

Case-study of
Competitive Manufacturing

ABnote NZ Limited
Christchurch, August 2010



ABnote

EXECUTIVE SUMMARY

ABnote NZ are the foremost high quality manufacturer of secure printed cards (cheques, financial cards, EMV smartcards, credit cards, loyalty cards, etc) throughout Australasia. 160 individuals are employed at their Christchurch site, comprising nine teams in the value stream producing about 70 million cards for several hundred customers per year.

During 2008, the ABnote NZ site management formulated a strategy to deliver significant and sustained performance improvement. The vision of being the preferred supplier of customer focused card solutions on Australasian and International markets required a systematic approach to continuous improvement.

Why: Their benchmark indicators for cost, quality, and delivery, were nowhere near expectations and not consistent enough. To achieve their vision they had to dramatically improve all three indicators simultaneously. They decided a formal process for everyone to manage and improve the business on a day-to-day basis, was required.

Who: John Ter Morshuizen from 'Just Performance Ltd' was contracted to coach the Christchurch site of ABnote through the first 18 months of their Competitive Manufacturing (CM) journey.

What: To fulfil their vision, nationally recognised CM certificates were chosen to develop staff at ABnote's Christchurch site. Site management was looking for a simple practical system that would engage all operational staff and encourage formal up-skilling. Staff were keen to reduce their work frustrations that occurred repeatedly.

Where: All work was done on site. The coach typically spent four consecutive days per month on site throughout the eighteen-month period. The coach gave a practical explanation of how to use the new tools from a selected group of unit standards that were appropriate for the specific challenge they were addressing at the time.

When: They started their journey in June 2008 and it continues every day.

How: Four stages of improvement were defined as:

- Initiate improvement
- Deliver small improvements
- Three challenges:
 - Deliver quality products by doing things right first time,
 - Deliver orders in full and on time with continuous flow,
 - Minimise cost by eliminating wasteful activity
- Sustain the journey.

How much: A ROI of 5:1 was achieved over the first 12 months. After the first eleven months savings achieved from the decrease in material waste alone paid for the complete 18-month program. On top of this ABnote recorded a reduction of non-conformances by 50% from customer feedback. Training engaged 104 staff members, with 81 National certificates achieved, a completion rate of 80% by February 2010. The time commitment required by staff was their largest investment. This investment totalled 28,132 hours (average of 4.5

hours per week per person) including training, coaching, assessment of unit standards and actively working on improvements.

Sustaining CM: Together with the coach, agreed KPI's and CM qualification targets were set. Sustained focus on achieving all three challenges together has been the most significant process of sustaining improvement. Based on the first year's increased performance, new targets were set for continuous improvement. Gaining qualifications in CM as a personal achievement has embedded a culture of continuous improvement with everybody involved.

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Background

The ABnote Global Group is one of the largest private sector security printers in the world. Today it operates through its subsidiary companies in Australia, Brazil, Canada, Czech Republic, France, New Zealand, United Kingdom and the United States.

The origins of ABnote NZ can be traced back to 1983 when Security Plastics Ltd, a joint venture between two of New Zealand's leading printing companies, was formed and started operation. Both partners had cheque printing and encoding divisions but had identified a market for plastic (credit) card manufacture. In 1985, the company began exporting to Australia, and then rapidly expanded into Asia during the following three years.

Security Plastics pioneered the introduction of smart cards in 1993 establishing Australasia's first smart card manufacturing facility. In January 1996 APS Credicard Ltd was acquired to add an established card processing and technology division to the Group.

In 2006 Security Plastics was purchased by the ABnote Global Group and now produces in excess of 70 million (secure) printed cards per annum through its New Zealand manufacturing facilities. In Australasia ABnote is the longest-established supplier of secure transaction products, services and logistics, employing around 650 people in New Zealand and Australia (160 staff at its Christchurch branch). In Australasia the company is market leader in cheques, financial cards, EMV smartcards, driver's licences and high resolution barcodes.

Beginnings

Prior to adopting competitive manufacturing practices ABnote NZ benchmark numbers on quality, cost and delivery were below what they expected of themselves. Management was of the opinion that a robust framework for the company operations had to be created to end continuous fire fighting and frustration, and to create stability in work practices.

Site management reviewed its options and decided that adoption of Competitive Manufacturing (CM) thinking would benefit the business, customers and staff, the most.

John Ter Morshuizen from Just Performance Ltd was contracted to coach the Christchurch site of ABnote NZ through the first 18months of the CM journey.

Leadership of improvement was to be seen and not just heard of. The complete value stream within the business had to engage to ensure performance improvement was given to all customers. CM presentations at the weekly management meetings would focus everyone's attention on measuring improvement. The improvements would impact on quality, cost and delivery, but in an integrated and simultaneous method.

"Initiating the process was a serious look at 'what do we really want out of this business'. Often we would say, 'Your plan is not working'. Little did we realise that meant the business was not performing for all of us."

Paul Williams, Production Manager.

'5S' as an engagement and development process

Implementing '5S'¹

A clean, tidy and organised site was a desired state that many individuals at ABnote NZ wanted. The 5S methodology was introduced at the very beginning of the journey. Creating an environment where there is a place for everything and everything in its place would go a long way to improving the waste of staff time looking for things.

Each 'S' was explored for its pragmatic and practical use within each team. Teams decided what should be done and what they were comfortable achieving. As each 'S' was applied the overall visual impact of the 5S methodology became evident.




As with all 5S ventures, it would have been easy to slip back to the old ways very quickly unless a standard was set. Each team took ownership of the standard they set and developed their thinking on how to, not only set a target, but also to maintain this throughout their daily work. Problem solving techniques were introduced to assist the teams in managing 5S in an effective manner. Staff learnt from each other's efforts and understanding and within four months an effective 5S system was developed.

Sustaining 5S: To sustain a clean and organised workplace a set of standards was developed and each team's area was audited on a regular basis. Audits are conducted monthly, both by team members auditing upstream or downstream suppliers or customers and by managers. These audits are now standard practice throughout the business and can be seen operating from the time one enters the site.

