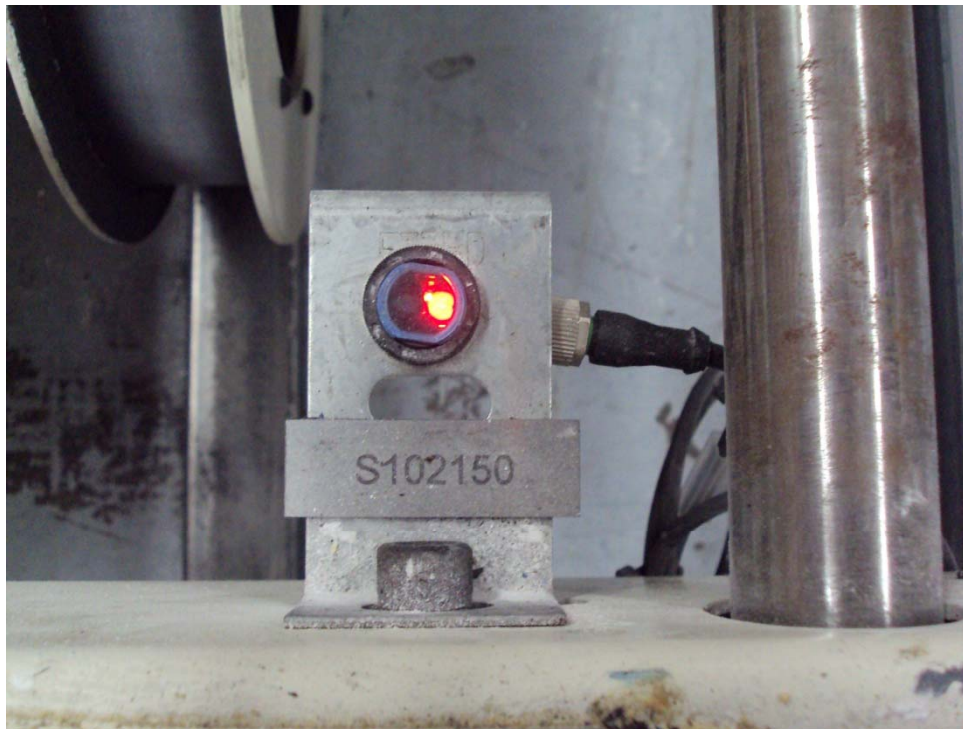
Simple Match Marking

AUSTRALIA'S FAVOURITE

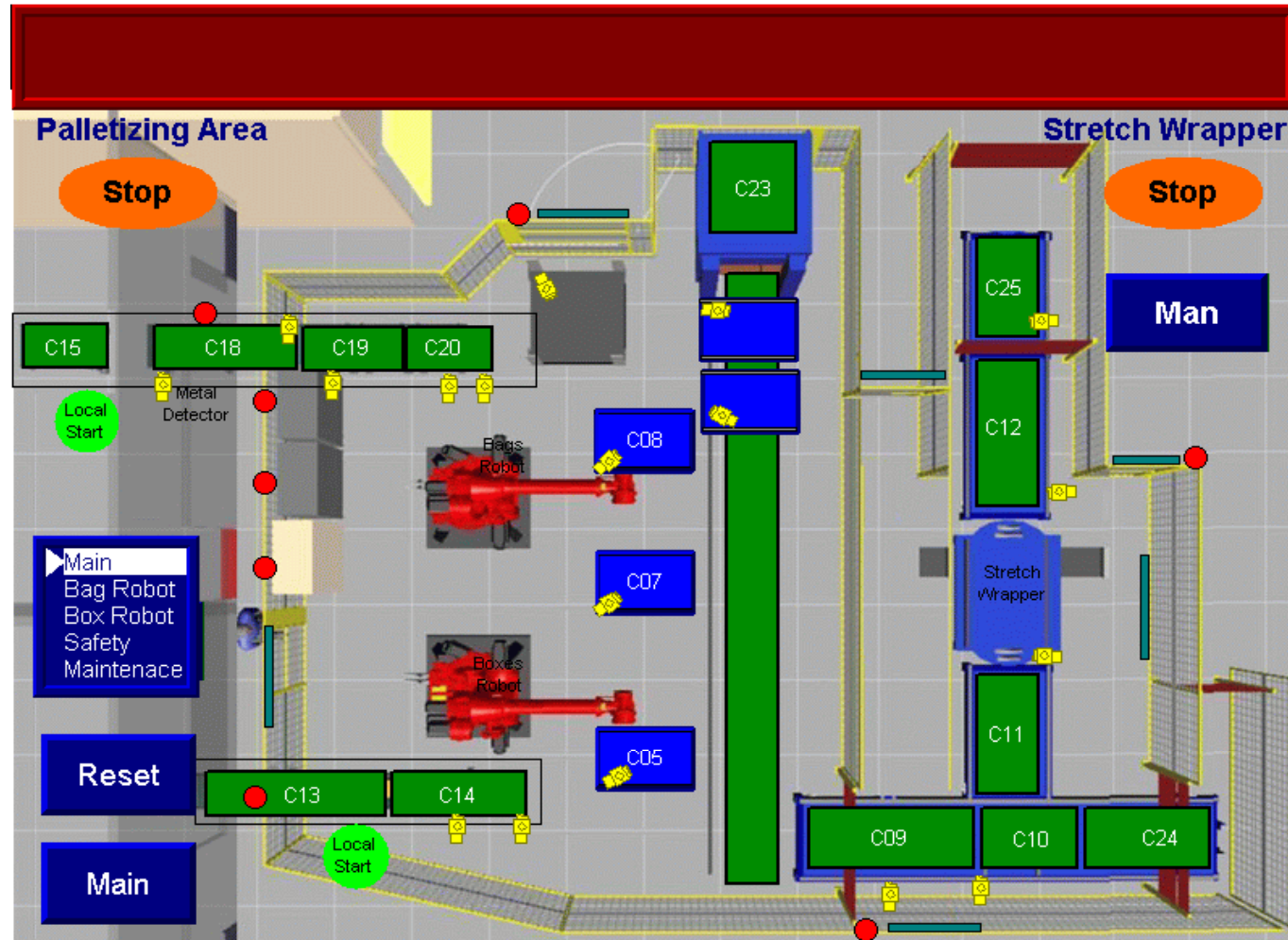


"TPM³ Friendly" Improvement








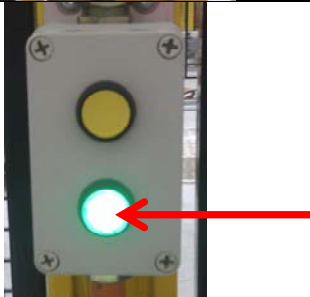
Sample of MAR Training Material





Sample MAR Training Material

To restart the Robot Cell after entry perform the following procedure

<p>1. Close Access Gate and replace handle</p>	
<p>2. Remove Safety Locks and apply Safety Key</p>	
<p>3. Red light will go out to indicate key has been returned and cell safety can be reset</p>	
<p>4. Press Green Reset/Start Button to reset Safety</p>	



Robot Palletiser “TPM³ Friendly” Operator Training Program Review

No.	Item	Proposed Improvement	SOP Required	One Point Lesson Required
Safety & Environment				
1.	Robot Cell Safety	<ul style="list-style-type: none"> SOP Entry into Robot Cell (Multiple People) SOP Entry into Stretch Wrapper Cell (Multiple People) 	Yes Yes	
2.	Light Curtain	<ul style="list-style-type: none"> Understanding function of Light Curtain (OPL) Resetting of Light Curtain (SOP) 	Yes	Yes
3.	E-Stops	<ul style="list-style-type: none"> Resetting of E-stop 	Yes	
4.	Interlock Safety System	<ul style="list-style-type: none"> Understanding function of Interlock System (OPL) Resetting of Interlocks (SOP) 	Yes	Yes




Training - One Point Lessons



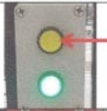






Sample One Point Lesson

	
One Point Lesson – Robot Cell - ENTRY	
Issue No.: 1	
Issue date: 23/03/11	
CR-PRO-WI-012	
Written by: Shane Fitzgerald	
Authorised by: Ben Crawford	
Page 1 of 1	

One Point Lesson

