

Case-study of Competitive Manufacturing

Jucy by Design
Helensville, December 2010



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Case Study Reference

This case study should be read in conjunction with the combined NZ MARINE ITO case study. The case studies can be found at www.cmi.org.nz under the case study tab.

The four case studies combined within the NZ Marine ITO executive summary are:

- 7-1 NZ MARINE ITO Case study
- 7-2 Jucy by Design
- 7-3 Formula Cruisers
- 7-4 Black Pearl Fibreglass and Work and Play Trailers
- 7-5 Stabicraft

Background

The company was in the composites manufacturing business before becoming *Jucy by Design*, the manufacturing division of *Jucy Group Ltd*. Jucy is a New Zealand owned and operated car and campervan Rental Company servicing the Australian and New Zealand market.

Over 30 staff are employed at the Helensville site which is responsible for the design, manufacture and complete interior vehicle fit out. *Jucy by Design* also strips, paints, panel beats and performs full mechanical overhauls within the factory.

As a result of the expansion of the business during the year and with a focus on social responsibility, employees were almost exclusively hired from within the Helensville community.

Situation

Starting with 10 employees in April 2010, the company faced the ambitious task of completing 250 campervans by the end of the year. Utilising QCD Systems¹ methodology and coaching, the small team set out to reduce any form of waste from their processes.

Firstly, the process was mapped to determine the time and most cost effective way to complete the project. Recording of standard times for each sub-process helped determine the process sequence, layout, and target workload for each workstation.

Secondly, standard operating practices were put in place for each workstation ensuring consistency of product quality, cost and delivery. This resulted in work flow, factory layout, and station set ups being improved through the rigorous documentation of the best practice at the time.



Lean
X Marine
Thinking =



Figure 1: Transformation of a van into an experience.

¹ Quality, Cost, Delivery (QCD) as used in lean manufacturing measures a business's activity and develops Key performance indicators. QCD analysis often forms a part of Continuous Improvement Processes. QCD offers a straight forward method of measuring processes while being applicable to both simple and complicated business processes. It also represents a basis for comparing businesses. (Source: qcsm.com)

Focus on Induction and Up-skilling of new Team Members

At the beginning of the 250 campervan challenge the small team sketched out a vision of a manufacturing and assembly line capable of meeting the challenge offered by Jucy. This was a critical first step.

As additional members joined the team a detailed flow chart of work (Figure 2) was drawn up. During their induction new employees were shown the process map and walked through each stage. This allowed them to understand the value stream and who their upstream and downstream customers were. New team members understood from the beginning why constant flow of manufacture, assembly and inspection were critical to achieving delivery deadlines.

“One of the most important steps to maintaining the culture of ‘Continuous Improvement’ in the company is to ensure all new employees are inducted appropriately. Special emphasis is placed on not only how we do things but also the benefits to both employer and employee of following these processes”.