Ownership of 5S: Achieving ownership of 5S was one of the most difficult objectives in CM. Through effective coaching from John Ter Morshuizen, the customisation of 5S so it could be applied in each team area has been achieved. The audit sheets have both photographic visual standards and text criteria. This makes it possible for anyone to determine what level of conformance the team has achieved for their own standards. As time has passed teams have updated their 5S audit sheets to accommodate the dynamics of the continuous improvements they have made. This has included simple markings on the floor indicating temporary inventory storage points, and tools and cleaning materials have been carefully situated at point of use.

Audits are now conducted on a formal basis once a week; individuals complete these checking their own area. 5S audit sheets similar to the one shown below have been prepared for all areas and an overall score of 5S results is kept. Audit sheets are normally more extensive than this example and cover all 5S principles. These are customised for a specific use by each team.

¹ 5S is a simple but highly effective set of techniques that remove waste from your work environment through better workplace organization, visual communication and general cleanliness. The pillars of 5S are defined as Sort, Set in Order, Shine, Standardise and Sustain.

<h2 style="text-align: center;">5s Housekeeping Audit - Despatch</h2>				
Importance To ensure staff know how to maintain a clean, organized & safe workplace				
Audit Scoring Up to 5 points per Bullet point				
0=Issues throughout area, no action 2=Evidence of action, but many issues still 4=Meets Standard only 1 minor issue found		1=Some Evidence of Action. 3=Generally meets standard, a few issues 5=Fully meets Standard no room for improvement		
STEP	HOUSEKEEPING AREA	KEY POINT	TEAM AUDIT DATE:	MANAGE AUDIT DATE:
1 WIP		<ul style="list-style-type: none"> All WIP to be kept in a tidy and orderly manner. Batch tickets securely stuck onto relevant trays. Any financial counted work to be shrinkwrapped if not packed. General area to be kept tidy. Walkways to be kept clear. 		
2 Paper/ Computer		<ul style="list-style-type: none"> Area kept clean and tidy. Stock levels of Ink ribbon, paper and labels to be monitored by Kanban. Paperwork to be filed away and kept up-to-date. Rubbish bins sorted into dry waste recycle, Workspace clear. 		
3 Finished product/ storage		<ul style="list-style-type: none"> Trolleys to be neat and tidy and not sticking out into walkway. Finished jobs to be continually moved into the vault to maximize storage space. Plain stock cards to be kept in tidy, in order and a monthly stock take undertaken. 		

Sample 5S audit sheet for the despatch area

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The following table summarises the standards focussed on in the workplace to achieve these results.

Training focussed on specific unit standards

21502 – Sustain Process Improvements, 21503 – Change, 21508 – Apply 5S, 21523 – Lead 5S, 21537 – Manage 5S, 21519 – Lead Change. These enabled all members of the team to actively participate in identifying and initiating improvement actions. Team leaders acquired skills to lead their teams in achieving the 5S discipline, while Managers created a system to manage 5S overall.

Specific skills and tools used were: Project management, visual management, recording data effectively, brain storming, capturing ideas, improvement sheets, Plan-Do-Check-Act cycle, 5S, photos as records, role of leaders.

Challenge #1, Delivering orders in full and on time (DIFOT), with continuous flow

In a fast moving high volume based business, a rigorous but flexible planning system is critical to achieve DIFOT above 98%. Prior to introducing CM stock levels at ABnote NZ often fluctuated from high inventory to no inventory at all, while often not meeting customer delivery times. A stabilisation of the flow of work was required.

The teams tackling this challenge identified four processes to improve overall DIFOT: forecasting accuracy, plan stability, input accuracy and plan attainment. Each team tried to identify the root causes of any problems, and developed their own plan of action.

Kanban - Simple tools creating significant results

*Kanban*² is a system of continuous supply of components, parts and supplies, so that workers have what they need, where they need it, when they need it.

Making a simple visual *kanban* was one of the challenges for ABnote NZ. The following two pictures show what an effective kanban can look like.



red = resupply, minimum inventory reached,
orange = sufficient inventory to run this shift,
green = maximum inventory no action required.



The visual indicator of this simple board triggers the action as stipulated when the colour is on top.

² The word Kan means "visual" in Japanese and the word "ban" means "card". So Kanban refers to "visual cards". It can be understood as a method of ensuring pull from upstream to create Just in Time, continuous flow and dramatically reduce inventory to sustain overall work flow.

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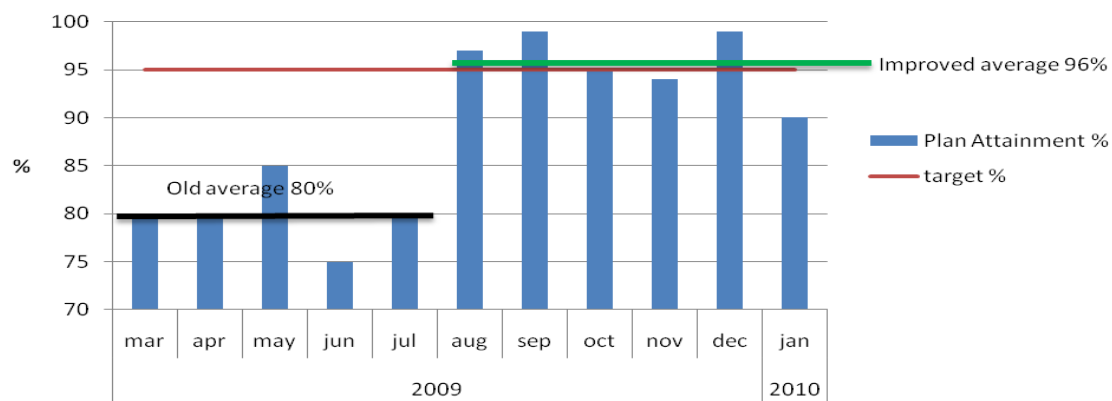
Minimisation of change-over times

Analysis of performance showed that approximately 80% of staff time was spent in changeover from one job to another. The offset team focused on the two main factors affecting change-over downtime in their area:

Grouping of similar jobs: By obtaining as much information about all the jobs for the day and the following day, jobs of similar nature could be grouped into batches. Grouping of jobs allowed for rapid changeovers between similar jobs and restricted longer changeovers by having them less frequently. Discussion with both upstream and downstream teams and the planning team also assisted in faster changeovers on average.