Subject: Safe entry of the robot cell
Safety: Use PPE at all times when performing tasks.
Purpose: To understand the safety requirements when entering the cell.
Location: Robot palletising area.

1. Press the Yellow Entry Request Button. Robots & Conveyors will come to a stop	
2. Yellow light will be illuminate to indicate Safety Key has been unlocked	
3. Remove Key. Red light will illuminate to indicate Safety Key has been removed	
4. First person to enter MUST keep Safety Key on them when they enter the cell. Further people to enter MUST apply Safety Lock to locking cover on door lock.	
5. Handle can then be opened to allow access to the Robot Cell.	



Learning's

- **Factory Acceptance Testing** – involving operations staff , maintenance and operators
 - ownership
 - Identify Operability & Maintainability improvements
- **Cell Risk Assessment**
 - identified issues early (location of Stretch Wrap controller panel not ideal)
- **Human Machine Interface (HMI)**
 - Overall good, some operations could be made clearer
 - Remote?
- **Training**
 - Group Delivery Vs One on One (or develop In-house Expert)
 - Competency based
- **Cleaning & Inspection**
 - Good access
 - Product contamination in equipment remains the biggest challenging
- **Post Commissioning - “*Very unlikely we will design perfect processes or equipment*”***
 - Following up improvements and minor problems to better performance and document learning's for future projects. Examples
 - Location of Sensors to avoid alignment issues
 - Bag robot head design



Video of Robot Palletiser





Questions Please?