



**10 YEARS OF
CONTINUOUS
IMPROVEMENT AT**

Coopers

Contents

	Page
1. Executive Brief	3
2. Continuous Improvement at Coopers Brewery	5
3. Site Leadership Team at Coopers Brewery	6
4. Improvement Activity - TPM ³ (TPM & Lean):	7
- Focused Equipment & Process Improvement	7
- Focused Process Improvement	13
- Work Area Management	16
- Operator Equipment Management	18
- Maintenance Excellence Management	27
- New Equipment Management	30
- Safety & Environment Management	32
- Process Capability Excellence	35
- Reactive Improvement & Frontline Problem Solving	37
5. 6 Sigma Activity	39
6. Maintenance Support Activity	41
7. Life of a TPM ³ Co-ordinator	43
8. Capital Expenditure	44
9. Suppliers	45
10. External Support	46
11. Road Ahead	47



Executive Brief

Dr Tim Cooper Managing Director



A way of life for operations at Coopers! In this executive brief we take a close look at how Managing Director, Dr Tim Cooper believes 10 years of Continuous Improvement has assisted Coopers Brewery Operations to where it is today. We look back on some achievements and the exciting times ahead.

Dr Tim Cooper is a fifth generation Cooper, with the unusual combination of qualifications in brewing and medicine. He entered the family company as Technical Manager, and in 1993 became Operations Manager, responsible for brewing, packaging and engineering. He completed his MBA and took on the responsibility as Project Director of the design and construction of the new brewery at Regency Park. Tim is now Managing Director of Coopers Brewery, and sustains the workload of MD duties whilst still keeping a keen eye on the brewing side of the business as Chief Brewer.

Employee Engagement

The entire philosophy of continuous improvement is one of teamwork and the importance on getting people and equipment working as one. Therefore it is no surprise that the engagement of people throughout the operations at Coopers is a necessity to achieve the great results we see today. The benefits of having different levels of operations working together as a team to find the solution to a problem is crucial.

As Dr Tim explained, the ability for engagement to create ownership amongst the employees through tasks as simple as clean and tidy work areas or as complicated as tackling highly technical problems is a testament to the process. It is the employee engagement that enabled Coopers to first focus on their most critical and vital area of operations, Packaging, with great success. The significant steps taken towards an improved workplace was based on the teams ability to identify problems and solve them to help increase productivity, decrease downtime and enhance changeovers.

Although over the 10 years productivity has increased from 33 million litres of beer in 2003 to 70 million litres of beer in 2013, the most impressive result was maintaining the high level of Overall Equipment Effectiveness. Enabling Coopers to handle the increase in beer product complexity, to keep operating costs down and to deal with the increase in production running only one shift up until 2011. This all from the simple tool of engaging the people to take ownership and responsibility of their work and area to make their working place better.

Coopers success and growth has required capital investment, but if not done in conjunction with the engagement of the employees giving ownership of the new machine then no benefit will ever come from it. Improvement activities on new equipment gave employees the chance to learn, interact, understand the machine, and enhance their work place before it is even installed so that acceptance is achieved.

Skill Development

Another aspect of the Continuous Improvement process is the ability of employees to develop and enhance their individual skills to gain a further knowledge of their work and understand the opportunities that may exist for improvement. Dr Tim acknowledged that the new found ability for departments to interact and communicate made life between the process and packaging areas as well as engineers and leadership better.

The Continuous Improvement process lent its hand to creating a greater acceptance and understanding of Coopers recently introduced guiding principles of Passion, Service, Consistency, Responsibility and Respect. At the operations level the improvement team structure worked in a synergistic way to promote the guiding principles of Coopers and underpin the value of the principles throughout the entire operations division.

In his own words Dr Tim stated “you can always learn something from the process. Something is always unfolded, made clear, and an opportunity found.” An example of this learning was seen from the improvement process undertaken by a team focused on improving Changeovers on the Homebrew Line. They identified the need for minimum production quantities on the line to be established which later became a standard across the site that ensured all production runs were cost effective.

Culture of Excellence

The third aspect of Coopers great success from the Continuous Improvement process is their reputation for achieving excellence. The Coopers name and brand comes with the highest regard and therefore the importance of consistently producing products of high quality. The culture that the improvement process has created not only supports this reputation of excellence but continues to push it to the next level.

Coopers operations deal with the variability of their raw organic material such as hops and malt in the fermentation stage of brewing. To create the product we all love, this degree of difficulty is certainly a reason for continual focus on to ensure consistency from one batch to the next is maintained.

The signature of Coopers brew generates a sense of camaraderie between the members of the brewery, which shows the strength of culture. The intangible results from continual improvement provides the motivation for people to be empowered to put forward suggestions and make the necessary changes and improvement to achieve excellence.



Continuous Improvement

Nick Sterenberg Operations Manager



Nick Sterenberg started at Coopers in 1993 after many years of experience in the Brewing Industry of United Kingdom and Australia. Working through a number of managing roles during his time at Coopers in the Brewing, Technical, and Human Resources departments, Nick now is in the role of Operations Manager and has been there since 2005. His commitment to the cause of Continuous Improvement is one of the reasons that Coopers after 10 years are still focused and heading down the pathway to excellence.

Starting off down the Continuous Improvement pathway Nick believes that there needed to be a motivation to change amongst the management of Coopers and employees. You need to be dissatisfied with your current situation and have an attitude which Nick described as slightly schizophrenic to be able to see problem after problem whilst recognising and celebrating the achievements. Having an eye continually on the future was a key to ensuring that continuous improvement would sustain.

To begin with, it was important to have a view of what is important to the business and using the theory of constraints it was the Packaging hall of the site that became the main focus of what was to be worked on. Having identified the bottle neck and critical area, there was the need to optimise its affect on the business by getting it working at its maximum efficiency. Focusing efforts of the program on the main constraint of the business helps to generate substantial gains which encourage belief and participation in the continuous improvement process.

Nick says, that the harder they work the quality of the problems get better. At the beginning problems were simple but now those simple problems are rarely seen with more technical and statistical problems taking charge. Continuous Improvement is the way Coopers does business, they can't add a new piece of equipment without conducting a New Equipment Management improvement team, but it is important to continue to improve.

Understanding your industry is key to applying the right tools to your journey. In the beer industry efficiency is key and not minimising finished goods, we can learn from others but adapt those learnings to suit our own industry. Once the right tool has been applied we must remember to set standards and police them through management taking responsibility to ensure sustainability.

Ultimately to be successful in your continuous improvement journey you must have a dissatisfaction with your current state, have an understanding of your business constraints, learn and train in the many tools of improvement, and finally apply those tools accordingly. Implementing Area Based Teams to engage and build team rapport, and Cross-functional Teams to generate quality and output improvement targets, will guarantee success like that achieved by Coopers.

Site Leadership Team



Why do you think the Leadership Team is important to the whole TPM process?

I believe it is important to the process. It is the Leadership team that can provide the level of mentoring, guidelines and above all support, for the TEAM to bring out its full potential.

Frank Perrotta - Warehouse Manager

The TPM Leadership team helps to keep a focus on all improvement activities and determine which activities take priority.

David Jones - QA Manager

Process improvement starts at the top. Having a Leadership team drive the Coopers TPM philosophy shows that there is commitment and accountability at management level to the employees.

Doug Conner - Packaging Manager

Leadership team is important to the TPM process because it shows commitment and it helps steer the projects and process.

Chris O Sullivan - OH&S and Training

The Leadership team is made up of experienced individuals representing each production department who together as a group identifies the next important improvement initiatives to be carried out. They also provide support and resources to ensure the successful outcome of the TPM process.

Dr. Jon Meneses - Brewing Manager

The purpose of the Leadership Team is to review, guide, mentor, evaluate and plan TPM teams, systems and processors to achieve desired outcomes. Without an effective Leadership Team that is committed to TPM desired results will never be achieved. But this commitment must also be seen to be driven by Senior Management as well.

Dave Tanner - Maintenance Manager

The Leadership team is critical for the CI process to be effective, they not only need to provide the resources, but more so, be there to support and 'enable' their teams to be successful. The Leadership need to understand, that the most important people to them are their staff. If their staff succeed/achieve results, then they as a leader look good, which is a win/win situation for both.

Gilbert Bruton - TPM³ Co-ordinator

Improvement Activity - TPM³ (TPM & Lean)

Macro Focused Equipment & Process Improvement (FE&PI)

Objective:

The objective of the Macro FE&PI activity is to establish a Baseline or “stake-in-the-ground” for the Defined Production Area (DPA) by documenting current performance, and to gain an understanding of all the equipment and process losses within the DPA, highlighting personnel frustrations along the way. The team identifies possible cost-effective solutions and implements them so as to achieve an increase in performance of the DPA. Most improvement journeys begin with this type of activity to provide a foundation of loss analysis which allows the Leadership Team the opportunity to create future improvement teams to achieve further Cross-functional Team improvements.

Cross-functional Team: Dirty Dozen - 1 (Cycle 17 - 2009)

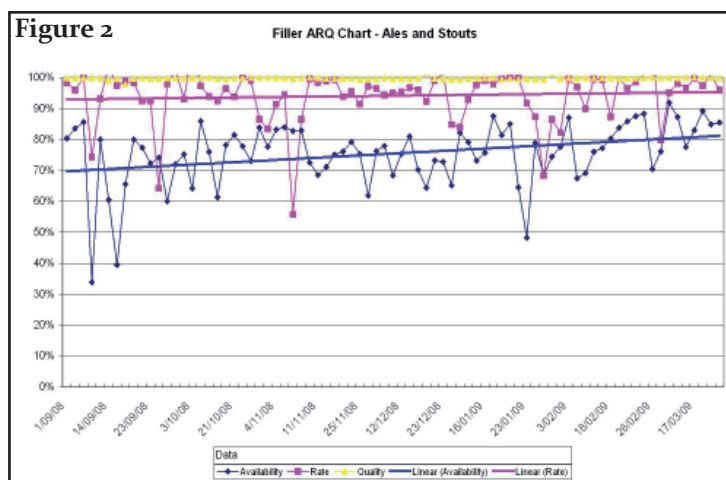
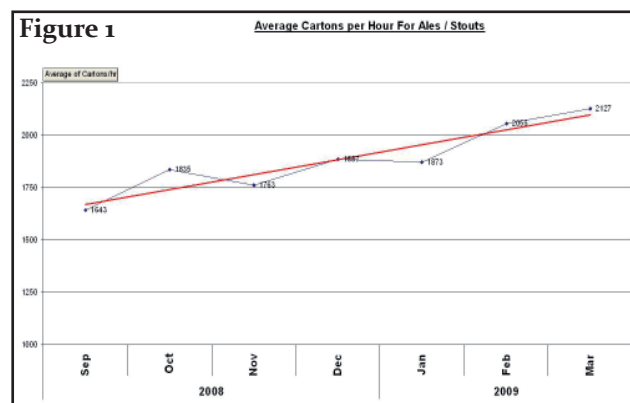
The end of March 2009 saw Coopers Brewery complete its seventeenth cycle of its TPM & Lean (TPM³) Journey with great success.



A part of Cooper's TPM³ Master Plan is to undertake a Macro Focused Equipment & Process Improvement Team on their Bottling Line at the start of each year while continuing Area Based Team activity. This gives the Site Leadership Team an updated Overall Equipment Effectiveness (OEE) Improvement Matrix outlining in detail the current performance (where all the losses are coming from) and the Cross-functional Team and Area Based Team activities required to achieve their agreed Vision for performance. This information is also used during the quarterly Pre-cycle Strategy planning sessions to map each cycle's improvement activities. Coopers Brewery has also been upgrading their Bottling Line equipment over the past 3 years, thus changing the characteristics of the line.

The Macro Focused Equipment & Process Improvement team, the infamous “Dirty Dozen-1”, has been very successful by achieving its challenging mandate of developing the OEE Improvement Matrix and improving Ale / Stouts OEE from 68% to 77% and carton per hour rate from 1873 to 2127 (see Figure 1 below) within the 12 weeks, which is a fantastic 13% improvement.

The Bottling Line has also seen good gains in Availability and Performance Rate as displayed in the Figure 2 below.



What’s made this team’s result even more pleasing for the Coopers Site Leadership Team, is that the majority of the cycle was undertaken while the Bottling Line was running on a double shift with resources fairly stretched.

Team Member Profile:



Renato Matto (7 Years - Packaging Operator)

Along with the “Dirty Dozen-1” team in 2009, Renato has been part of numerous improvement teams throughout his time at Coopers. “In my eyes the whole TPM process is an opportunity to have your opinions heard without any regret,” explains Renato. “I believe that having an agenda and framework around improvement allows our teams to concentrate and really focus on the job at hand, which ultimately improved the workplace for all.”

Further Team’s to have undertaken Macro FE&PI:

Cycle	Team Name	Area of Focus	Date
Cycle 1	The Go Go’s	Homebrew Line	Sept 2003
Cycle 3	The BottleO’s	Bottling Line	May 2004
Cycle 5	Andy Capp	Homebrew Line	March 2005
Cycle 6	Malteasers	Malt extract	Sept 2005
Cycle 6	BottleO’s Unplugged	Bottling Line	Sept 2005
Cycle 8	The Boxers	Warehouse/Supply Chain	June 2006
Cycle 11	The Rackoons	Keg Line	June 2007
Cycle 13	Bottle Magic	Bottling Line	Jan 2008
Cycle 17	Dirty dozen -1	Bottling Line	Jan 2009
Cycle 17	Water Rats	Water Usage	Jan 2009
Cycle 23	Double Trouble	Bottling Line	Sept 2010
Cycle 23	NPD	New Product Development	Sept 2010
Cycle 26	State Limit 110	Homebrew Line	Sept 2011
Cycle 30	Box & Dice	Bottling Line	Jan 2013

Micro Focused Equipment & Process Improvement (FE&PI)

Objective:

The objective of the Micro FE&PI activity is to continue on from the upfront analysis of the Macro FE&PI team by more fully understanding losses associated with a specific section of the equipment and continue to improve the performance. The team identifies possible cost-effective solutions and implements them so as to achieve an increase in performance. Most importantly the activity would continue to create a learning and positive environment to not only develop their problem solving skills, but also allow personnel from different departments eg Production, Maintenance, Technical Support etc to gain a greater understanding of each others situation and build relationships.

Cross-functional Team: Rack 'n' Roll (Cycle 13 - 2008)

The Rack n' Roll team was presented with the challenge of improving keg line efficiency and identifying opportunities for further gains. And they delivered!