Organisation of change-overs: The team ensured all required tools and materials for the change-over were placed as close as possible to the point of use. This enabled the team to minimise the wastes of waiting, motion and un-necessary processing.

ABnote overall Plan Attainment



ABnote overall plan attainment, shown as percentage

Plan attainment is a measure of the total effort by the teams to meet each of their planned lead times. The combination of their respective efforts using many different CM tools and methods has culminated in reaching the average target for the first time ever during the second half of 2009. This in turn gave the sales team more confidence to sell the product knowing delivery on time would happen.

Delivery on time has doubled since the beginning of the year. Customers want the assurance that ABnote NZ can deliver on a certain date. A graph that was visible to all encouraged them to work and meet the expected delivery date. Both the performance itself and the fluctuation of performance improved as they stabilised their processes. Measuring on a daily basis was a critical success factor, and all teams visually displayed their graph on plan attainment.



ABnote delivery on time to customers during 2009

“The biggest improvement I have seen is bringing stability to the production flow. This was possible through engaging all the staff and for them to realise no matter what their role was, they have an impact on flow. Our challenge is to have continued increasing throughput in the same size factory.”

Paul Naylor, Technical Manager

Training focussed on specific unit standards

21502 Sustain improvements, 21503 Manage change, 21505 Apply JIT, 21518 Ensure improvements are sustained, 21520 Facilitate JIT and 21333 Workflow management.

Specific skills and tools used were: contribution of ideas to add value, Measuring and recording of standard practices, value stream mapping, cause and effect diagrams, root cause analysis, inventory management, kanban system, and track product flow.

Challenge # 2, Deliver quality products by doing things right, first time

As the teams at ABnote NZ delved into the reasons why they were sometimes not achieving the desired quality standard they found that all processes relied on the final inspection to 'catch' any non-conformances.

Through coaching, they learnt not to accept poor quality from suppliers and not to pass on poor quality to their (internal) customers. Using this thinking, everyone was engaged to improve quality.

Simple feedback forms

The offset team received a number of sets of information and materials from different upstream suppliers. As they began measuring their performance, they found that some information and or materials had not been supplied correctly or at all. They started monitoring these non-conformances, where they originated from, and set up a simple system of giving feedback to their suppliers.

A simple form was introduced and every time a non-conformance occurred, they wrote up a simple message.

- “From the Offset Team
- To XYZ team
- Issue/problem is.....
- Impact to our performance is.....
- Time lost is.....
- What we require is.....”

The process captured the problem and gave the supplier insight into consequences on performance. This in turn made suppliers realise how their processes were impacting on downstream customers. The affected teams then used problem solving techniques to find a solution to all identified problems.

This simple but effective method is now widely used to identify opportunities to improve overall performance within ABnote NZ.

Order management team finds a solution to frustrations

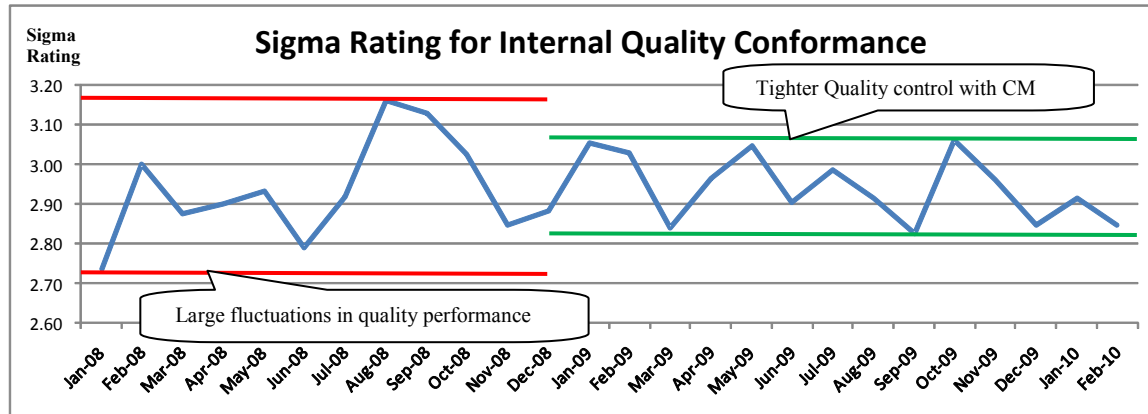
The team was tired of being blamed for many issues relating to orders. They decided to record all errors that were reported and analysed the data. The 'magnitude of error' attached to each non-conformance was one significant outcome that became apparent to the team. They set out to solve issues by priority. Detailed dialogue with all the team's customers followed. Systematically the requirements were refined and resolved to ensure the order management process was accurate, on time and in full.

“CM gave our team clout as we could clearly show where the root cause of the problem and frustration arose from. This was the most welcomed relief from finger pointing to working the problem through a process together.”

Nadine Lewis and Vicky Boles, Order Management Co-ordinators.

Using Sigma ratings to measure performance

Sigma ratings are the number of defects per million opportunities. As ABnote NZ made 70 million cards per annum, using this system was appropriate at the strategic level. Since applying the CM methods and tools, the quality fluctuations have decreased showing that there is a better level of control in the processes. This swing in quality represented a 50% improvement in consistency, giving the sales team and customers more confidence in the quality of products.



Sigma rating for internal quality conformance Jan 08 - Feb 10

Screen printing team formulates a foolproof solution

The screen printing team faced constant problems to ensure the print result was perfect every time. Inks were the most critical material in the process with a multitude of permutations. The team took a hard look at the processes and the errors that occurred.

As they collected data, they realised that there was no right way of finding the answer as errors seemed to occur randomly. They decided to use the copy the customer had approved as their 'sample' copy. This 'job sheet' contained all of the material information and the ink recipe for each particular job. Also on this job sheet are in chronological order, the process sequence, the number of passes, and any other teams involved.

"The major frustration was not having a 'recipe' that was standard for all to use. "We had to get to the root cause of our quality problem and fix it. Passing on bad quality was just not the way it should work."

John Mettam, Supervisor.

Utilising the combined experience of the team, they used the *poka-yoke method*³ to find a permanent solution to this frustration. The solution was to formulate a unique number for each ink recipe and link that to each order they received.