Roimata Ruhe-Hodge

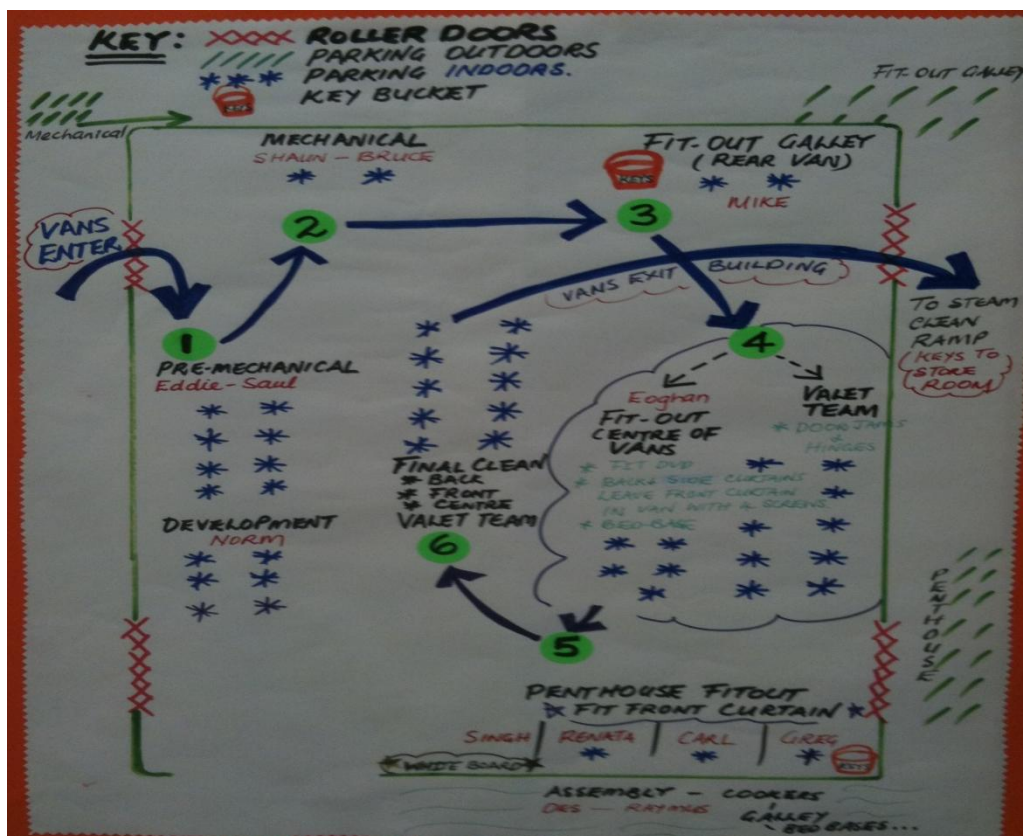


Figure 2: Process flow chart illustrating the fit-out of ‘Jucy’ vehicles.

Coaching and mentoring during the training process were essential tools to help equip new team members with the necessary skills to perform their tasks. At *Jucy by Design* Detailed Process Sheets² (DPS) were the bases to ensure consistency of training results.

² A Detailed Process Sheet (DPS) is a living document in that once it is implemented as the 'standard' for a process; it becomes the basis on which gradual and continuous improvement is built. (Source: qcdsm.com)

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New staff that required up-skilling to perform a task they had not attempted yet were trained from a DPS (sample DPS see Figure 3). A skilled team member demonstrated how the task was completed by following the DPS while the trainee watched. This was usually repeated to ensure all the nuances of the new task were also conveyed. The trainee then attempted the task while the DPS was read and followed. The new task was then practiced until the delivery was within time and quality specification.

This simple method ensured that any up-skilling happened in the shortest possible time while achieving required results. None of new team members hired during the project had any prior experience or training in campervan fit-out, yet they performed their set of tasks producing a minimal amount of defects.

| Laminating Shop DPS | | | | | Notes... |
|---|----------------|-----------|--------------------------|-------------|---|
| Mould | Seat Base | | | | Gelcoat required 1.1 Thickness 20-25 mm |
| Gel Coat Colour | White | | | | |
| Mould Release System | Zyvax Z3.0 | | | | |
| Layer | Glass | m2 | Resin Required KG | Time | |
| 1 | 1 x 300 CSM | 2.16 | 1.3 | | Entire surface |
| 2 | 1 x 450 CSM | 2.16 | 1.9 | | Entire surface |
| | Coremat Strips | 0.1 | | | Opposite rounded corner side, seated into bottom corner and flat on vertical face |
| | 1 x 450 CSM | 2.16 | 1.9 | | Entire surface |
| | | | | | Last layer with white resin |
| Release Method | | | | | *Important * As this step has the potential to destroy the mould and article and cause serious injury. Do not attempt until you have been trained and are competent |
| Tap blunt nail into blow hole situated on underside of mould (light tap just to release article from mould surface, a hard tap would result in the nail going through the article). Using appropriate air gun place nozzle into hole and apply very low bursts of air pressure into hole. When mould pops continue blowing air in as you lift off article | | | | | |

Figure 3: Detailed Process Sheet (DPS) sample for the Laminating Shop

“The biggest change that has assisted me since the implementation of TRY-Z³ is the ability and ease of tracking the parts produced and the quality. As this is done on a daily basis I am able to pin-point any problem areas or issues and deal with them immediately. The communication between me and our staff in the greenroom meetings is highly beneficial.”

Tony Clayton

³ Try Z (or "Trial Zero") is a three-step procedure. The name TRY Z is derived from a process common to the automobile industry. It refers to a method whereby model changes for production are made. When changes to a current model unit or to a new model unit at preproduction stage are imminent, the model unit is laid out in an assembly hall separate from normal production. All concerned with the development of that model unit, including production personnel, begin to assemble the unit from scratch, documenting their activities. (Source: qcdsm.com)

Focus on communication within the business

Team communication

Green Room meetings⁴ each morning were a vital communication link that ensured each staff member was aware of important issues and of what was expected of them for the day. During a Green Room meeting new ideas were discussed and decisions were usually made on the spot in a collaborative manner. If the suggestion was of value it was put in place immediately wherever possible.

The ‘first-level’ Green Room meetings were held daily and preceded the ‘second-level’ meeting by managers. These meetings focused on the tasks at hand through visual management improving effective communication at all levels.

Visual management

The visual management scoreboard (Figure 4) illustrates how the fibreglass lamination team recorded their progress on a daily basis. They regarded the scoreboard as a pivotal tool in the management of resources required to produce 2 sets of 23 parts each per day.