After identifying and implementing several production modifications, the Rack n' Roll team was able to report in March that significant improvements in keg rejection and keg line rates had been achieved. The team's mandate within the 10 week period had been to:

- Review all equipment and process losses relating to the keg line.
- Increase OEE on Ales and Stouts while improving or maintaining the agreed counter-balance measures.
- Recommend further loss-related improvements to the Leadership team.

The Rack n' Roll team undertook a review of the keg line and bottling hall, developed a vision for improved performance and then identified possible root causes and solutions. Improvement projects were centred on the robot access gates, Burkett valves and the sterile air filter.

Keg robot area

Team member Doug Connor identified a problem with the robot access gates. An interlocking system was installed on the gates, which previously were padlocked only. This achieved the aim of ensuring the robot is isolated before gates can be opened.



Burkett valve

Team member David Medlyn identified that 2.4% of kegs were being rejected for under fill. This was considered excessive. Investigations found that the Burkett valve was not being calibrated on a weekly basis as recommended by the supplier. Steps were put in place to calibrate the valve at the start of shift every Monday and recorded on a daily production sheet. This resulted in the rate of kegs rejected for under fill dropping from 2.4% to 0.4%.

Air & CO₂ filter for Keg filler

Team member Martin White identified that there was no maintenance program to replace the filter on a regular basis, which could lead to quality issues. To rectify this, a new filter was installed and a three-monthly check put onto MAINPAC (Computerised Maintenance Management System) to ensure regularity of checks and replacements. This resulted in improved air and CO₂ supply to the keg filler, reducing keg rejects and providing better quality of gas supply.

Team Member Profile:



Pat Varricchio (26 Years - Process Operator)

As part of the “Rack n Roll” team, Pat thought that the team’s improvements to the Keg Line were certainly a great success. The introduction of the Keg Reject Lane greatly improved the lines efficiency which in turn helped maintenance understand how rejects came about. “I believe that the in-house approach to improvement through TPM has made the work environment better and easier, while increasing productivity and efficiency for the company,” says Pat. “This TPM process creates a win-win and gets the job done!”

Further Team’s to have undertaken Micro FE&PI:

Cycle	Team Name	Area of Focus	Date
Cycle 2	The Kronies	Homebrew Labeller	Feb 2004
Cycle 3	“Kerry” Packer	Homebrew Packer	Feb 2004
Cycle 4	The Palletiers	Bottling Line – Palletiser	Oct 2004
Cycle 4	Keg Busters	New Keg Filler	Oct 2004
Cycle 5		Bottling Line – Glass usage	Mar 2005
Cycle 7		Bottling Line – Labeller upgrades	Feb 2006
Cycle 11	The Reducers	Homebrew – Set Up Reduction Team	June 2007
Cycle 13	Rack ‘n Roll	Keg Line	Jan 2008
Cycle 14	Glue Boys	Bottling Line – Innoket Labeller	Apr 2008
Cycle 16	Packer Pirates	Bottling Line – Kister Packer	Oct 2008
Cycle 18	Time Lords	Bottling Line – Set Up reduction Team	Apr 2009
Cycle 20	Lab Micro	Lab – Micro Team	Oct 2009
Cycle 21	“Line Kings”	Bottling Line – Conveyor Line Logic	Jan 2010
Cycle 22	“F.I.F.O.”	Warehouse – Raw material stacking/Rotation	Apr 2010
Cycle 23		Lab – Micro Team	Sept 2010
Cycle 24		Bottling Line – Labellers	Jan 2011
Cycle 24		Bottling Line – Depal to Filler	Jan 2011
Cycle 25	Change Out team	Homebrew Change overs	May 2011
Cycle 27	Yeast Beasts	Homebrew – Yeast Sachet machine	Jan 2012
Cycle 27		Bottling – MES Review team	Jan 2012
Cycle 28		Bottling – Bottle Filler QC Team	April 2012
Cycle 28	Waste Watchers	Site – Trade Waste & BOD	April 2012
Cycle 29	Lost & Found	Bottling Line – Container Waste	Sept 2012
Cycle 30	N/A	Site – Daily Review Meeting	Jan 2013
Cycle 31		Bottling Line – Bright Beer	April 2013
Cycle 32		Site – MRP/JDE Review	April 2013

Mini Micro Focused Equipment & Process Improvement (FE&PI)

Objective:

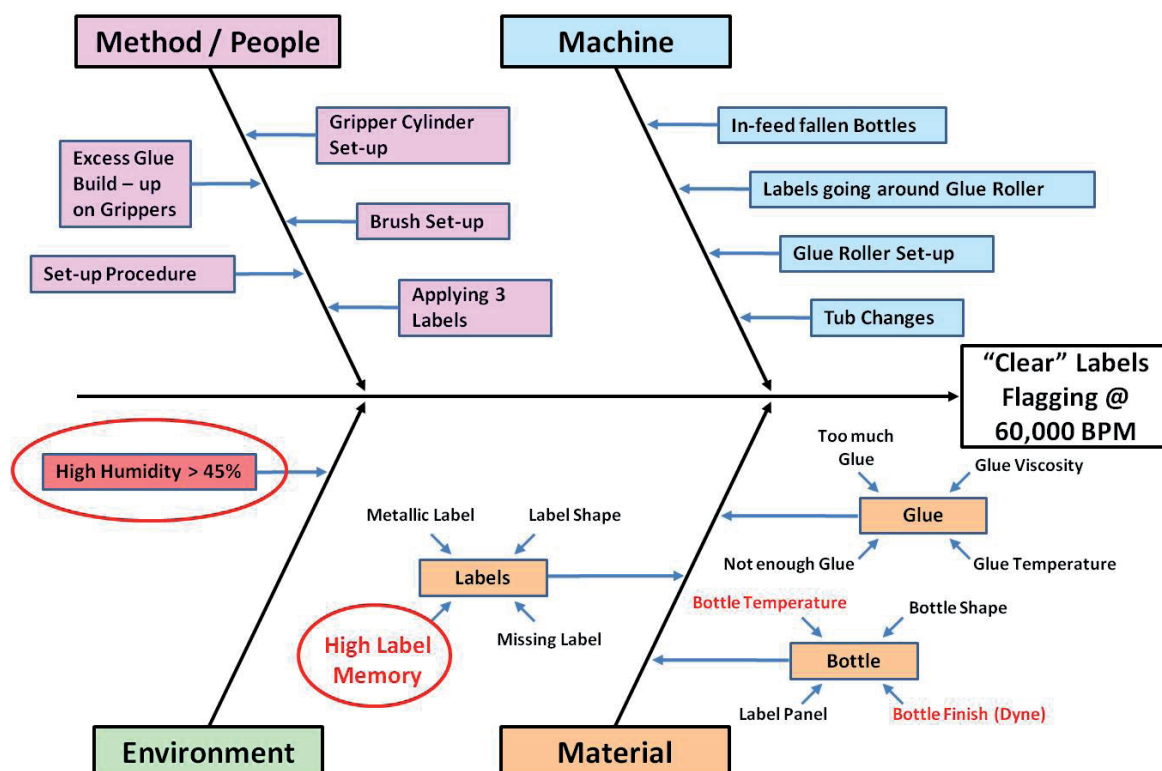
The objective of the Mini Micro FE&PI activity is to continue on from the upfront analysis of the Macro FE&PI team by more fully understanding losses associated with a specific part of a section of the equipment and continue to improve the performance. The team identifies possible cost-effective solutions and implements them so as to achieve an increase in performance. Most importantly the activity would continue to create a learning and positive environment to not only develop their problem solving skills, but also allow personnel from different departments eg Production, Maintenance, Technical Support etc to gain a greater understanding of each others situation and build relationships.

Cross-functional Team: Making It Stick (Cycle 25 - 2011)

Just when you thought there were no problems with the beer.... don't worry it's only the label!

Following on from the good work of the Labeller Team in the previous Improvement Cycle, a Mini Micro Problem Solving Team was formed to achieve consistent labelling on Coopers Clear products at 60,000 Bottles per Hour (BPH) on the Innoket Labeller without flagging or quality problems.

By following the Mini Micro Problem Solving 7 Step process and conducting line trials using Design of Experiment (DOE) techniques, the team was able to establish the root cause of why body and neck Coopers Clear labels were flagging above the line speed of 40,000 BPH. The team considered a number of causes that could affect the flagging (refer to the figure below).



Armed with the knowledge gained from the previous Improvement Cycle on key process variables such as bottle finish (Dyne testing), gluing characteristics including Cobb Value (paper water absorbency) and "Wet Tack" (stickiness of glue), the team were able to conduct a number of trials with combinations of synthetic and casein glues and labels with different types of paper and levels of embossing (paper memory or stiffness).

The results from the production trials and DOE analysis supported the hypothesis that High Label Memory was the root cause of label flagging at high speeds.

A full shift production trial with existing glue (Henkel - LG21A) and Rotoflex paper (heavy embossed, low memory) was able to be run at 60,000 BPH with good label quality and no flagging. This was an excellent result for the team, but their work is not yet finished.

There was still another hypothesis to prove or disprove; was High Humidity >45% a cause of label flagging at 60,000 BPH. During the summer months, the team conducted further trials and analysis which determined that high humidity was not a root cause.

They also made other improvements to ensure high speed running and good label quality, which included an improved Change Parts Trolley (as seen in the figure below) designed and made by Maintenance team member Troy Roberts. The new compact design allowed for better storage of changeover parts, especially label brushes which were prone to damage.



Other improvements included water proof covers for Glue Pumps and a Glue Pump cleaning station. Terry Santucci (Packaging Maintenance Team Leader) also identified that Coopers Clear Body Gripper Cylinder does not have “Push-out Sponge” as per other products.

Team Member Profile:



Troy Roberts (4 Years - Maintenance Fitter)

With only 4 years under his belt at Coopers, Troy is certainly still new to the site. However, he still recognises his role in the TPM process to help enforce change and make life easier for the teams by designing and implementing improvements such as the Change Parts Trolley he created during his time with the “Making It Stick” team. “I enjoy the chance to work with my colleagues to help recognise problems and fix them. My passion for the job and the improvement process has only increased from the great success of the performance on the Innoket Labeller,” says Troy in obvious delight.

Micro Focused Process Improvement (FPI)

Objective:

The objective of the Micro FPI activity is to help teams identify and map a section of the dominant value streams within the business. The Micro FPI process establishes the measure of Lead Time as the 'driver', reduces the complexity through product rationalisation, process simplification etc, stabilises the flow (which may include addressing the production planning and scheduling issues), and reduces waste within the dominant Value Stream. Along with reducing the frustrations amongst the personnel, this improvement process creates the capability for the Value Stream to support an OEE improvement (increased throughput) within the plant.

Cross-functional Team: F.I.F.O (Cycle 22 - 2010)

The F.I.F.O Team was established to develop "First In First Out" (FIFO) System for all Packaging Raw materials. These would include:

- Cartons - Bottling and Homebrew Line
- Labels - Bottling and Homebrew Line
- Glue - Hotmelt for the Bottling and Homebrew Line, and Cold Glue for the Bottling Line
- Cluster - Clusters and Baskets for the Bottling Line
- Bottles, Crowns, Cans and Can ends – Bottling line
- Cans and Can Ends – Homebrew Line
- Stretch wrap – Bottling line
- CHEP Pallet Storage
- Return of Beverage Pallets
- Return of Packaging materials

When developing the FIFO System and storage for the above items, the team were also having to keep in mind during its design the future introduction of Automated Guided Vehicles (AGV's).

Analysing the current situation the team found numerous problems with Bottle Carton Storage including:

- No dedicated area for each SKU;
- No system of storing pallets in date order;
- Difficult to conduct stocktake; and
- Currently unsafe storage practices (as seen from the below photo),

As well as issues with the Rack Storage including:

- Rear rack unable to access without moving front row (No forklift access to rear of rack);
- Poor Label Identification (Not Forklift Friendly); and
- Poor utilisation of racking space.



During the improvement process the team conducted observations and considered many capital improvements. They identified the key measures for stock that needed to be considered before deciding on which capital improvement best suited Coopers needs. Stock measures included:

- Stock Rotation (Age of Stock);
- Cost of Stock;
- Stock Loss (Waste);
- Stock Levels (Stock Outs); and
- Stock Holding over Minimum Stock Level.

Original stock holding was based on the variability of planning and production process, supplier reliability, and existing racking and storage areas. The team reviewed all stock levels to take into account improvements in the areas.

Generating a First In First Out compliant system the team agreed that the Racking needed was an all existing double racking access from both sides, with the new racking design being gravity feed. Blocked stacking was to be introduced for high volume beer cartons (Pale and Sparkling), Glass / Beverage cans safety stock, Empty pallets, and Home Brew Cans, Drums, Pallecons, and Pails.



To complement the new gravity feed racking the team also emphasised the importance of raw material ownership. The packaging department was to take ownership of raw materials and the storage area by nominating the location for incoming materials, carrying out weekly house keeping of storage areas, and ensure correct materials are sent to the packaging lines and follow FIFO. It was also recognised that the Packaging Purchasing Officer required assistance with regular stocktakes.

On completion of the cycle the team recommended the purchase of New Racking to allow all nominated materials to be stored in racks and FIFO, to include ownership of packaging materials into Packaging Supervision job roles, and to visit Lindemans Winery to study AGV application.

Team Member Profile:



Rob Small (19 Years - Material Planner)

For Rob, the improvement process is a logical way to solve a problem to ensure that issues are not lost and forgotten along the way. “The “F.I.F.O” Team introduction of the Gravity Racks and our achievements of continual stock rotation and easier deliveries for the site is one aspect of the improvement process that I am most proud of,” Rob happily explains. “Having the weekly meetings provide teams and personnel the time to take a different look at the problems whilst at the same time, understanding the big picture.” “Above all, I believe that the process was a bit of fun!” he adds with a grin.

Cross-functional Team: Changing It Up (Cycle 25 - 2010)

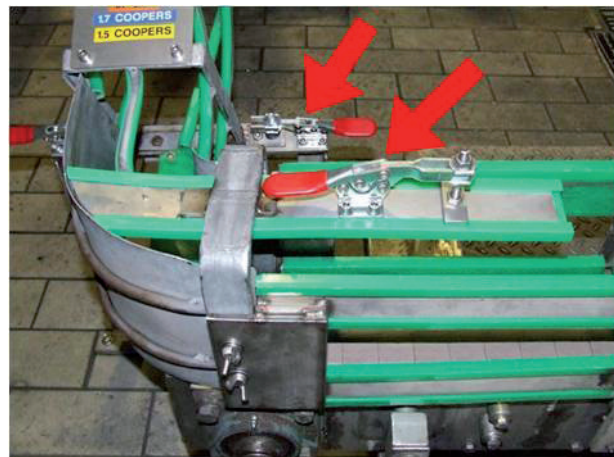
A special Micro Focused Process Improvement (FPI) Team was formed to investigate and develop a plan for handing over Home Brew Line changeovers to the Operators.