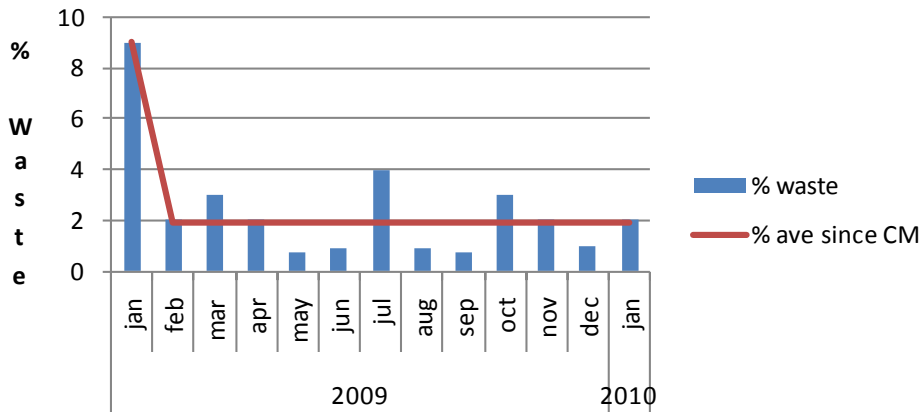
The team also decided to set in place a method of concurrence, which meant the two main operators would agree and sign off (and check off all the requirements) on every job sheet prior to starting it. In the past this had not been the case and consequently had led to

³ Poka-yoke is a Japanese term that means "fail-safing" or "mistake-proofing". A poka-yoke is any mechanism in a lean manufacturing process that helps an equipment operator avoid mistakes. Its purpose is to eliminate product defects by preventing, correcting, or drawing attention to human errors as they occur.

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assumptions that would eventually create defects. There was now a process in place that had embedded the discipline of ‘concurrency’.

Since the introduction of the unique ink recipe number combined with the dual checking of job parameters, virtually no errors in ink have occurred. The team keeps a vigilant eye on their process and records their performance on their visual management board. Waste and rework decreased from 9% to 2% after introducing CM to this area of the ABnote Christchurch production.



Waste and rework shown as percentage between Jan 2009- Jan 2010

Training focussed on specific unit standards

21503 manage change, 21516 contribute to maintenance, 21528 maintenance analysis and 21529 implement maintenance

Specific skills and tools used were: seven wastes, 5 why questioning, value stream mapping, cause and effect diagrams, root cause analysis, role of staff in maintenance, three evils of maintenance, maintenance records, recording of machine up and down time, analysis of machine performance.

Challenge # 3, Minimising cost by eliminating waste and improving cycle times

Removing waste⁴ is one of the best ways to increase profits of a business. To remove waste ABnote had to understand what waste was and where it occurred.

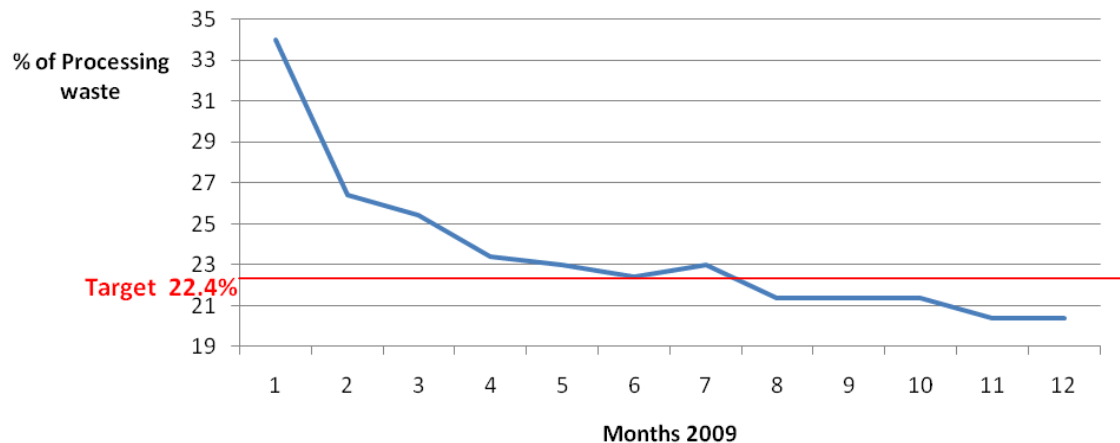
The teams at ABnote NZ started by defining the term “**processing waste**” as “**any activity performed that does not add value**” to the final product. With this broad but easy to understand definition, ABnote NZ staff began investigating where they were performing unnecessary tasks. These included all activities throughout the business that were seen to be ‘a waste of time’ causing a major amount of frustration.

The main forms of waste they identified were:

- Unnecessary staff movement to find, fetch and transport items.
- Waiting time, due to stock-outs occurring at point of use while machines were often underutilised.
- Defects, directly translating into raw material cost.

Tackling waste

A system was set up to record waste elimination per team and this was totalled for all of ABnote NZ site. The index was calculated by recording all the time team members spent on activities that had been identified as waste. The management team met on a weekly basis and reviewed progress. During 2009, the ‘processing waste index’ dropped from 34% to 20% as a result of this focused challenge to eliminate wasteful activities. This can be regarded as a productivity improvement of 14% for staff adding value.



Percentage of ‘processing waste’ measured across 2009

⁴ Competitive manufacturers have identified seven forms of waste:

1. Waiting 2. Overproduction 3. Too Much Inventory 4. Unnecessary Movement 5. Transporting products 6. Unsuitable Processing 7. Defects

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“When CM first started, finance was not involved in the process. I heard and watched what was happening and knew this would work for the whole business. It would be the method to relate what was happening in production and sales to the reality of finance. As I look around now I see so many people understanding what this business is all about, because we can all see how we are performing, as person, a team and a business. People realise now what their impact on the business is, either doing something or not doing something.” **Elsie Lim, Finance Manager**

Managing CM with downstream customers credit notes

Customers can cause many frustrations if they fail to pay their bills on time. In the finance department, credit notes were a major source of frustration. Irrespective if the customer owes \$1 or \$10,000 the process of them paying on time is the same. A standard procedure was created by the team and non-conformances recorded to determine the source of the frustration. Two areas were highlighted and problem solving commenced. Clearer understanding of the process was presented to the sales staff who initiated the value stream. Customers were also presented with this information and improvements started. The impact on cash flow has been positive since the focus on prompt payment was highlighted. The greatest benefit is the decrease in frustration as both staff and customers now understand what their impact on the financial staff is. The decrease in the amount of unnecessary work has freed up time to focus on value adding activities.