The team developed the following 7 step process to achieve the mandate:

1. Review the machine Change over Components (Homebrew De-palletiser to Palletiser machines) - this involved listing each machine and identifying what components need adjustments on a Change Over.
2. Identify the Improvements needed to simplify the Change Over, the following should be born in mind when carrying out this step. Centre lining – working from a datum point to ensure equipment is adjusted to an exact position; minimise adjustments where possible – minimise the tools needed; apply Visual Controls; and use SMED techniques.
3. Responsibilities - who will do changeovers – all or selected staff?
4. Implement the Improvements identified to simplify the Changeovers (Steps 1 & 2 above).
5. Develop Training Materials including Job Training Aids; Change over Procedures (to include Check Lists); One Point Lessons on Equipment function; and Competency Based Assessments.
6. Conduct Training.
7. Trial Changeovers with Operators and review.

The team has been able to complete steps 1 to 4 and has implemented a number of improvements (as seen in Figures below) to help simplify changeovers including:

- Height gauges;
- Quick release devices to eliminate the need for tools; and
- Colour Coding to identify correct changeover parts.



The team has done a great job to date and the team will be re-established to continue on in Cycle 26 to complete step 5 to 7.

Team Member Profile:



Massimo Piantedosi (24 Years - Packaging Team Leader)

Massimo has seen great benefit from the TPM process over the years. “Having a group of individuals focused specifically on a single issue has created a better chance of success and has also brought about a sense of care and responsibility to the team to improve our workplace. The ability to find the real cause of the problem and implement a solution to fix it is rewarding,” admits Massimo. “The improvement approach has helped me develop my analytical and observations skills, and it is these tools that I will use forever and will pass on to others for years to come.”

Work Area Management (WAM)

Objective:

The objective of Work Area Management is to introduce formal improvement activities involving everyone within the Defined Production Area by establishing Area Based Teams of 4-8 personnel with a designated working Team Leader across all shifts with clear responsibilities and boundaries for agreed Improvement Areas. Specifically the WAM team will improve safety, productivity and morale by establishing “a place for everything and everything in its place” within the Defined Production Area. It also aims to standardise practices, to support a more consistent approach to achieving the production plan across all shifts, with the support of self-assessments to develop the discipline to maintain these standards. Once completed the activity will improve communications and standard practices between shifts, as well as create time and reduce the frustrations of all Area Based Team members so that there will be a desire (pull) to support on-going improvement activities.

Area Based Team: Brewhouse (Cycle 28 - 2012)

Initially the whole Process Department was going to be included, but after breaking the areas down into smaller focus groups, it was decided that trying to address all the areas would be too much. So the team focused on the Dry Goods area (5 floors including the ground floor), and the Brewhouse Area (top and bottom floors), with the remaining areas to be addressed in Cycle 29.

The team followed the WAM 10 part process:

1. Confirm Mandate & Boundaries;
2. Form Team & Scope Activities;
3. Clear-Up of Area (this includes tagging the removal of unwanted items);
4. Identify Requirements for Area;
5. Identify Place for Everything in Area;
6. Obtain Approval to Proceed (from all shifts and Management @ Mid Point Presentation);
7. Establish Place for Everything;
8. Set Standards & Procedures;
9. Self-Assess Achievements & Team Skills; and
10. Communicate Results & Share Learning (Final Presentation).

Due to the small number of operators working in the area on each shift, it was decided to have a cross-shift WAM Team, rather than a separate team for each shift. As such the meetings were conducted on a Tuesday to accommodate the Operators on shift (Mondays were already very busy with other TPM³ team meetings and activities) as a result of this, the team members changed regularly, with all Brewhouse Operators attending at one time or another.

Figure 1

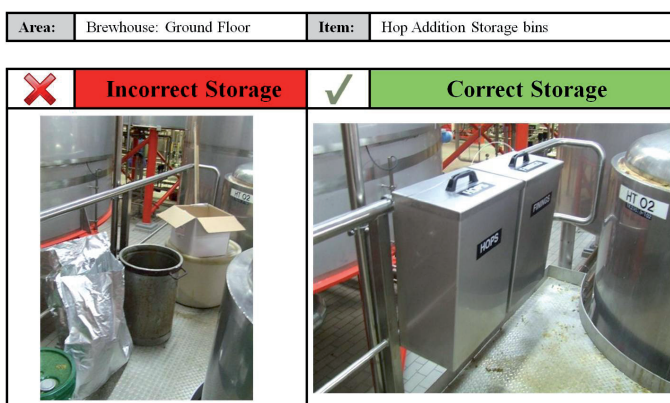


Figure 2



To ensure the improvements would sustain, the team focused on setting up good standards, procedures, checklists and monitoring systems (Part 8). Where;

- Standards - Show what you expect to see;
- Procedures - Explain what to do, when to do it, who and how to do it;
- Checklists - Show a record that the activity has been completed; and
- Monitoring System - Checks that everyone is maintaining the standards and following the procedures.

An example of a team improvement can be seen in Figure 1. The team also came up with the idea of centrally locating all the WAM Standards and Procedures on each floor of the Dry Goods area to help ensure that there is: “A place for everything & everything is in its place” (Refer to Figure 2).

Also, the team incorporated any work area cleaning activities that were on existing Preventive Maintenance / Cleaning tasks into the new procedures, therefore reducing the paperwork and administration of PM's, and eliminating the need for the scheduling of these tasks every week by the Brewing Manager. The design of the initial WAM Checklist clearly identifies what should be checked or cleaned taking into account the 3 shift pattern.

Steve Schmitz (Process Maintenance Team Leader) also attended the team meetings when maintenance type issues and improvements were required. The team thanked Steve and his team for their support, as well as Ralph Ruggiero for his support on team improvements.

Team Member Profile:



Pele Matto (27 Years - Brewhouse Operator)

Richard Arbon (18 Years - Brewhouse Operator)

These two Brewhouse operators have many years of experience on their side, and they have found that the improvement process has given them the chance to help make the work area better. “Seeing the end result to the new ideas and solutions the team has at the beginning of the process is rewarding,” says Pele proudly. “The visual changes have also had a big impact on the workers and the company. Everything has its place and we no longer have to search for certain tools or equipment.” “I have gained new problem solving skills and a better understanding of the workplace,” says Richard. “I have enjoyed the recognition from management and knowing that the team solutions are followed through to the end,” adds Pele. “We have benefited from both learning off others and sharing our own experiences amongst our co-workers along the way,” explains Richard.

Further Team's to have undertaken WAM:

Cycle	Team Name	Area of Focus	Date
Cycle 2	The Flintstones	Homebrew Area	Feb 2004
Cycle 5	The Scrubbers	Bottling Line Packer & Keg Robot area	March 2005
Cycle 7	The Slackers	Bottling Line	Feb 2006
Cycle 10	Slim Dusters	Drygoods area	Feb 2007
Cycle 11		Brewhouse	June 2007
Cycle 19	Chemical Cocktails	Hazardous Chemicals	July 2009
Cycle 28		Brewhouse & Drygoods	April 2012
Cycle 30		Brewhouse services area	Jan 2013
Cycle 30	Twilight Zone	Warehouse – Repacks	Jan 2013

Operator Equipment Management (OEM)

Objective:

Operator Equipment Management is broken up into 4 Stages involving 7 Steps which typically span 2-3 years of Operator and Maintainer development relying on weekly half-hour lessons / planning sessions supported by activity time (the doing) in the workplace. The objective is to support the Defined Production Area in improving OEE along with the agreed holistic goal aligned performance measures, by:

- Restoring equipment to its “ideal” state through establishing Basic Equipment Conditions;
- Reducing accelerated or early deterioration through daily checks and proper operation;
- Identifying and initiating the improvement of any Design Weaknesses;
- Establishing the necessary conditions and systems to allow equipment to be properly maintained; and
- Developing self-managed world class operators competent in Frontline Safety & Environment, Frontline Quality, Frontline Equipment Care, Frontline Energy Management, Achieving the Production Plan, and Formal Continuous Improvement.

Combined with opportunity for personnel to care for their own equipment and workplace, to establish new ways of thinking within a positive environment where production and maintenance work in harmony, Operator Equipment Management creates a workplace that is failure-free, trouble-free and safe.

Stage 1 Step 1 - Identify & Rectify Equipment Defects

In Stage 1 Step 1 of Operator Equipment Management teams continue on with Work Area Management activities and introduce Clean for Inspections (typically 1-2 hours per week per shift) so as to identify and rectify equipment defects.

Area Based Team: DFC (Cycle 10 - 2007)

The DFC team mandate was to work towards Basic Equipment Conditions through regular Clean for Inspections activities by working through the 10 parts of Operator Equipment Management Step 1 (OEM-1); create or enhance standards and checklists to ensure that WAM & OEM-1 improvements are sustained; ensure visual controls are established to communicate your standards and checklists to make any deviation from standard easy to see; achieve a OEM-1 Self-Assessment Rating of at least 80%; and complete within 12 weeks.

In preparation for their initial Clean for Inspection the team broke up their area into Improvement Focus Areas, which were divided amongst the team. Franco took on the De-palletiser, Craig / Andrew Mc the In-Feed Conveyor, Jovan / Wendy the RFC, Robyn V the Can Filler, and Massimo the Out-Feed Conveyors. The Leadership Team and Operators all participate in the initial Clean for Inspection event as seen from the Before and After photos below.



During the event the team completed the 4 Lists of OEM to ensure that no stone was left unturned and missed along the way.

OEM Defect List

Date: 16/02/07

Equipment: Depalletiser, Depal to Filler, Rinser Filler Crowner, Filler outfeed conveyor & Can Filler (Incl Air conveyor)

Team: OEM1 & Leadership Team

No.	Defect Tag No.	Machine/Area	Description	Comments	Legend		
					A	B	C
1	N/A	Depal - Pallet Conveyors	Key moving out of idler sprocket - Grab screws loose	Completed.			
2		Conveyor Drip Trays	Falls & drains need to be correctly set to drain ALL water from the trays, preventing pools & slime growth				029080
3		Bottle Filler - Centre column	Need to make up & install a catch tray to prevent excessive grease falling onto the floor during cleaning				029081
4		Crowner - Top of machine	Auto tube will need adjusting as there is too much grease going onto the V belt				029082
5		Crowner K Box	Redesign needed to prevent crowns from being held up in the structure. Also need a way to clean this area easily.				029083
6		Crowner Belt conveyor covers	Need a simpler & quicker way of removing covers for cleaning purposes.				029085
7		Conveyor between Depal & air conveyor - Chain lube line	When everything is turned off this set of sprays remain on.	The whole lube system needs upgrading, needs to be put onto the 0.7/08 wash list			025043 Item No 42
8		Can Filler-Seamer	Airlines & Electrical cables lying loose under Can Filler				029086
9		Depal - Pallet conveyor Stop/Start station at Northern end loose	Only held down by two bolts, control station moves back & forth - Requires extra bolting.				029087

OEM Difficult to Access Area List

Date: 16/02/07

Equipment: Depalletiser, Depal to Filler, Rinser Filler Crowner, Filler outfeed conveyor & Can Filler (Incl Air conveyor)

Team: OEM-1 & Leadership Team

No.	Description	Comments	Date Actioned
1	Space between air conveyors & Bottle conveyors, hard to access.		
2	K-Box area hard to Access to clean on the Eastern side.		
3	Crown conveyor hard to access towards Filler end.	Minimum requirement is a Scissor lift.	
4	Depalletiser - Pallet conveyors, difficult to clean under the Drive area		
5	Depalletiser - Pallet conveyors	Look at modifying guards so the centre plates can be removed for easier cleaning	
6	Depalletiser to Filler Singuliser conveyors require extra platforms.	Look at a quote & put into next Financial Budget	

OEM Sources of Contamination List

Date: 16/02/07

Equipment: Depalletiser, Depal to Filler, Rinser Filler Crowner, Filler outfeed conveyor & Can Filler (Incl Air conveyor)

Team: OEM-1 & Leadership Team

No.	Type of Contaminant	Description of Source of Contamination	Comments	Date Actioned
1	Broken Glass - ALL AREAS	Broken bottles on whole line		
2	Plastic Wrapping - DEPAL & CONVEYORS INTO FILLERS	Comes from wraps on Pallets with new glass		
3	Pooling water - CAN FILLER	Water used for cleaning	On can Seamer - No place for water to escape.	
4	Pieces of Masonite- DEPAL & CONVEYORS INTO FILLERS	Comes from layer boards on Pallets with new glass		
5	Crown paint dust - CROWN CONVEYOR	Paint from crowns		
6	Mould & Slime under Filler table - FILLER	Beer & bacterial growth	Difficult to access & clean frequently	
7	Glass under Can Filler - CAN FILLER	Washed under machine during cleaning.		
8	Pallet wood on Depal conveyors	Comes from Pallets with new glass		

OEM Key Questions List


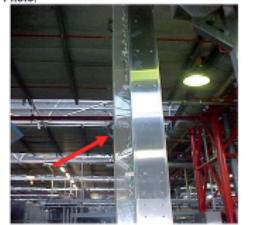
Date: 16/02/07

Equipment: Depalletiser, Depal to Filler, Rinser Filler Crowner, Filler outfeed conveyor & Can Filler (Incl Air conveyor)

Team: OEM-1 & Leadership Team

No.	Question	Answer	OPL #
1	How does glass get onto the Air conveyors - Robin V		
2	Are there filters on the Air conveyors, if so how often are they cleaned? - Robin V		
3	Is there rust on the Can Filler, if so how can we treat or rectify this- Robin V		

The defects identified brought about many improvements as seen in the example improvement sheet below. But in order to stay on top of the defects and to ensure they were not re-occurring, a time table and checklist to conduct regular Clean for Inspections was introduced.