Managing CM with upstream customers time sheets

Staff time sheets are an essential part of running a business. The financial staff had endless frustrations due to non-conforming staff time sheets. The root cause of this situation was determined as a lack of understanding by team leaders who completed the time sheets on a weekly basis. More importantly, the team leaders themselves did not know how their work (the non-conforming time sheets) frustrated others. As the team leaders had by then already developed an appreciation for how to deal with ‘product non-conformance’ issues, they quickly realised their impact on timesheets and the performance improved very quickly.

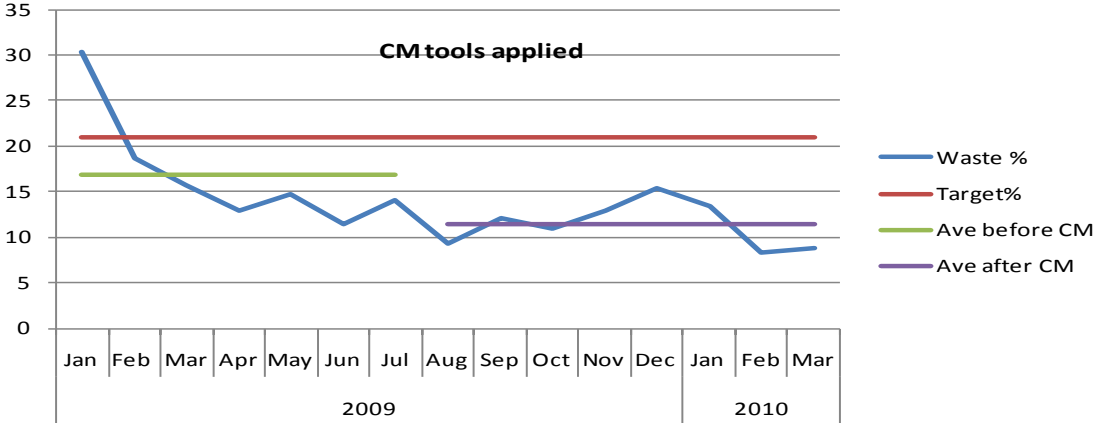
Let’s count every sheet we waste!

Many employees may have thought that counting every single sheet that was wasted was in itself a ‘waste of time’. However the offset printer team’s thinking about waste and competitive manufacturing had already progressed sufficiently. The team understood the truth in **“you can’t manage it [the waste], unless you measure it”**.

The team started counting any sheets wasted and by using their internal customer issue sheet they started eliminating any non-conformances of supply. They also worked on up-skilling their team to solve their wastage issues internally. This two-pronged approach has resulted in a decrease of wastage from highs of over 30% and an average of 16.9% to lows of 8.4% and an average of 11.4% over the past 15 months. A 5.5% reduction (on average) of waste (in this case equivalent to raw material cost) is a big success in any industry.

“To know what we are doing, we had to capture good data. We knew if we were serious about solving our waste problems, we had to measure! However we needed a simple method, otherwise nobody would use it. We set up a waste cage and recorded every single sheet wasted on a graph for all to see. Better still we also knew why waste occurred and could tackle that with the tools of CM. The results speak for themselves and instil a real sense of achievement in all of the team.”

Dougal Monteath, Team Leader.



Percentage waste reduction in the 'offset' process, Jan 2009 – Mar 2010

Training focussed on specific unit standards
 21504 Apply QCT, 21507 Interpret costs, 21515 Root cause analysis, 21521 Improve cost factors, 21524 Capability improvement, 21530 Map a value stream, 21533 Quick changeover procedures.

Specific skills and tools used were: value stream mapping, cause and effect diagrams, root cause analysis, internal and external change over, point of production, seven forms of waste, recording to gain accurate data, presentation of cost factors, cost/benefit calculations.

Overall Equipment Effectiveness (OEE) focus

ABnote NZ own and run over \$30m worth of highly sophisticated equipment that should produce quality products according to the manufacturer's specifications and customer's requirements. As the teams began analysing their machine data, they found that their performance was nowhere near, what manufacturers stated. Also as they measured the quality of products, these numbers were nowhere near where ABnote NZ wanted to be. The machines ran reasonably well, but improvement was definitely possible.

The CM Coach introduced the teams to the concept of Overall Equipment Effectiveness⁵ (OEE). It came as a shock to one team when they worked out the **OEE (quality x availability x throughput)** of their equipment. The effect of multiplication of the three elements of OEE reduced their overall percentage to 23%.

The team began to realise why their original benchmark numbers did not produce the overall results they wanted. Their new understanding of OEE called for a major paradigm shift, a shift in thinking more holistically about how they ran their equipment and production. All elements (quality/availability/throughput) would have to improve collectively and not be isolated from each other.

Solution

The three challenges, they were already working on, would eventually all work together to improve OEE.

- #1 Deliver orders full and on time with continuous flow,
- #2 Deliver quality products by doing things right first time, and
- #3 Minimise cost by eliminating wasteful activity and improve cycle time,

Two major bottlenecks were identified to be the Bureau and the Offset processes. Abnote NZ knew that just improving these areas would not significantly improve overall OEE, it had to be everyone. Each team focused on their constraint and began improving them as a priority.

Mini projects included:

- Pre-press - Workload pull
- Offset printing - Problem solving around material and ink changes
- Order management - Meetings to communicate OEE
- Finance - Volume of recycled material
- Embedding/licences - Waste performance measures

⁵ Overall equipment effectiveness is a hierarchy of metrics which focus on how effectively a manufacturing operation is utilized. The results are stated in a generic form which allows comparison between manufacturing units in differing industries. OEE measurement is also commonly used as a key performance indicator (KPI) in conjunction with lean manufacturing efforts to provide an indicator of success.

- Screen printing - Implement downtime codes for ink mixing, waiting, wrong screen and incomplete information
- Technical – improved maintenance and up skilling
- Supply chain – ensuring materials and information flow was known to all and consistent
- Bureau - Setting machine targets.