Team Name: DFC		Location: Bottling Hall		Initiated Date: Feb 2007	
Team Type: OEM-1		Item: Crowner Conveyor - Quick Release clamps		Completed Date: May 2007	
Initiator: Robin V					
1. Problem (Plan)					
Crown Dust accumulating in conveyor chutes. Access to clean them is made difficult by the design of the covers					
2. Current Situation (Plan)		3. Proposed Change / Approved Improvement (Do)			
Photo:		Sketch / Photo:			
					
Improvement Target: Minimize the build up of crown dust in conveyor chutes					
4. Results: (Check)		5. Future Actions: (Act)			
Quick clamps installed to aid removal. Which makes cleaning easier		Display sheet on Noticeboard so as to share our learning			

Equipment / Machine: Rinser Filler Crowner

Item	Clean / Inspect Activity	Daily		Weekly		Monthly	
		# People	Time (min)	# People	Time (min)	# People	Time (min)
1	Safety Door Switches check (7 Doors)					1	5
2	Foam & Clean Rinser Whistle still COLD & CIP cups are in position			1	45		
3	Crown spray to be cleaned of slim & scaling	1	2				
4	Crown Carousel Shut, turning device to be cleaned of crown dust build up	1	5				
5	Star wheels & guides cleaned (removing glass & beer)	1	2				
6	Drip Trays Hosed OFF	1	5				
7	Drip Trays Foamed and Brushed			1	20		
8	Yeast buildup on rails			1	15		
9	Floor Foamed			1	30		
Totals			14		110		5

By the end of the Operator Equipment Management activity the team had gained some great results and most importantly learnt to involve trades and schedule more time for Clean for Inspections (with the plan to have no production on the Clean for Inspection day), and to display the Team Noticeboard in the Work Area.

Team Member Profile:



Wendy Pengilly (10 Years - Packaging Operator)

Being a part of many OEM improvement teams along the years, Wendy has witnessed the many improvement ideas unfold, and gained a great awareness for equipment management through regular Clean for Inspections. "On a personal level, my understanding of the equipment in my work area has greatly improved and has brought about a passion to care for the equipment," explains Wendy.

Stage 1 Step 2 - Address Sources of Contamination and Difficult to Access Areas

In Stage 1 Step 2 of Operator Equipment Management, teams continue on with Step 1 activities and focus on reducing the Clean for Inspection time by addressing the sources of contamination and difficult to access areas.

Area Based Team: Slime Busters I (Cycle 14 - 2008)

The “Slime Busters” team was focused on the area from the De-palletiser to the Labeller Out-feed. Their mandate was to work towards basic equipment conditions through counter measures to sources of contamination and difficult to clean areas activities by working through the 10 parts of OEM Step 2; achieve and sustain a final OEM-2 Self-Assessment Rating of +80%; improve Bottling Line OEE by 5%; and complete within 12 weeks.

Continuing on from the regular Clean for Inspection activities, this team focused on addressing the sources of contamination found and the difficult to access areas identified as seen by the lists below.

OEM Sources of Contamination List

No.	Type of Contaminant	Description of Source of Contamination	Comments	Date Actioned
1	Broken Glass - ALL AREAS	Broken bottles on whole line		
2	Plastic Wrapping - DEPAL & CONVEYORS INTO FILLERS	Comes from wraps on Pallets with new glass		
3	Pooling water - CAN FILLER	Water used for cleaning	On can Seamer - No place for water to escape.	
4	Pieces of Masonite- DEPAL & CONVEYORS INTO FILLERS	Comes from layer boards on Pallets with new glass		
5	Crown paint dust - CROWN CONVEYOR	Paint from crowns		
6	Mould & Slime under Filler table - FILLER	Beer & bacterial growth	Difficult to access & clean frequently	
7	Glass under Can Filler - CAN FILLER	Washed under machine during cleaning.		
8	Pallet wood on Depal conveyors	Comes from Pallets with new glass		
9	Labeller -Broken Glass	Broken glass in-feed, inside label machine & out feed.		
10	Labeller -Glue	Build up on segments , sensors, guards, label grippers		
11	Labels	Drum, station 2 area		
12	Water/Slime	Slime build-up at Labeller in-feed, blower and base		

OEM Difficult to Access Areas List

No.	Description	Comments	Date Actioned
1	Space between air conveyors & Bottle conveyors, hard to access.		
2	K-Box area hard to Access to clean on the Eastern side.		
3	Crown conveyor hard to access towards Filler end.	Minimum requirement is a Scissor lift.	
4	Depalletiser - Pallet conveyors, difficult to clean under the Drive area		
5	Depalletiser - Pallet conveyors	Look at modifying guards so the centre plates can be removed for easier cleaning	
6	Depalletiser to Filler Singuliser conveyors require extra platforms.	Look at a quote & put into next Financial Budget	
7	Poor access to the rear of Labeller	Platform for being designed	
8	In-feed & Out-feed of Pasteuriser		
9	Mould build up on Filler base	Foaming not adequate	

Once the contamination problems and access issues were identified the team then moved ahead with implementing improvements as listed below:

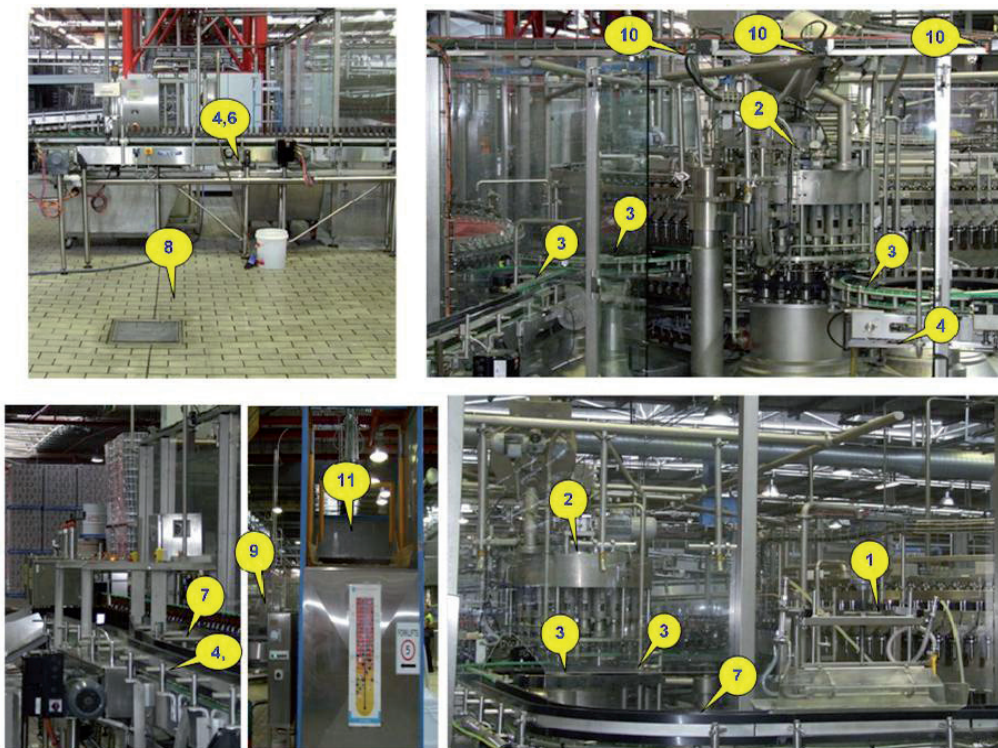
Contamination Improvement Projects

- Filler CIP and Foam to be linked together (KHS Project)
- Improve the securing of all drip trays to maintain correct fall
- O-I Masonite damage audit (Brian Wilton)
- Adding Foam Spray Jet to the bottom of Filler for better coverage
- Water jets to be added to De-pall drip trays
- Improve K-Box access to clean crowns
- Manual Foamer Improvement
- Clean Filters on Crown Air conveyor
- Replaced Bottle Dryer Blower Filters and implemented PM
- Accumulation table drip trays modified
- Re-position Beer tank relief valve away from labeller

Difficult Areas to Access Improvement Projects

- Modify K-Box to allow easy removal of loose crowns
- Platform addition to gain access rear of Innoket Labeller
- Purchased Ladders for Pasteuriser in-feed and out-feed

Along with the great improvements made, the teams continued to enhance their Clean for Inspection Checklist as seen below and complete their Self-Assessment to further improve themselves.



	Inspect
	Clean
	Adjust
	Listen

Machine:	Filler
Date Issued:	16 June 2008
Developed By:	Slime Busters
Reviewed By:	Robin Vanstone

#	Item	Clean / Inspect Time	Not Running	Running	Frequency
1	Spray jets to be cleaned of slime & scaling	2 min.			Daily
2	Crown Carousel shut, Turning device to be cleaned or crown dust build up	5 min.			Daily
3	Star Wheel & Guides cleaned (removing glass & beer)	2 min.			Daily
4	Drip trays hosed off	5 min.			Daily
5	Foam & clear rinsers whilst Cold & CIP Cups are in positions	70 min.			Daily
6	DripTrays Foamed and Brushed	20 min.			Weekly
7	Clean Yeast build up on rails	15 min.			Weekly
8	Floor to be foamed & clean drain	30 min.			Weekly
9	Empty Crown Dust Extraction Filter	2 min.			Weekly
10	Safety Door Switches check (7 doors)	5 min.			Monthly
11	Clean Crown K-box (dust & crowns)	30 min.			Monthly

Team Member Profile:



Massimo Piantedosi (24 Years - Packaging Team Leader)

Massimo has seen great benefit from the TPM process over the years. "Having a group of individuals focused specifically on a single issue has created a better chance of success and has also brought about a sense of care and responsibility to the team to improve our workplace. The ability to find the real cause of the problem and implement a solution to fix it is rewarding," admits Massimo. "The improvement approach has helped me develop my analytical and observations skills, and it is these tools that I will use forever and will pass on to others for years to come."

Stage 1 Step 3 - Establish Perfect Lubrication and Clean for Inspection Standards & Procedures

In Stage 1 Step 3 of Operator Equipment Management teams continue on with Step 2 activities and introduce education on lubrication so that teams can establish perfect Lubrication and Cleaning Standards so as to lock in Basic Equipment Conditions (no looseness, no contamination and perfect lubrication) and thus reduce variation in component life to allow more accurate preventive / predictive maintenance activities.

Area Based Team: Slime Busters II and Dust Busters III (Cycle 15 - 2008)

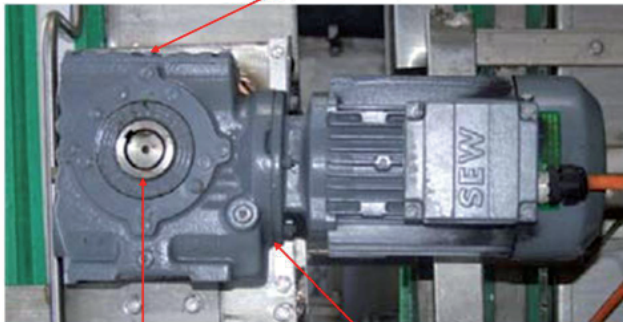
Coopers Brewery has recently successfully completed Operator Equipment Management Stage 1 Step 3 (OEM-3) for its high speed Bottling Line.

The line was divided in half with the “Slime Busters II” Area Based Team focusing on the filling end of the line which includes a Depalletiser, Rinser Filler Crouner, Pasteuriser and two Labelling machines. A second Area Based Team, the “Dust Busters III” focused on the packaging end of the line which includes a Cluster / Basket Packer, Carton Packer and Palletising machines.

Both teams participated in the following OEM-3 activities:

- Reviewing machine Cleaning & Inspection checklists to assess their effectiveness and reduce the time taken to conduct Clean for Inspection activities
- Education in lubrication through One Point Lessons (OPLs)
- Developing Lubrication Inspection Checklists for each machine on the Bottling Line
- Identifying Lubrication related defects for repair
- Developing visual controls to assist in lubrication & inspection
- Undertaking training in lubricating machines

Supporting the OEM-3 teams was a Micro Maintenance Improvement Team (MIT) developing the numerous Lubrication OPLs and Machine Lubrication training materials. Refer to the figure below for OPL on Lubrication Education.

TPM ³ One Point Lesson								Team	Maintenance	No. CoopOEM-011
								Preparer	Micro MIT Team	
Subject: General Gearbox oil leaks positions										
STEP	Operator Equip Management	1	2	3	4	5	6	7	Unit Topic:	Lubrication – General
				✓					Machine:	Bottle Conveyor drives
 <p>The arrows on the above photo show the “typical” places that you would expect to see oil leaking from a Gearbox.</p>										

The Lubrication OPL & Machine Lubrication training sessions were conducted by Coopers Maintenance staff, which included Maintenance Manager David Tanner, Packaging Maintenance Team Leader Terry Santucci and Maintenance Planner / TPM³ Co-ordinator Gilbert Bruton. The Machine Lubrication Training session can be seen in the photos below.



Both OEM-3 teams have developed good visual controls to aid operators in the Lubrication inspections and to save time. One of the many examples can be seen below.



Team Member Profile:



Terry Santucci (9.5 Years - Maintenance Team Leader - Packaging)

As one of the Maintenance trainers for the training sessions conducted in the “Slime Busters II” and “Dust Busters III” teams, Terry found great satisfaction in sharing his knowledge of equipment lubrication to operators to help improve their understanding of the equipment. “The unity found between the teams allowed knowledge to be shared, and opinions to be heard in a structured way,” explains Terry. “In addition to improving the company, the team improvements have also helped me develop my own communication skills along the way. After witnessing the proven success and positive impact it has had on the work environment, I am now a great supporter of TPM,” exclaims Terry.

Stage 2 Step 4 - Understand Equipment Functioning (by each inspection category or module)

In Stage 2 Step 4 of Operator Equipment Management teams continue on with Step 3 activities and introduce structured on-the-job education using One Point Lessons etc so as to develop an understanding of Equipment Functioning by the operators (typically 6 modules over 3 cycles) so they can identify and diagnose equipment problems at the source.

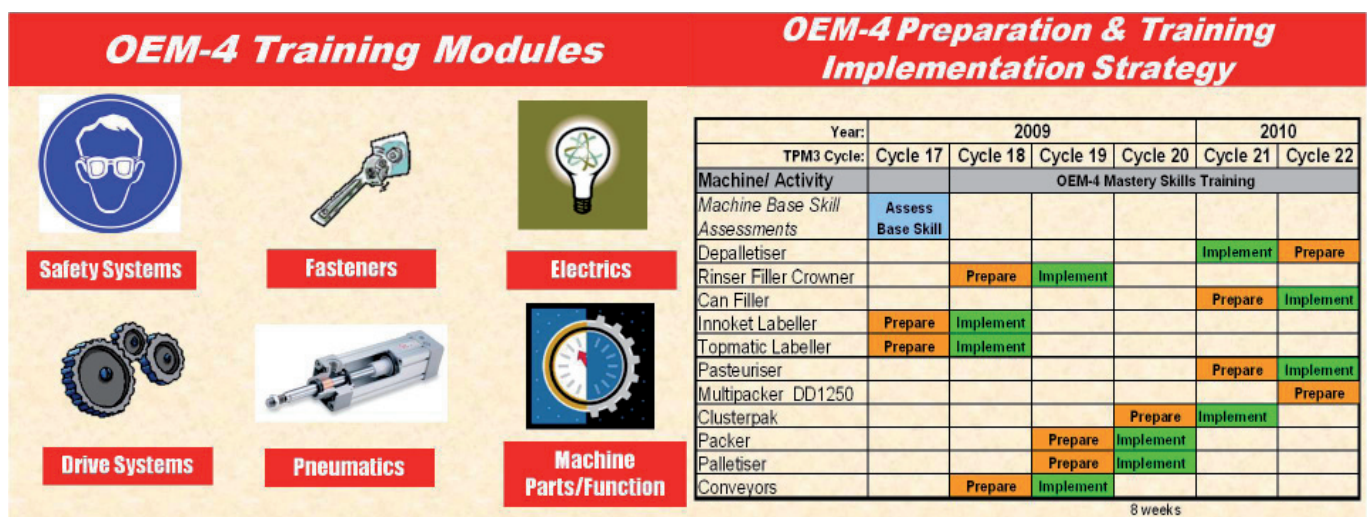
Area Based Team: OEM-4 Summary (Cycle 16, 17, & 18 - 2008 & 2009)

Over cycles 16, 17, and 18, the focused turned to OEM-4. Following the improvement process operators were to learn how equipment functions so as to diagnose equipment, quality and safety problems at the earliest possible time, be able to identify and contribute to improving Design Weaknesses and contribute to achieving a workplace that has Zero Breakdowns while improving Safety and Quality.