Results

Over a period of 58 weeks their collective efforts raised OEE from 23% to 73%. The beginnings were slow, little steps and also decreases occurred, but overall the trend in OEE was going up and gathering momentum. A 34.7% improvement has been achieved primarily due to a focus on the measurement and putting into practice the previous six months of learning. The Coach analysed progress and presented teams with new tools where these were required and helpful.

Their first big breakthrough came due to quick changeovers. This was a focus across all teams to decrease the time it took from the 'last good product out' to the 'first good product out'. Simple ideas put into practice made frustrations go away. The right tools, information and materials for each job made a significant 13.3% improvement to OEE.

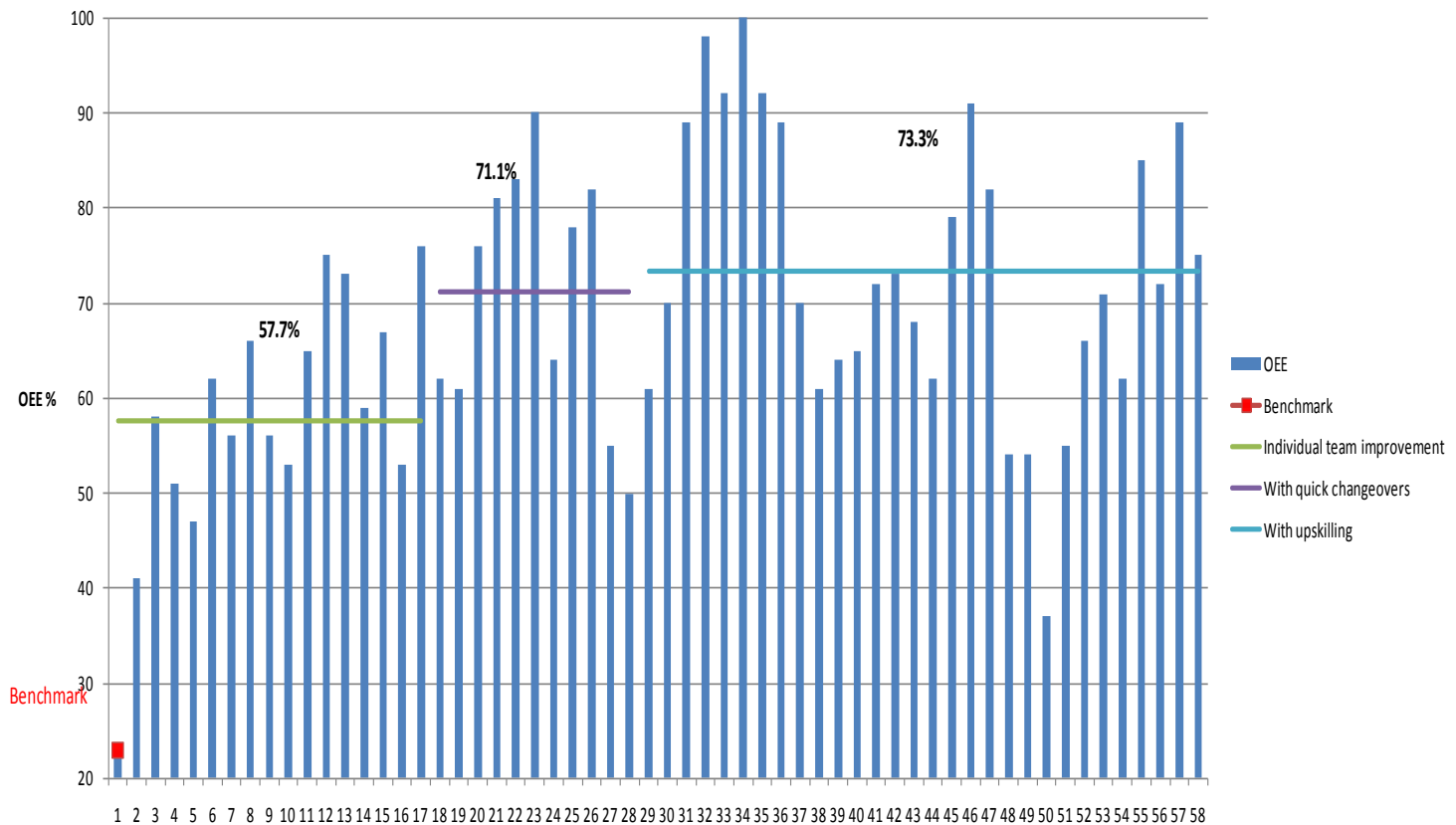
Everyone was happy about each percentage point improvement; however the coach reminded all that as you improve it gets harder to inch closer to 100%, which of course is a target you will never reach.

A second breakthrough was triggered by up-skilling. Only a significant shift in thinking of all team members has led everyone involved to understand another principle of Lean: The whole business only performs at the rate of its biggest constraint.

The upward trend of OEE would probably maintain momentum for some time ahead, with further up-skilling across all teams taking effect. However for now ABnote NZ employees are keen to learn how to consistently achieve 80% every shift, every day, every month.

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Overall Equipment effectiveness for all production centres



Overall equipment effectiveness for all production centres, from Jan 2009 to Feb 2010, in weekly intervals.

Training focused on specific unit standards focused on 21501 Apply CM practices, 21517 Implement a CM system, 21518 Ensure improvements are maintained and 21519 Lead change. (As OEE is a combination of all previous unit standards, they are not repeated.)

Specific skills and tools used were: understand roles, knowledge of upstream suppliers and downstream customers, value stream mapping, cause and effect diagrams, root cause analysis, leadership in change, project management, audit sheets and systems, visual management of KPI's, strategic value of OEE, all maintenance tools.