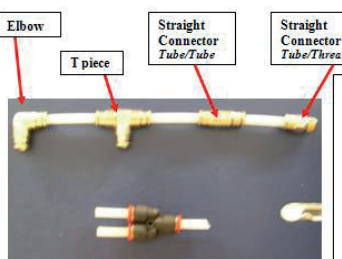
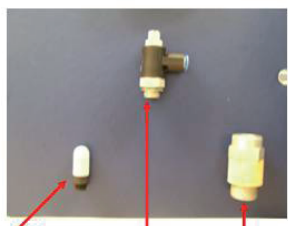
The 3 Phase Approach to OEM-4 was undertaken to support the teams in these cycles:

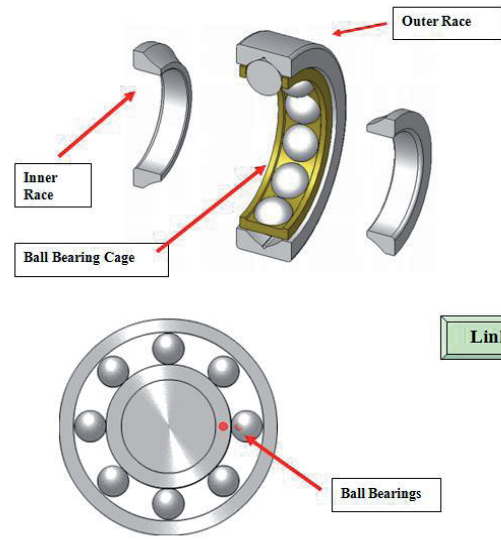
1. *Planning* - first phase of OEM-4 is a requirement for the Preparation Phase, and includes the make up of a Training Plan for implementation. This is completed during the first half of the OEM-3 Cycle using a Cross-functional Team involving operators and maintainers from the area.
2. *Preparation* - second phase of OEM-4 includes the need to create training material for each module and increase the skills of the trainers. This is initiated during the second half of the OEM-3 Cycle by an Education & Training Cross-functional Team involving operators and maintainers from the area.
3. *Implementation* - final phase of OEM-4 which the training for all modules is conducted, and an audit of OEM-4 Implementation is undertaken by the team.

In the Planning phase the improvement team implemented a Training Plan which included 10 Machines with 5 modules each, totalling a whopping 50 modules! In terms of timing the training and assessment was estimated to be 60 minutes per person per module, with 5 people, 10 machines, leaving a time requirement of 50 hours per module. See diagrams below for a list of the modules and implementation strategy.



In the Preparation phase of the process all the training material for each of the 5 modules per machine was put together and made up by the teams with the help of experts in the field. Numerous One Point Lessons were introduced to brief operators how to achieve an equipment standard, how equipment functions highlighting inspection points, how to remove or install equipment components, or even how to clean equipment. Such examples can be seen in the following figures.

TPM ³ One Point Lesson									
Team:		Maintenance			No. CoopOEM-014				
Preparer:		OEM4 Team							
Subject: Pneumatic (Air) Fittings									
STEP	Operator Equip Management	1	2	3	4	5	6	7	Unit Topic: Air Fittings-General
					✓				Machine: All
Air Fittings, Restrictors & Silencers:									
									
1. Various types of Air fittings: Connectors Various "push lock" fittings are used to aid in connecting lines & changing pipe directions without bending the hose causes low air flows. Fittings usually leak from the point where the tube is inserted into the fitting, the leak can be heard or felt by hand.									
2. Air silencers & restrictors: Most solenoid valves are fitted with silencers to protect the operator from ear damage. Restrictors can be used to slow down the rate at which air distributed to another air component.									
									

TPM ³ One Point Lesson									
Team:		Maintenance			No. CoopOEM-13				
Preparer:		Micro MIT Team							
Subject: Bearings									
STEP	Operator Equip Management	1	2	3	4	5	6	7	Unit Topic: Bearings
					✓				Machine: All
									
Link									

The Implementation phase of the process was simply that! The training modules for each machine to operators in the area commenced and they continued throughout the cycle. Improvements to the process were identified and applied along the way. Each trainee was issued with a training record as seen below, with identification of training conducted and sign-offs at the initial assessment stage, then a month down the track, and finally six months later to reinforce the learning.

OEM-3 Bottling Line Lubrication Training Record									
Trainee:		Trainer: Terry Santucci		Date:		Machine: Innoket Labeller			
Preparer: Gilbert Bruton		Unit No.: CoopOEM-Train-001		Topic: Lubricating Gripper Finger Bushes					
1 Educate: Trainee to understand why & how				OPL: CoopOEM-008					
Instructions: 1. Deliver One Point Lesson(s) 2. Ask questions to ensure trainee understands key points									
2 Demonstrate: Trainer to show trainee how to do it				OPL: CoopOEM-008					
Instructions: 1. Demonstrate correct position of Cam Roller for lubrication task (Roller off top cam to "work" lube into bushes). 2. Demonstrate lubrication of cam roller & Finger shaft bushes 3. Ask questions to ensure trainee understands key points									
3 Practice: Trainee to undertake & perform the skill under the guidance of trainer									
Instructions: 1. Instruct trainee to preform greasing of gripper bush on a different label station 2. Observe trainee to ensure greasing is conducted and assist as required									
4 Review: Trainee assessed to be competent				Initial Assessment:		Date:			
Instructions:				Trainer Signature:					
1. Give feedback to trainee on their assessment				Trainee Signature:					
2. Retrain if required				Competent:		Yes		No	
3. Ensure sign-off by trainee and trainer is complete				Monthly Follow up :		Date:			
Observations / Comments:				Trainer Signature:					
				Trainee Signature:					
				Competent:		Yes		No	
				Six Monthly Follow up :		Date:			
				Trainer Signature:					
				Trainee Signature:					
				Competent:		Yes		No	

Team Member Profile:



Carmel Lineage (16 Years - Bottling Line Operator)

Seen by many as the star pupil of TPM teams over the years, Carmel has adapted and applied herself to the TPM process tremendously. "As one of the operators involved in the OEM-4 teams, I appreciated the training conducted by maintenance to help take care of the equipment through specific standards on lubrication and so on," says Carmel. "I have improved my own ability to understand more about the problem at hand through Root Cause Analysis and used my involvement in teams not only to have a say, but to also be the voice for my fellow operators. In my eyes, sure and steady always wins the race!" she smiles.

Further Team's to have undertaken OEM-1, 2, 3 and 4:

Cycle	Team Name	Area of Focus	Date
Cycle 3	CSI (Coopers Scene Investigators)	Homebrew Line - OEM 1 & 2	May 2004
Cycle 8	DustBusters	Bottling Line – OEM 1	June 2006
Cycle 10	DustBusters 2	Bottling Line – Depal, Filler & Pasteuriser – OEM1	Feb 2007
Cycle 14		Bottling Line – OEM 2	April 2008
Cycle 15		Bottling Line – Filler & Packer sections OEM 3	July 2008
Cycle 16	Prep team	Bottling Line – OEM4 Preparation Team	Oct 2008
Cycle 17	Plan Team	Bottling Line – OEM 4 Planning Team	Jan 2009
Cycle 18		Bottling Line – OEM 4 Implementation	Apr 2009
Cycle 19		Bottling Line – OEM 4 Implementation	July 2009
Cycle 20		Bottling Line – OEM 4 Implementation	Oct 2009
Cycle 21		Bottling Line – OEM 4 Implementation	Jan 2010
Cycle 26	Innoket Team	Bottling Line – Innoket OEM 1-3 revisit	Sept 2011
Cycle 27	The Mob	Bottling Line – Filler OEM 1-3 revisit	Jan 2012
Cycle 28	Packers Team	Bottling Line – Packer/Clusterpak OEM 1-3 revisit	Apr 2012
Cycle 29	Redbacks	Bottling Line – Depal/Palletiser OEM 1-3 revisit	Sept 2012

Maintenance Excellence Management (MEM)

Objective:

The objective of Maintenance Excellence Management is to engage all maintenance employees on site through a comprehensive maintenance self-assessment process to allow them to reflect on the Leadership, Capability and Processes of Maintenance Excellence along with defining the nature of their work and identifying the time lost each week due to the environment they work in. It is important to progressively, over say 3 cycles (3-4 month periods) of improvement activities, create and implement a MEM Improvement Plan that will free up maintenance resources to support TPM³ as it cascades across the site; reduce frustrations and Time Lost from not being able to find things; improve processes within the Maintenance department; and transform the nature of work to a proactive learning stable domain.

Area Based Team: The Missing Links (Cycle 21 - 2010)

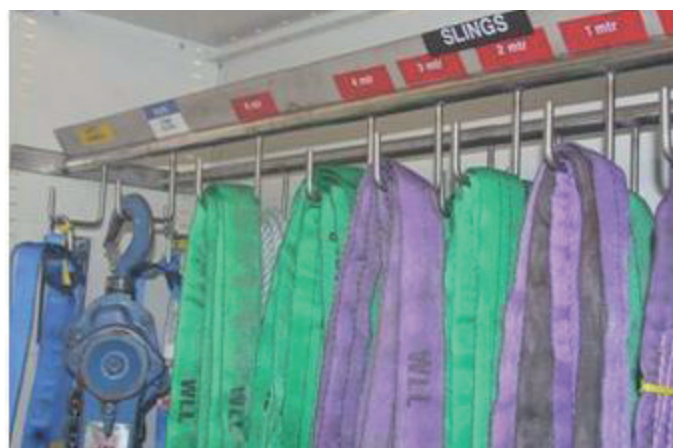
It's not about what happens in the workplace but how you react and learn from that experience that makes you stand out from the pack! At Coopers Brewery, Regency Park SA, they have used their experiences to create learnings and improvements that provide a stepping stone towards a safer workplace.

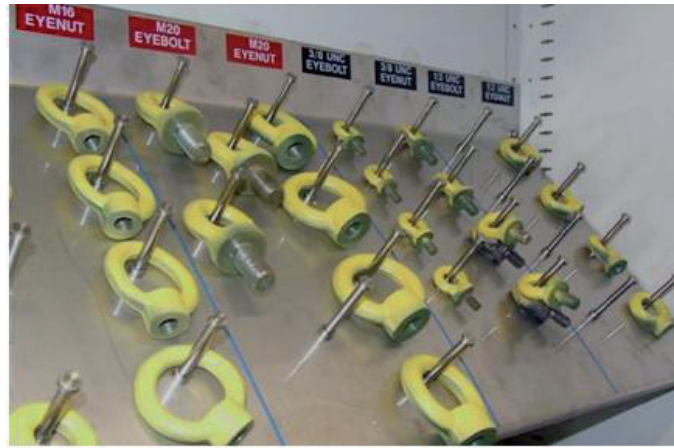
Towards the end of 2009 Maintenance had a 'near miss' experience while undertaking a routine task involving lifting equipment. From this incident a Maintenance Improvement Team was set up to review the application and storage of all lifting equipment on site through inspections and testing. This led to the formation of "The Missing Links" team.

"The Missing Links" team specified mandate, focused on the following tasks:

- Identify all equipment that requires registration & control measures;
- Evaluate the equipment to include:
 - Regulatory Compliance
 - Inspections
 - Correct Equipment for the job
 - Storage provisions
 - Control System / Tracking
 - Correct stock levels of equipment; and
- Complete all tasks within 12 Weeks.

From the above mandate, one of the team's key challenges was how to identify, register and correctly store all the lifting equipment in one location to ensure 100% compliance inspection. By not having all lifting equipment correctly registered and centrally located in the one area, there was a high possibility of missing some items when the inspection was due and therefore increasing the risk of faulty or unsafe lifting equipment use.





After much thought and discussion also involving the revisit of past improvement team experiences, the team decided to store all the lifting equipment in the one storage system located in the workshop. By applying the catch cry, “*a place for everything and everything in its place*”, the team developed some innovative storage ideas which enabled lifting equipment to be located efficiently and helped to identify the use of the equipment. Some examples of the storage system can be seen in the figures above.

For the storage of power tools, the good use of dividers, labels and photos made it simple to locate and correctly return tools to their allocated place as seen in the figure below. Also, on the outside of each isle a photographic cataloguing system as seen below, was develop to enable maintenance staff to quickly identify at a glance the shelf location of the lifting equipment or tools they required.



Circular Saw Hitachi A1	
9" Grinder Metabo A1	
Barrel Grinder Metabo A2	
Barrel Grinder Makita A2	
Battery Drill 14.4V Hitachi C328323R A3	
Battery Drill 14.4V Hitachi C328321R A3	

The team also implemented a simple “In use” system, where maintenance staff place a magnetic name tag in the location of the lifting equipment or tool they have taken. With this system any item in use can be quickly located if needed by another tradesman or if it is required for testing or inspection.

Other improvements implemented by the team include:

- Monthly Audits of the storage system, shadow board & machine tools;
- Loan Tool procedure for non maintenance staff;
- 6 Monthly Inspection of personally issued company tools; and
- Lifting technique training for all maintenance staff.

Team Member Profile:



David Tanner (6 Years - Maintenance Manager)

Having the passion and desire to succeed is what Dave sees as the platform to keep Coopers in good shape for the future. “Improving the performance of the site by involving the personnel have been beneficial for both the TPM teams I have been involved in and in the long term for the business,” explains David. “It is important to create a standard approach whilst implementing the improvement procedure to ensure that everyone is working in the right direction,” he adds. “Keeping the workforce motivated through the TPM process ensures success, and reflecting on the accomplishments is important to gauge how much you have achieved.”