Embedding a culture of continuous improvement

“Setting up the system for all staff to engage was essential to me. On our wall, we have just three words, Ownership – Awareness – Responsibility. Ownership, we interpret to mean ‘seeing through the whole job from start to finish. Awareness implies what thinking we will apply to identifying and solving problems. Responsibility is completing the action or solving the problem. These three guiding principles keep us focused on sustaining our mission of getting better every day.” **Bryce Thomas, Team Leader**

Skills upgrade program

“After chipping off all the problems that were easy, and that was a major confidence booster, we realised that the next step would be to look at the skill levels. This would not be easy, but with John Ter Morshuizen coaching us, we managed the process to achieve our next breakthrough.” **Adrian Groskamp, Master Printer.**

Due to recent absenteeism, a shortage of skilled printers was exacerbated at ABnote NZ Christchurch. The consequent increases in lost time, overtime, and waste were simply not acceptable and the teams knew they could do better. The people involved agreed that there was an urgent need for up-skilling, eventually making all printers proficient on all printing presses. Those printers with limited knowledge and experience would be given the time and exposure to eventually master all printing presses.

This approach required one of the machines to be shut down and one producing 10% of the throughput was selected. The lower skilled operators were then paired up with their senior colleagues. A list of all essential printing press skills was compiled and each operator was mentored completing weekly assessments along the way. This skills upgrade programme brought about:

- Consistency: all three shifts are now capable of producing quality within standard times;
- Improved coverage: there are now backup printers available to step in when another is away;
- Learning: the teams are embracing continuous professional development;
- Efficiency gains: through a broadening skill base in each team.

An enthusiasm to learn from (and be taught by) a master craftsman in a Competitive Manufacturing environment was a good indicator of the successful embedding of a continuous improvement culture within the company.

Measure, analyse, reflect, next target

“The best part of CM was the creation of a new common language. In this way, we can now better understand what is going on. The graphs in each work area tell everyone what the performance is.” **Peter Boekholt, Supervisor**

With the wide use of visual management score boards everyone focused on improvement. After a year’s worth of accurate recording and display, new targets could be set from data known to all staff.

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	2009		2010		Improvement over 2009
	Target	Actual	Target	Actual	
Waste #1	0.50%	0.20%	0.14%	0.12%	76%
Waste #2	0.50%	0.15%	0.10%	0.08%	84%
Throughput	360	400	450	442	23%

Table illustrating target vs actual levels of two types of waste and throughput for 2009 and 2010

The table shows how embedding continuous improvement keeps raising the bar. Today the team is comfortable with the new targets as they have gained confidence over the past year. They are now familiar with the tools and methods to eliminate more waste in the new period.

Productivity improvement through structured training

Starting with the 'end in mind', gave ABnote NZ the focus required to achieve results.

Management at ABnote NZ have made a conscious decision to harness the skills, experience, and creativity of each one of their employees. Through structured training in competitive manufacturing tools and techniques they have empowered their people to make a difference and achieve positive change.

A total of 794 unit standards (equating to just under 3900 credits) have been achieved by 81 staff on site and at completion rate of 80% (to date). Note that at the time of writing the 20% still active were set to complete their qualifications within the following six months.

	Unit standards	Staff Started	Staff Completed	Credits
Level 2	610	80	61	2745
Level 3	160	19	16	848
Level 4	24	5	4	296
Total	794	104	81	3889

Table illustrating the number of staff, units, and credits covered by CM training

The following tables demonstrate the unit standards staff completed to gain their National Certificates in Competitive Manufacturing.

Unit #	21501	21502	21503	21504	21505	21507	21508	21515	21516	21333
Leverage on	Morale	Delivery	Morale	Cost	Delivery	Cost	Safety	Cost	Quality	Delivery
2008 – 2010 completions	61	61	61	61	61	61	61	61	61	61

Unit standards completed by all Operators, Level 2

This allowed 61 operations staff to complete their Level 2 National Certificates in Competitive Manufacturing with skills and knowledge that related to their contribution to workplace improvements at ABnote NZ.

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Unit #	21501	21502	21503	21507	21515	21520	21523	21524	21529	21333
Leverage on	Morale	Delivery	Morale	Cost	Cost	Delivery	Safety	Cost	Quality	Delivery
2008 – 2010 completions	16	16	16	16	16	16	16	16	16	16

Unit standards completed by Team Leaders, Level 3

This allowed 16 Team Leaders to complete their Level 3 National Certificates in Competitive Manufacturing with skills and knowledge that reflected their input into the team improvements at ABnote NZ.

Unit #	21517	21518	21519	21521	21528	21530	21533	21537
Leverage on	Morale	Delivery	Morale	Cost	Quality	Cost	Cost	Safety
2008 – 2010 completions	4	4	4	4	4	4	4	4

Unit standards completed by managers

This has seen 4 managers complete their Level 4 National Certificate in Competitive Manufacturing confirming they have skills and knowledge to lead CM in the workplace. A further 11 of the team leaders are moving on to complete this qualification in the next phase of structured training.

ABnote NZ's approach was a win-win for business results and staff certification in CM. Staff were able to acquire certified transferable skills, while the impact on the bottom line of the business speaks for itself. A variety of waste, amounting to an estimated \$500,000, has been mined over the first 18 months of the programme alone.

However the benefits to the business don't stop there. Tools and techniques have been gradually introduced and the coach closed off any gaps with each staff member. The employees' new skills have been applied and tested by everyone involved. ABnote NZ have managed to prepare their most valuable resource, their people, for an exciting and successful future ahead. It is this engagement of every individual that will keep ABnote NZ competitive in the global market place for years to come.

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Investment in training time

Over the two-year period, a total of 28,132 hours were dedicated to CM training, coaching, and projects. On average means 4.5 hours per week were invested to holistically improve the business and develop staff.