Further Team's to have undertaken MEM:

Cycle	Team Name	Area of Focus	Date
Cycles 7- 23		MELT Team	March 2006
Cycle 7	The Tools	Micro MIT – Company Tools	March 2006
Cycle 8	The PMT's	PM Tasks review	June 2006
Cycle 11	The Standards team	Micro MIT – Eng Stds (Welding, Valves etc)	June 2007
Cycle 13	The STD's team 2	Micro MIT – Eng Stds (Electrical Stds)	Jan 2008
Cycle 15-18		Micro MIT – Eng stores	July 2008
Cycle 19-21	Missing Links	Micro MIT- Tools & Lifting equipment	July 2009
Cycle 22		Micro MIT – Electrical Workshop	April 2010
Cycle 23		Micro MIT – Planning & Scheduling	Sept 2010
Cycle 24-26	The LubriCANS	Micro MIT – Lube Automation	Jan 2011
Cycle 29	The Innochangers	Micro MIT – Innoket Change over	Sept 2012
Cycle 30	Fly's eyes	Micro MIT – Kister Packer Change Over	Jan 2013
Cycle 31		Micro MIT – Rinser, Filler & Crowner	April 2013



New Equipment Management (NEM)

Objective:

The objective of New Equipment Management is to provide everyone with the framework, systems and opportunity to input into new equipment being introduced into the site. The concept of Life Cycle Cost (LCC) as the “driver” for focusing new equipment improvement activities is established, and the Design, Engineering and Operations departments work together as a team in the design of new equipment. The teams apply their previous TPM³ experience to new equipment designs through Prevention at Source Design Activities so as to minimise Life Cycle Costs utilising a Macro and Micro team approach, and also apply their TPM³ experience to new equipment in order to maximise TPM³ Friendliness utilising a Mini Micro team approach. With TPM³ Friendliness meaning to make the new equipment easy for operators to identify process and quality problems at the earliest possible time, to identify equipment abnormalities, and to perform quick set-ups, all through the use of visual controls and effective training programs using One Point Lessons, Training Aids and Boards etc.

Area Based Team: The Label Guys (Cycle 11 - 2007)

The “Label Guys” team was set-up to undertake a Mini Micro New Equipment Management improvement activity with a mandate to identify and implement the most effective equipment modifications and training to make it easy to identify Equipment Defects at the earliest possible time, and ensure Basic Equipment Conditions are maintained during operations. The team was also to complete the activity in the timeframe of 8 weeks.

Starting off, the team reviewed the New Equipment, New Work Area and New Training to ensure all was to be considered TPM³ Friendly.

“TPM³ Friendly” Equipment - Sample Checklist

<u>VISUAL CONTROLS – To assist in operating and trouble shooting</u>		YES	NO	COMMENTS
<u>SAFETY</u>				
1/	Does machine have any hazard labels or signs?	X		
2/	How many emergency stops and where are they located?	5		Around the machine and every Station
3/	May switches be locked out and tagged out?		X	Every switch is tagged out, only the main switch is lockable
4/	What are the machine safety interlocks?			From Company Schmersal
<u>FASTENERS, FITTINGS AND PIPES / HOSES – Visual Controls</u>				
1/	Any markings on levers, wheels etc. for adjusting and settings?	X		
2/	Colour coding and labelling of pipework?	X		Coloured pipes
3/	Direction of flow on pipework?		X	
4/	Marking of open and closed positions for valves?	X		Valves with LED heads
5/	Labelling of inlet and outlet ports?	X		Unmistakeable couplings
6/	Colour markings on gauges and dials so we know a sight the correct operating settings> (eg. Air Pressure)		X	
7/	Do we have quick release fittings and fixtures for adjustments?	X		

“TPM³ Friendly” Work Area - Production Requirements for Labeller Layouts

<u>CURRENT</u>	<u>REQUIREMENTS</u>	
	KHS LABELLER	TOPMATIC
Change Parts: • 750ml – KHS & Topmatic • Foil Topmatic only	- 750ml Change Parts	- 750ml Change Parts - Foil Change Parts
Hot Water requirements:	- Cleaning water (Temp to be legal) - Hot water for flushing on Machine - Hot water for Cleaning machines etc.	- Cleaning water (Temp to be legal)
Cold Water (RO water)	- Cleaning water - Wash down hose for floors etc.	- Cleaning water - Wash down hose for floors etc.
Sink for washing Parts	- Sink to wash change parts	- Sink to wash change parts
Lights inside machine – Topmatic	- Internal lights for machine	- Internal lights for machine
Label Storage Trolley	- Trolley to store & transport labels for days production.	- Trolley to store & transport labels for days production.
Glue bucket trolley	- Trolley to store & transport glue buckets for days production.	- Trolley to store & transport glue buckets for days production.

“TPM³ Friendly” Training - Sample of 3 Day Training Program

Day-2 Troubleshooting & Error Elimination:

- Possible malfunctions and “Help Text” examples
- Set machine to zero point
- Vario Drive in basic - Function, Rotation Check, Function test and Changeover at the machine
- Lubrication plan and points
- Lubrication and inspection

After the review many improvements were identified such as the Cleaning System in place which would automatically clean the glue drum and pallets with hot water.

Lessons Learnt by the Team:

- Size of Label needed to change to suit and accommodate Laser Coder;
- Material specifications for glue need to be suitable for Australian suppliers; and
- Would help to have a supplier representative as team member in future teams.

Recommendations:

- No production possible during the floor preparation and installation;
- 20/08/07 – 26/08/07 floor preparation Topmatic relocation;
- 3/09/07 – 09/09/07 floor preparation KHS labeller;
- All changes in services to be completed prior to installation of the both Labellers;
- Operator & Maintenance Training program to be agreed to prior to machine arrival and to be competency based; and
- Team to reconvene prior to project commencing

Team Member Profile:



Andrew McIntyre (24 Years - Operator)

As part of the “Label Guys” team Andrew enjoyed the opportunity to not only have his voice heard, but to cover all aspects of the machine and set-up the work area to suit. “Becoming an expert of the machine was really rewarding and developing that understanding of the machine to detect faults before they breakdown made for a pleasant environment to work in,” says Andrew. “As well as developing a better understanding of the machines, I have also improved my communication skills with colleagues, teams and through presentations to leadership.”

Further Team's to have undertaken NEM:

Cycle	Team Name	Area of Focus	Date
Cycle 5	Mead for Speed	Bottling Line - BW250 – Clusterpak	Feb 2005
Cycle 5	Warp Speed	Bottling Line – Rinser, Filler & Crouner	Feb 2005
Cycle 10	The Label Guys	Bottling Line – Innoket Labeller	Feb 2007
Cycle 14	NewPal	Bottling Line – Palletiser	April 2008
Cycle 14	Nice Cans	Bottling Line – Can Filler	April 2008
Cycle 16	Filter Blockers	Lager Cellar – New Filtrox Filter	Oct 2008
Cycle 17	Multipaks	Bottling Line – Multipak Machine DD1250	Jan 2009
Cycle 22	Newpak	Bottling Line – Packer	April 2010
Cycle 22	De- Palletiers	Bottling Line – Depalletiser	April 2010
Cycle 27	Mr. Beer	Homebrew – Mr. Beer	Jan 2012
Cycle 31		Bottling Line – New Line 2	April 2013

Safety & Environment Management

Objective:

The objective of Safety & Environment Management is to ensure safety standards and procedures, based on the site / company standard, are in place, fully understood and followed during all TPM³ activity. Safety Analysis is effectively used by Area Based Teams to identify and address safety risks during all TPM³ activities and Safety Observation System is used by all Area Based Teams to monitor and address any unsafe conditions or behaviours during TPM³ activities. Visual Controls are used to indicate safety risks and help promote safe behaviours, while the impact on safety is considered and evaluated by all TPM³ Improvement Teams in their decision making process.

Area Based Team: Chemical Cocktails (Cycle 19 - 2009)

The Site TPM³ Leadership Team identified that the storage and handling of chemicals on site could be improved by applying Work Area Management (WAM) methodology which had improved the house keeping in the production work areas. Hence the “Chemical Cocktails” team was formed.

The team’s mandate included the following key points:

- In compliance with OHS Legislation identify and develop “Best Practice” Work Area Management standards for the Storage and Handling of all Chemicals brought and used on the Coopers Brewery site, including Hazardous Substances and Dangerous Goods;
- Including the use of appropriate information, instruction and training for employees who are responsible for the use and handling of Chemicals, Hazardous Substances and Dangerous Goods; and
- Complete within 12 weeks.

The team’s boundary included the whole site, so the team decided to divide the site up into six key areas and assigned each team member a focus area as per the table below:

No.	Focus Area	Team Member
1.	Grounds - Includes Sheds, Pavilion, Museum & Distribution	Steve
2.	Packaging - Includes Packaging Hall, Homebrew, Keg Line, Offices & Cleaners Storerooms	Robin
3.	Brewing - Includes Brewhouse, Lager Cellar, CIP Store, & EUWA Plant	Darren & Greg
4.	Stores - Maintenance Store & Oil Store	Ian
5.	Laboratories - Main Lab, Brewhouse Lab & Packaging Lab	Janie
6.	Services - Boilers, Cooling Towers, Refrigeration plant , RO Plant & LPG area	Doug

The team started the improvement process by having each team member(s) responsible for each of the above six areas conduct a review of the area which included:

- An Audit of all chemicals used (Quantity, application, dispensing, MSDS sheets, etc);
- A Clear-up of the storage area and any unused or obsolete chemicals;
- Correct Storage (as per Chemwatch Standards);
- Adequate Signage or Labelling;
- Site Chemical Manifest up to date; and
- Was appropriate PPE and Safety Equipment available in the area (e.g. Eye wash station or Safety Shower).

The team (as seen below) identified and implemented numerous improvements to the storage and handling of Chemicals and Hazardous Goods to all six of the focus areas. A number of purpose built yellow chemical storage cupboards were purchased to safely store chemicals around the site as shown in the photo below.



Another key improvement the team made was to develop and implement policy / procedure for introducing new chemicals or substances on site. This ensured a high level of control to the introduction and approval of new chemicals to the site. This procedure would also maintain a good level of rationalisation for chemicals on site and hence reduce cost.

Team Member Profile:



Chris O'Sullivan (8 Years - OH&S & Training Co-ordinator)

During his time with the "Chemical Cocktails", Chris witnessed some great achievements of improvements in chemical housekeeping and development of chemical knowledge throughout the site. "The introduction of a chemical register along with the improved storage standards of chemicals ensured that a contingency plan was in place if an emergency would arise. During my time on other TPM teams, I found great value and reward in training operators and was taken back by their appreciation and willingness to learn," explains Chris. "I have improved my communication skills and learnt new ways to convey my opinions to ensure understanding. For me, the structured TPM approach is a vehicle for change and a forum to solve problems while making people accountable."

Cross-functional Team: Waste Watchers (Cycle 28 - 2012)

Coopers Brewery has always been a very environmentally conscious company with a number of past teams looking to reduce all types of waste or consumption of resources (eg "Water Rats", "Malteazers" etc). National, State and Local Governments are more than ever looking at industry to reduce emissions. In South Australia, SA Water is reducing levels and increasing tariffs on trade waste. Hence the "The Waste Watchers" were formed with a mandate to:

- Establish Trade Waste and Biological Oxygen Demand (BOD) Levels Baseline Data for the site;
- Identify sources that generate high levels of Trade Waste and BOD; and
- Identify improvement to reduce the Trade Waste and BOD to comply with the new licence limit.

A recent study on the sites waste streams had been conducted by an external expert John Constable. The team used his report as part of the initial analysis and then allocated team members with areas of the plant to validate the report's assumptions and measurements to ensure the analysis was accurate and complete.

Team members were given the following areas of focus: John Hood - Brewhouse and Lager Cellar; Darren Leopold - Lager Cellar; Simon Fahey - Evaporation; David Jones - Packaging; Tom Bullock - Trade Waste Pit and Other; and David Medlyn - SCADA Trends and Data.

The further analysis conducted by the team revealed that 64% of losses (waste water) were being generated from the Lager Cellar. The biggest contributor to BOD was Waste or Excess Yeast. With this insight, the team decided to focus its improvements on reducing the amount of Yeast going through the trade waste system.

Firstly the team had to identify a way of capturing the excess yeast that was currently going to drain from the following 3 main areas.

1. Fermenter bottom dumps;
2. Centrifuged Yeast; and
3. Excess from Yeast Tank.

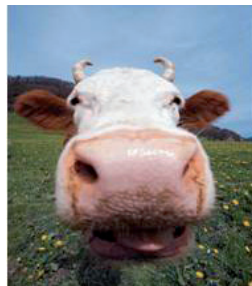
The team identified the following two solutions to capture the above excess yeast.

1. Commission an existing tank (not in use) into the Yeast Handling System to capture and store the excess yeast from the centrifuge and existing yeast tanks.
2. Commission a second tank to capture the Fermenter Bottoms and then pump into the centrifuge inlet pipe to recover more beer and separate the yeast.

The team investigated a number of options to dispose of the excess yeast slurry with an emphasise of selling it (increase revenue), rather than dumping it (increase cost). The two proposals put forward and accepted at the final presentation were:

1. Increase Yeast Sales for food use; and
2. Wet Feed for animals by mixing excess yeast with spent grain (already sold as animal feed).

These improvements are currently in the process of being implemented and the trial of mixing the excess yeast with the spent grains has been successful. The cows like it!



Team Member Profile:



Tom Bullock (12 Years - Supply Chain Manager)

Tom introduced Coopers to TPM all those years ago and applauds the teams for their consistent and structured approach to improvement. They have encompassed all the principles and tools needed to engage all levels and generate total involvement from the site with Cross-functional and Area Based Teams. "I have great pride in being involved in the first team to embody external suppliers and also as part of the initial teams in the process area involving other technical aspects of the plant," says Tom. "The culture of improvement at Coopers and participation amongst personnel is a result of an excellent time defined approach which keeps people engaged and motivated," Tom adds proudly.

Process Capability Excellence (PCE)

Objective:

The objective of Process Capability Excellence is to understand the natural variation of raw materials, intermediate products and processes at the site, while establishing Basic Equipment Conditions for all plant & equipment in a process to help achieve Standardised Work across all shifts. This activity will ensure that the site has their control systems well designed, operated and maintained, and that all personnel will engage in undertaking continuous improvement.

Leadership Team: PCE (Cycle 14 to 19 - 2008)

Developed jointly with CTPM, the introduction of Process Capability Excellence was to help gain a systematic approach to meet the needs of the Brewing operation. Based on the Maintenance Excellence Management approach a PCE Leadership Team was put together with the core motivation to change the philosophy of Coopers to getting things right every time.

The improvement journey had always been difficult when it came to the involvement of process people. Therefore, PCE was born to address quality and consistency issues through the engagement of process people. This direct approach to process looked at the numerous dimensions of the process and identified what needed to be addressed.

An Innocence to Excellence matrix put together to help create an “as is” “could be” vision so that a destination / goal for the people could be set. The process team used the matrix to score themselves against the benchmark parameters which enable the team to identify the short comings of Process Capability Excellence and then create mandates for teams to focus on the parameters that needed most improvement at the time. The initial matrix would then become the baseline for future completions of the matrix to show the trend of improvement over time. Below is the overall results of the matrix as completed by the Leadership Team.

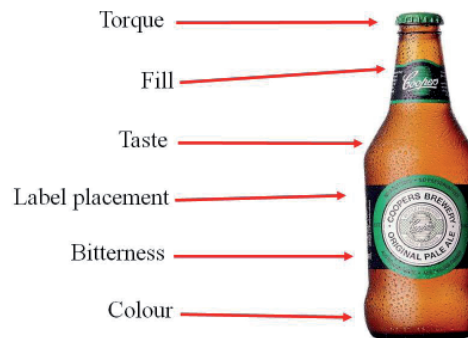
Process Capability Innocence to Excellence Matrix										
	Leadership & Talent					Methods				
	Vision & Strategy	Measurement & Data Analysis	Organisation Structure	Human Resources	Technical Knowledge Management	Process Specifications & Capability	Product Quality Management	Standard Operating Procedures	Product Development Management	Problem Solving
Excellence	Personal action plans and appraisals are clearly tied to the Vision & Strategy.	In line, real time monitoring using Statistical Process Controls supported by the application of quality improvement tools.	Structure supports ownership and training of employees in function of entire supply chain.	Learning organisation. World Class employees with mastery skills. Self-managed team focus.	Innovative – Leading Research World Class Competitive advantage	All Processes have highly defined & documented specifications, with 6 - Sigma capability at all Critical Control Points and are positively monitored for improvement. Cpk > 1.5	Online employees are able to stop the process at any time if the product is out of spec . Corrective actions are acted upon immediately. Prevention at Source is the quality approach.	All processes have well documented, accepted and available SOP & SOC with clear roles and responsibilities & are continually applied and updated as required.	All Development changes to be reviewed, verified & validated and approved before implementation using a scientific method.	Entire organisation is actively involved in proactive problem solving, both at an individual, small group and team level.
80%										
70%	Improvement action plans are linked to the Vision & Strategy.	All key processes monitored off line and trends by frontline employees to eliminate variation and obtain predictable stable products.	Established teams for key objectives in the Vision & Strategy.	Empowered, flexible employees able to conduct process capability analysis and take corrective action if required.	Leading Edge – Have developed technical areas of expertise with core skills	All Processes have highly defined & documented specifications, with above 3 - Sigma capability at all Critical Control Points. No customer complaints or rework. Cpk > 1.0	Prevention at Source quality is applied to Raw Material, Process Parameters or End Products and corrective actions are deployed immediately.	Majority of processes have well documented, accepted SOP & SOC being applied by all staff.	An integrated method of product development that is controlled & documented used by the majority of stakeholders.	Entire organisation involved in problem solving, embracing a proactive focus.
60%										
50%	A clear Vision & Strategy is documented and communicated to all employees.	Routine data collection for all critical processes. Data graphed and trends reviewed periodically.	Decentralised with central support. Clearly written mandates / roles for each function and group.	Employees have problem identification & solving, team dynamics and training skills.	Underpinning – Applying science & theory to what you're doing.	All specifications for inputs, process & outputs are in place & regularly reviewed. Processes are capable to 3-sigma. Few customer complaints or rework. Cpk = 1.0	A NCR is raised for all out of spec Raw Material, & Process Parameters, but not all corrective actions are complete or acted upon in due time.	A system to develop & review SOPs & SOC exists for all key processes. All Legal requirements & legislation are documented and being applied.	A system to conduct product development that is controlled & documented, but only used by some stakeholders.	A well developed problem solving method is used for key issues in all departments. Problem solving involves people at all levels but is led by managers.
40%										
30%	No clearly documented 'Role' as Vision & Strategy exists of how we contribute to the business.	Data collection for key areas, but are cumbersome and create extra work and delays. Some analysis undertaken, but not acted upon.	Centralised with alignment to production. Team approach to technical problem solving.	Employees have good technical, OH&S and quality knowledge and practice.	Practical – "How to do it" Consistently demonstrating capability	End product specifications developed & in place. Variation still present in Processes causing off spec product. Random customer complaints. Cpk < 1.0	A NCR is raised for all out of spec End Products and corrective actions are deployed in immediately including containment plans.	Documented SOP & SOC system exists, but is ineffective or is outdated. Inconsistent work practice are evident.	Some level of control and method used in product development, but not understood or used by all stakeholders.	Data on problems collected. Problems are solved using a scientific method, lead by managers.
20%										
10%	Our main roles is to do our core function and fix problems when they occur.	Minimal Data collection or only those that is legally required. No data analysis & reactive to problems.	Centralised with no alignment to production, focus is on tasks. "Command and Control" approach.	Employees have their basic skills, however little or no technical or support training given.	Fundamental – Basic operation & understanding	No or inadequate end product specifications & Processes are unable to hold desired limits (not process capable). Frequent customer complaints.	A NCR is raised for all out of spec End Products, but corrective actions are not complete or acted upon in due time.	No SOP or SOC, work procedures vary from person to person.	Product experimentation & Development is not controlled or documented.	Problems are solved in an ad hoc manner by the best people available.
Innocence										

The Process Capability Excellence at Coopers was made up of 10 parameters / elements which would become the benchmark of improvement teams. A summary of some of the elements which teams were already working towards is detailed on the following page.

Element 2 - Measurement and Data Analysis (Leadership)

Objective: In line, real time monitoring using Statistical Process Control supported by the application of quality improvement tools.

The focus for Coopers was to have all measures completed in the process by the lowest possible level of the organisation, and where possible use sensors rather than operators to complete them. They identified Quality Control Points to help distinguish which measures they needed to keep at front of mind. These Quality Control Points were seen as those points which any variation in production would harm the brand value of Coopers. See image below for the Quality Control Points identified.



Element 3 - Organisation Structure (Leadership)

Objective: Structure that supports ownership and the development of employees through the entire supply chain.

The focus for Coopers was on establishing relationships and dependencies based on the four rules of Toyota:

1. All work shall be highly specified as to content, sequence, timing, and outcome
2. Every customer-supplier connection must be direct, and there must be an unambiguous yes-or-no way to send requests and receive responses
3. The pathway for every product and service must be simple and direct
4. Any improvement must be made in accordance with the scientific method, under the guidance of a teacher, at the lowest possible level in the organisation

The aim was to engage all employees to take the rules as part of the way Coopers do things, and ensure that the structure supports the process of improvement and the efforts of the teams.

Element 6 - Process Specifications and Capability (Methods)

Objective: All Processes have highly defined and documented specifications, with 6-Sigma capability at all Quality Control Points and are proactively monitored for improvement.

The focus was to recognise the Input, Process and Output specifications at Coopers to better understand their capability. In doing so the team realised that although they had Input and Output specifications, they did not have any specifications for the process itself and were managing the process by the output specifications. They found that they needed to start to measure the process and obtain an understanding of what the process capability was in order to help achieve process excellence.

These are just three of the ten elements that the teams are looking to cover through the Process Capability Excellence activity. By performing analysis at the lowest practical level, managing the process based on the data and specifications, and by following Coopers philosophy on processing the activity will certainly be a great success. Up to this point the PCE journey has established a systematic review of the process, engaged all key stakeholders, started to build a robust process management system and quality management system, and established a systematic continuous improvement of the process and quality systems to achieve excellence.

Reactive Improvement & Frontline Problem Solving (Root Cause Analysis)

Objective:

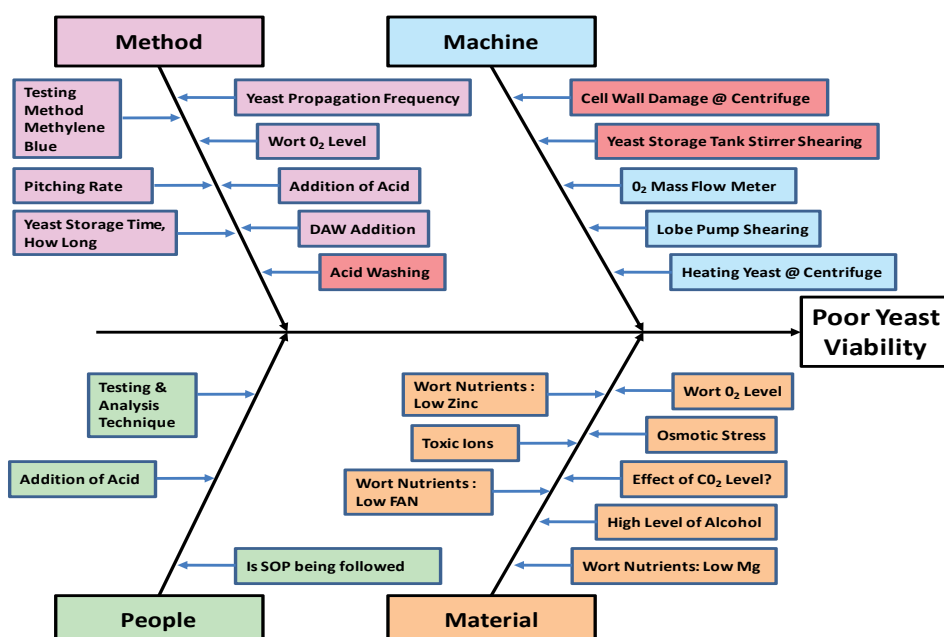
The objective of Reactive Improvement is to rapidly recover from an event or incident that stops you from achieving your budgeted or expected performance for the day or shift and most importantly initiate corrective actions so that the event or incident will not re-occur anywhere across the organisation. Reactive Improvement is supported by Frontline Problem Solving or Root Cause Analysis (RCA), which should be initiated whenever you fail to achieve expected performance based on agreed initial triggers which are progressively refined, eg you might start with greater than 60 minutes downtime or rework event or greater than 5% quality loss, then overtime progress to greater than 2 minutes downtime or greater than 0.1% quality loss. The key to effective Reactive Improvement is discipline through a very effective Daily Review Process supported by a standardised and robust Frontline Problem Solving or RCA process that is suitable for all people to be trained in, and used regularly, across the organisation.

Cross-functional Team: Yeast Viability (Cycle 21 - 2010)

On the back of the success created by the Ale and Stout Tank Problem Solving Team, a second team was formed to look at improving the yeast viability, an issue of concern over the past four years.

Deming's P-D-C-A	7 Step Process supported by Workbook & A3 Summary Sheet
Plan	1. Define Problem
	2. Contain Problem
	3. Analyse Problem
	4. Develop Root Cause Solutions
Do	5. Implement Solutions
Check	6. Evaluate Results
Act	7. List Future Actions

Following the CTPM “7 Step Frontline Problem Solving” method as referred to in the figure above, the team focused their energy on getting to the root cause of the problem once and for all. After correctly defining the problem, the team then developed a Cause & Effect diagram as shown in the figure below, to help identify all the possible causes resulting in poor yeast viability.



Once numerous experiments were conducted and data was analysed both in house and by knowledge experts, such as the group from Brewing Research International in the UK, the team was then able to identify the following three contributing causes to poor Yeast Viability:

1. Yeast cell wall damage during centrifuging;
2. Shearing caused by the Yeast Storage Stirrer; and
3. Acid washing.

In the end, the problem solving process not only identified the causes to the problem but also helped improve their knowledge of Yeast Viability and gain a better understanding of Cooper's Yeast Handling Process.

Team Member Profile:



Jon Meneses (25.5 Years - Technical Brewer)

As a well educated member of the Coopers brewing department, Jon is vital to the Root Cause Analysis (RCA) process. "The robust and not so demanding structured approach gets results, I believe the holistic view helps teams to solve problems based on informed decisions through evidence based analysis," says Jon. "Effectively a research and development department, the RCA process forces personnel to act and find solutions with hard facts. As a member of many RCA teams over the years, I have enjoyed the opportunity to not only solve the problem at hand, but to learn the process in detail and the challenge of dealing with different team dynamics through becoming more of a listener and not driving my own opinion," explains Jon.

Further Team's to have undertaken RCA:

Cycle	Team Name	Area of Focus	Date
Cycle 17		High BU	Jan 2009
Cycle 18		Yeast Viability	April 2009
Cycle 19		Malt Extract loss	July 2009
Cycle 22		Hops	April 2010
Cycle 23	Everyday RCA	Process Dept – Evaporation – Malt Pumps	Sept 2010
Cycle 25	Clear Team	Innoket Labeller Speed/Quality	May 2011



Six Sigma Activity

Alister Lee 6 Sigma Practitioner



Making an exception from his usual line of work, Alister has been part of the Coopers improvement journey for a number of years. Initially brought in to help the Brewhouse Team with SPC (Statistical Process Control) as a means to monitor and control the brewing process to ensure it operates at its full potential, the focus was then shifted to Six Sigma.

A set of technical tools not for the faint hearted, Six Sigma seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors) and minimising variability in manufacturing and business processes. It uses a set of quality management methods, including statistical methods, and creates a special infrastructure of people within the organisation such as Black and Green Belts who are recognised as qualified experts in the methods. Each Six Sigma project carried out within an organisation follows a defined sequence of steps and has quantified value targets.

At Coopers the focus has been on reducing cycle times with the intent of increasing capacity through the Brewhouse, to keep up with the increases in capacity in the bottling line. As to date the Brewhouse team have so far achieved a 20% reduction in cycle times, which is the equivalent of 2 extra brews per day. This extraordinary success is down to the efforts of a dedicated team:

- Jon Meneses - certified Black Belt
- David Jones - certified Green Belt
- David Medlyn - certified Green Belt
- Simon Fahey - certified Green Belt
- Janie Zimmermann - not yet certified

Fitting into the same time frame of the TPM activities, Alister admires Coopers strength in maintaining a regular approach to improvement which shows a dedication not usually seen amongst companies. On the eve of completing their sixth major project through Six Sigma, Coopers are certainly keeping a step ahead. Each of their certified personnel have been through a vigorous independent assessment process from the Strong Star Consulting firm in America. The nominated project leader must complete a detailed report (including an A3 summary), and interview process before the allocation of a certified belt is issued.