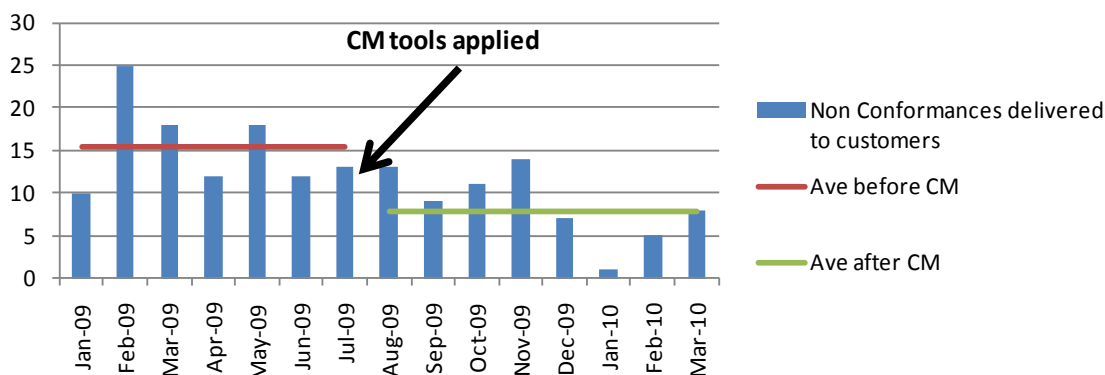
	Investment in hours per staff member					Total hours invested for the whole site
	Training	Follow-up	Internal Coaching	Projects	Total	
Level 2	23	12	122	165	<u>312</u>	19,032
Level 3	40	40	80	290	<u>450</u>	7200
Level 4	50	120	80	225	<u>475</u>	1900

Table illustrating the amount of time invested into CM activities within ABnote NZ

“The ultimate accolade was when the CEO of ABnote visited with the senior managers and declared that we were the benchmark site in the world and the rest of the company must follow. Then I knew we were on the right road.

ABnote NZ supervisors and managers say that managing the business has become far easier as staff take on responsibility for their results, because they understand how they impact performance. Frustrations have been systematically decreasing. A ripple effect in performance culture has developed as teamwork has grown through the confidence gained in quick results through the application of new skills. Employees at ABnote NZ now have a deep-rooted understanding that they are either part of the problem or part of the solution. With their new CM skills they now know how to be part of the solution!” Steve Morgan, Plant Manager

Irrespective what the business does, in a global market place, it must lead to serving the customers better, cheaper and faster. The graph below shows that from the time the CM tools and methods began taking an effect, the non-conformances have dropped by 50%. This shows that during the past 18 months through everyone’s efforts, ABnote NZ have been delivering a better product and service to their customers.



Amount of non-conforming product delivered to customer, Jan 2009 to Mar 2010

A personal journey of learning – What the employees say

Glenda Allott, Human Resources Manager

“The CM programme that was undertaken by ABnote was instrumental to a huge cultural shift within the organisation. I have never worked for any organisation that has had the opportunity for every employee to be coached and guided to setting their departmental goals, managing their processes in achieving these goals and gaining unit standards along the way. These goals were all aligned to the company objectives, and as such lead to a huge improvement in the company's bottom line. Before CM, training staff had very little input into improvements and no one had the time or the skills to teach them how to identify and undertake improvements. Managers are now acting as coaches and encouraging and supporting the growth of their staff.”

Paul Williams, Production Manager

“The power of CM qualifications for the lean methodology lies in the staff grasping their responsibility as a full team member and then giving them the tools to assist in identifying, find root-causes, and developing a countermeasure that has buy in from the team as well as the staff upstream and downstream. From that flows the new thinking that training both upstream and downstream staff in your role adds value to everyone. Likewise, staff reciprocates in training the staff member that has just trained them in their role. The pleasure I took from this was with all the efforts from everyone, we saw this transform the bottom line of the business. That is when I fully believed that what we were doing was the right thing, not just doing things right. The platform we have created has influenced how staff on the shop floor see their role of work.”

Tony Cook, Day-shift Team Leader

“After being in this business for 16 years, I know everyone wants to help solve problems. When CM arrived the lessons we learnt was “How to help solve problems”, something all of us had never formally trained in together as a team. We now communicate very differently than was the case two years ago. A major change and everyone is much happier at work. Our staff are multi-cultural, and CM has levelled the playing field because it gave us focus and a method to respectfully work together.”

Paul Naylor, Technical Manager

Once again, our people now have the tools to assist in solving this constraint. The manner in which John Ter Morshuizen has brought lean to ABnote is not hierarchical as many other companies and consultants I have heard of, and this has been the heart of the success we have had.”

Appendix

The following table lists the full detail of the unit standards referred to in this case study. Further detail can be obtained from the NZQA website at www.nzqa.govt.nz.

NZQA ID	Title	Level	Credit
21501	Apply competitive manufacturing practices in a competitive manufacturing organisation	2	5
21502	Sustain process improvements in a competitive manufacturing organisation	3	3
21503	Manage the impact of change on own work in a competitive manufacturing organisation	3	3
21504	Apply quick changeover procedures in a competitive manufacturing organisation	2	5
21507	Interpret product costs in a competitive manufacturing organisation	3	5
21508	Apply 5S procedures in a competitive manufacturing organisation	3	5
21515	Undertake root cause analysis in a competitive manufacturing organisation	3	5
21516	Contribute to a proactive maintenance strategy in a competitive manufacturing organisation	3	5
21333	Demonstrate basic knowledge of workflow management in a manufacturing environment	3	4
21517	Implement a competitive manufacturing system in a competitive manufacturing organisation	4	10
21518	Ensure process improvements are sustained in a competitive manufacturing organisation	4	8
21519	Lead change in a competitive manufacturing organisation	5	8
21520	Facilitate a Just in Time (JIT) system in a competitive manufacturing organisation	4	5
21521	Improve cost factors in work practices in a competitive manufacturing organisation	4	5

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NZQA ID	Title	Level	Credit
21523	Lead 5S in a competitive manufacturing organisation	4	5
21524	Undertake process capability improvements in a competitive manufacturing organisation	4	10
21528	Undertake proactive maintenance analyses in a competitive manufacturing organisation	5	8
21529	Assist in implementing a proactive maintenance strategy in a competitive manufacturing organisation	4	8
21530	Analyse and map a value chain in a competitive manufacturing organisation	5	10
21533	Develop quick changeover procedures in a competitive manufacturing organisation	5	10
21537	Manage a 5S system in a competitive manufacturing organisation	5	15

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ACKNOWLEDGEMENTS

The CMI Consortium wish to recognise the assistance of the following:

The Tertiary Education Commission of the Department of Education of New Zealand for funding of this work.

ABnote NZ Limited for their openness and willingness to have their story told as an exemplar site in New Zealand. Specific thanks to Glenda Allott, Tony Cook and Paul Williams for their input into making this case study possible.

John Ter Morshuizen of Just Performance as CM coach, for the excellent insights into the ABnote NZ journey to date. john@justperformance.co.nz

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