Summary of Coopers Six Sigma Projects to date:

Project 1 - Mash filtration cycle time

Leader - Jon Meneses (Green Belt awarded)

Found that the speed of the hammer mill was having a significant impact on the filtration times. By fitting a VSD to the hammer mill, the mill speed was slowed, producing a courser grist which resulted in reduced filtration times.

Result - Reduced the average sparge filtration time for Pale Ale brews by 28%.

Project 2 - Malt extract pail filling

Leader - David Medlyn (Green Belt awarded)

Found that the PLC setting for the filler and air in the lines were major factors affecting the variation on pail fill weights. Changes were made to the fill process and the purge / priming sequence.

Result - Reduced out of spec fill weights from 85% to 0% by reducing the variation in pail weights.

Project 3 - Repeatability of beer tasting scores

Leader - Simon Fahey (Green Belt awarded)

An inhouse team of tasters was tested on flavour and aroma scores for a range of 6 beers. It was found that some tasters had problems repeating the scores when doing the test for a second time. Training was provided and the consistency of the scores improved.

Result - The out of spec scores reduced by 69% following training.

Project 4 - Trade waste discharge control

Leader - David Jones (Green Belt awarded)

The amount of organic material in trade waste is tested externally and limits are set by government. This project studied 4 methods of testing organic content (COD) - 2 external & 2 internal.

Result - The Merck method was found to be effective and equivalent to the results achieved by external lab used by SA Water.

Project 5 - Bitterness testing

Leader - Janie Zimmermann (not yet certified)

Bitterness testing is conducted in Coopers lab. With the introduction of Carlsberg, a different testing method was required. This project studied whether the 2 testing methods produce the same results.

Result - The initial round of tests picked up some incorrect methods. The procedures were simplified and operators retrained. The second round of testing showed the Coopers and Carlsberg methods were equivalent, with the Coopers method being more efficient.

Project 6 - Mash tun impact on sparge cycle time

Leader - Jon Meneses (Black Belt awarded)

This project investigated the impact of a number of factors in the mash tun process for the downstream effect on sparge cycle times.

Result - It was found that reducing the Steele's smasher speed and agitator speed as well as reducing the opening of a membrane exhaust valve contributed to reductions in the variation of sparge cycle time.



Maintenance Support Activity

Maintenance Support Activities with Ingenia

In Cycle 23 September 2010, Coopers and CTPM, as part of their Maintenance Excellence Management activities, identified the need to address the Maintenance Tactics and Planning & Scheduling Elements of the 10 Elements of Maintenance Excellence.

The Maintenance Improvement Team charged with this task did a great job identifying all the issues however struggled to identify possible solutions due to the complexity involved especially when linking Planning & Scheduling with their Computer Maintenance Management System – Mainpac. As such it was decided to seek local external technical assistance from Ingenia.

Ivan Winter from Ingenia was involved in the enhancing of Mainpac in 2005 and in more recent times, his company had assisted Coopers with Risk Assessment for the Site, Tender documentation for New Equipment and Mainpac Support. As such the logical choice was to ask Ingenia to assist with Tactics and Planning & Scheduling.

The reasons Coopers wished to improve Tactics and Planning & Scheduling was to achieve the following:

- A re-defined and focused approach to Maintenance Tactics or Strategy;
- Reduce losses due to changeovers;
- Address concerns of plant performance;
- Address issues associated with shift work, plant access and resources; and
- Address inconsistent packaging line reliability.

To achieve the above, we completed the following:

1. Training in Failure Theory and Failure management;
2. Developed a Planning & Scheduling work group; and
3. Defined and agreed guidelines for the work group to ensure our customers' needs were considered as well as our own needs.

The process we followed to ensure we met our objectives was:

- Step 1 - Brainstorm all information/data available;
- Step 2 - Review brainstorming information;
- Step 3 - Collect samples of data;
- Step 4 - Analyse data to determine actions required; and
- Step 5 - Prepare prioritised actions & estimated time required.

Key Achievements of the work group:

- All tradesman, now close their own Work Orders including transactions (hours spent on the job). These hours then assist the Maintenance Manager to run a weekly report to ensure costs are correctly allocated to the correct Business Unit;
- All tradesmen raise and close Work Orders for Breakdowns;
- Planning & Scheduling of all work for all Maintenance staff (a major step forward in the department's history);
- Root Cause Analysis (RCA) on the top two faults was started;
- The review of all PM (Preventive Maintenance) tasks was started with 95% of the Line 1 Bottling completed; and
- Schedule Compliance reports are run and checked by the Team Leaders and Maintenance Manager to ensure we are achieving the Targets set.

Next steps.....

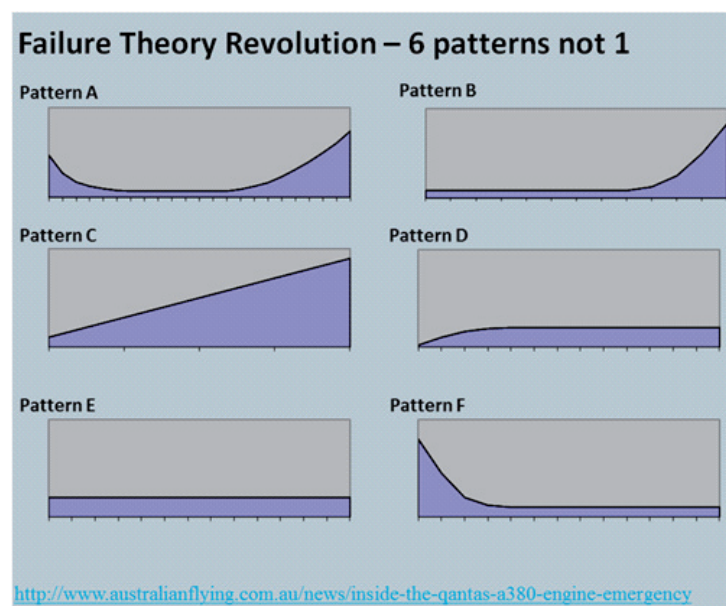
Like all improvement processes, it is important to regularly review where we are at currently and where to next. Our plant continues to change with new equipment, new products and new processes happening on a regular basis as Coopers continues to grow, as such we recognise this is a journey that has no end!

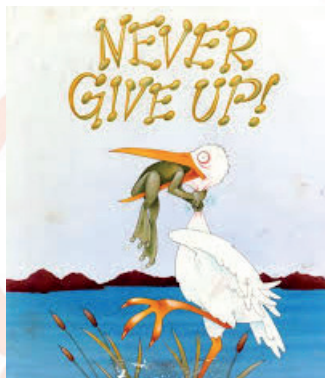
Ingenia also assisted Coopers with:

- Development of effective measures of maintenance performance;
- An audit of the Mainpac system to identify opportunities to streamline and improve;
- Review of maintenance practices to identify opportunities to improve; and
- Review the stock management and purchasing processes for improvement opportunities.

They also provide the following short training programs:

- The Evolution of Maintenance (including maintenance terminology);
- Failure Theory and the Failure Theory Revolution;
- Key elements to an “effective maintenance program”; and
- What does “Maintenance excellence” / “best practice” look like?





Life of a TPM³ Co-ordinator

Gilbert Bruton MAINPAC & TPM³ Co-ordinator



An ever present and dedicated servant to the Improvement Journey of Coopers Brewery, Gilbert understands the importance of the journey towards the sites success. Starting off as an apprentice fitter and turner, Gilbert has obtained over 35 years of experience in the brewing industry with breweries in Zimbabwe, South Africa, New Zealand and finally Australia. Initially as a contract fitter with Coopers in 1999, Gilbert moved through various roles before becoming the central figure of the sites improvement journey with the title role of TPM³ Co-ordinator.

In his eyes Continuous Improvement is exactly that..... Continuous! There is no end to the journey, simply milestones that you pass along the way. We don't ever give up and as Gilbert's analogy reminds us we need to be just like a frog holding the birds throat. You need to be prepared and not scared to start the journey and although it will be difficult at times, you need to learn to crawl before you walk.

In CTPM, Coopers have found a coach to support them throughout the improvement journey and their holistic approach is effective, simple and easy to follow. Having something for everyone ensures buy-in and engagement of the personnel but the implementation is certainly not easy. The journey will see plenty of pain and gains but you need to push through the pain, celebrate the gains and continue on.

The support from Leadership is crucial. It's the leaders of the company that maintain and support the process and at Coopers, Nick Sterenberg along with the Site Leadership Team have been a constant pillar of strength. Their interaction and involvement in the TPM Teams helps to show the personnel their commitment to the process and the attendance of Managing Director Dr Tim Cooper at Team Final Presentations portrays a seriousness from Coopers to follow the journey.

For Gilbert, the most satisfaction he receives from the journey is the development of his colleagues and their constant appreciation of the training. "Seeing the personnel onsite excel and gain a greater understanding for not only their workplace but the improvement process has been rewarding" explains Gilbert. His own development thanks to the support and great help from CTPM Navigator Larry Mazza has been compounded by his recent trip to go and see the beginning of Lean & TPM in Japan. A reward for his hard work, "the trip enhanced my learnings, reinforced my belief in CTPM's methodology and showed me that at Coopers we still have a long way to go".

Capital Expenditure

At Cooper Brewery the engineers are seen as the enablers of improvement progression. It is without the involvement and dedication of the engineers to the continuous improvement journey that the Coopers plant would only ever be good and not great.

The Engineering department has been developed with two different wings, capital expenditure and maintenance. Capital at Coopers is always handled by contracts either in the form of a purchase order or a full blown contract. Each capital expenditure is judged by its degree of risk and from this assessment Coopers imposes their specific standards to ensure all new installation of equipment by suppliers fits into the Coopers way of operation. Second best simply does not make the mark.

Creating this control at the front end provides the opportunity for improvement at the back end when operations have the chance to ensure that the equipment fits in with Coopers using the New Equipment Management approach. Along with the operators, the involvement of maintainers is essential to tune up the new equipment to run at the highest quality. Creating a maintenance team to become a Formula 1 pit crew is paramount to Coopers success.

The history of maintenance at Coopers was an ever growing problem. The lack of planning and or execution of a plan showed that improvement was needed and fast. Generating a weekly plan and schedule of Planned Maintenance (PM) tasks to get the ball rolling was a start, having a plan was in some what better than no plan at all. A step forward was to make the tasks meaningful for the maintainers in order to help the plan be completed to schedule. Getting the basics right and giving them the time through improvement activities to enhance their plans help to create ownership. A lesson learnt along the way is that it is important to find the right balance to having maintainers involved and not having them take the blame.



Suppliers

In 2013 Coopers is set to obtain 4.3% of the Australian beer market, although great, it is still small compared to some of the larger beer manufactures. Being in this situation can certainly hurt the influence Coopers can have on its suppliers. However, their philosophy is not to influence but to look for the highest quality supplier and establish a two-way relationship based on loyalty. Even without the ability to use its power in the marketplace to influence suppliers, Coopers still need to compete with its larger competitors and generating a better working relationship is the key.

The two-way relationship based on loyalty from both sides has been a success for Coopers over the years, they stay loyal to their suppliers with continuous demand and the supplier stays loyal to them with high quality products and efficient service. This loyalty allows for a more co-operative and collaborative approach to negotiations when ever they come around and ensures that they ultimately deal with fewer suppliers and rarely look for a change.

The improvement journey has also provided the chance to work even closer with the suppliers through their involvement on certain improvement teams and also through greater communication through the need to analyse a process or product more closely. Coopers ability to batch products from the one supplier helps creates a financial and volume importance which showcases their commitment to a long term relationship.



External Support

The importance of external support is critical to Coopers. In their eyes not only does it have the ability to see things that you can not, but it imposes discipline and it provides the skills and knowledge that you do not have. At Coopers, external support comes in the shape of three distinct organisations:

- Ingenia - Ivan Winter
- Six Sigma - Alister Lee
- CTPM - Larry Mazza

With Ivan at Ingenia we have seen the benefit of an Effective Maintenance System implemented with great success as detailed in the Maintenance section of this booklet.

The introduction of Six Sigma through the support of Alister has been of great benefit especially in regards to the achievements in the Brewhouse. The technical and difficult statistical analysis approach is seen as clever people using clever tools for complex problems. It has created experts amongst the brewers at Coopers as detailed in the Six Sigma section of this booklet.

The third support arm supplied by CTPM through Larry has been the back bone of the 10 year continuous improvement journey for Coopers with the use of simple but effective TPM & Lean tools creating discipline and the engagement of people through its consistent approach of Area Based and Cross-functional Teams. CTPM's support is detailed in the Improvement Activity section of this booklet.

Setting aside the time to generate the discipline at Coopers and getting everyone (external support and all) working together has been essential to their success with all consulting scheduled in for each Monday. Although all fantastic in their own right its Coopers ability to find the right tools at the right level of the organisation to address the problem at hand that is the key. "You don't use a putter to drive" as Nick Sterenberg says.



The Road Ahead

Having come so far, it is important to stop and reflect on where Coopers were at the start of the Continuous Improvement journey and how things have changed. By looking forward you need to also look back and appreciate your success.

A by-product of the journey is personnel who are smarter, more engaged and in general better than in the past. As you move people to be involved and owning the problems of their workplace, area and line, although initially negative, it creates individuals who are passionate and care for their work. They recognise the importance of improvement and although at times the journey may bring about some heated discussions and upset individuals, they wouldn't be upset if they didn't care.

Coopers will keep on going down this pathway. Moving forward Coopers looks to:

- Continue the improvement philosophy throughout the Warehouse and Distribution Areas by picking the right tool to help make it beneficial, whilst maintaining and sustaining the Packaging Area improvements.
- Move into the next level of Six Sigma with smart process people to learn from managers. Cross-functional Teams breaking down the barriers and showing each other who they really are and the great resource they can be.
- Generate a greater emphasis on Production Planning and the importance to get it right in order to optimise production by reducing changeover times or eliminating the need for changeovers.

At the end of the day Coopers Brewery is World Class, but to stay there and keep in front of the pack we need to keep putting in the effort on those most critical assets of the business which are the people.





Coopers Brewery

Address: 461 South Rd, Regency Park, SA 5010

Postal Address: PO Box 46, Regency Park, SA 5942

Telephone: (08) 8440 1800

Fax: (08) 8440 1888

Email: coopers@coopers.com.au

Website: www.coopers.com.au

The Coopers logo, featuring the word 'Coopers' in a stylized, cursive script font with a white outline, set against a green background.

Published and prepared by CTPM Australasia in November 2013, refer to website www.ctpm.org.au