Tracking the number of parts enabled the team to structure overtime and any down time in a way that sets were completed without disrupting the essential 2 sets per day routine.

| MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY | BOI | Target |
|--------|---------|-----------|----------|--------|-----|--------|
| 5/9 | 6/9 | 7/9 | 8/9 | 10/9 | 90 | -5 |
| 1 | 1 | 1 | 1 | 1 | 86 | -3 |
| 2 | 2 | 2 | 1 | 1 | 92 | -6 |
| 2 | 1 | 1 | 1 | 1 | 85 | -2 |
| 2 | 2 | 2 | 2 | 2 | 84 | -4 |

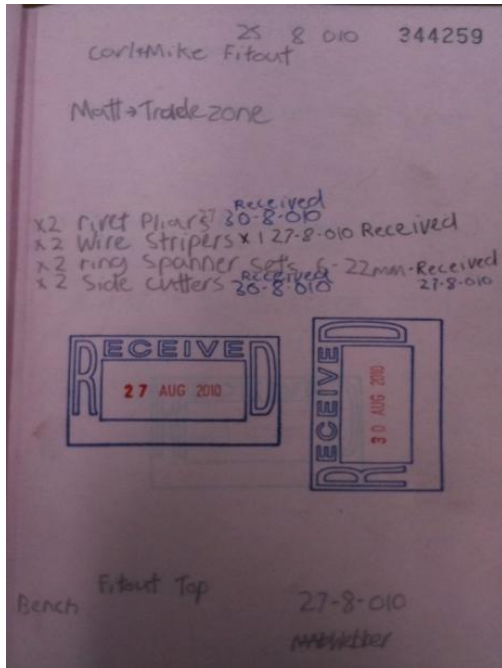
Figure 4: Scoreboard of the fibreglass lamination team scoring their progress

Through using visual management systems staff could track their daily performance and record and resolve issues if standards were not being met. This was a very important step in ensuring that staff took ownership of their workstations and pride in their work.

The ‘white-boards’ typically showed the daily plan with tasks and a two-week production forecast. Each team had its own visual management white-board.

⁴ The QCDSM System is built around the simple concept of involving the people of an area who do the work in the day to day management of their area, not only by just working in the area but by actually taking control of their area. QCDSM does this by establishing a structure within the company known as the Green Room Meeting process. The Green Room is designed to be the data centre for the group. They meet in this centre either daily at the beginning of each shift, weekly in service areas and management areas, for the sole purpose of examining how well they did during the period since their last meeting. (Source: qcdsm.com)

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"It was a nightmare just to keep the staff informed of where their orders were. Some of the ideas from QCD have definitely made my work day easier and more organised."

Matt Webber

Half of Matt's day was taken up answering questions and chasing orders. A very simple system was developed to streamline the process. All orders placed with Matt were recorded in an order book (see Figure 5)

The requirements were recorded along with the order date, the supplier details and the expected time of delivery. The white copy was torn out and kept on a clipboard until the order was received then it was attached to the packing slip. This meant that orders that hadn't been filled by suppliers could easily be followed up; it was all there on the clip board!

Figure 5: Order book, sample page

As part orders were sometimes received the back orders were also recorded on the duplicate page. Mark reckoned the system suited perfectly and due to its simplicity (just one page) they had no issues with incorrect or unfilled orders. The system also had the added benefit of providing a permanent record of specific order data and supplier details for future reference.

Making the fit-out work easier

As the team became engaged in their work and found continuous improvement a value practiced every day, ideas for improvements started flowing. Even after hours, when enjoying an after work BBQ, ideas were thrown around as to how to improve the factory and the products produced.

The team that installed the 'penthouse' sleeping cabin on the roof top of the camper found it difficult to achieve their targets without compromising on quality. Climbing up and down ladders many times a day did not add value and a solution to the issue was overdue.

The team came up with a mezzanine floor design that would not only save time and allow for storage but was also a much more stable and safe platform from which to fit the penthouses.

A builder was contracted to construct the 3 bay raised floor and did so within 4 days.

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Figure 6: Mezzanine platforms make the installation of roof-top sleeping cabins easier and safer.

"Having the mezzanine has helped me to focus on the task of fitting the penthouses instead of spending so much time figuring out how to safely co-ordinate the boys using ladders and a scaffold."

Carl Mitchell

During the TRY-Z course attendees were shown how simple self-made jigs could dramatically improve quality and delivery times. This combination increased accuracy and productivity allowing staff to work smarter, not harder. There were over 200 different components that required precise fitting in sequence into each campervan. A number of simple jigs (see Figure 7) have been made to ensure that this can be achieved.



Figure 7: Sample jig helping to improve quality and delivery time

"The jigs have given me the confidence to know that I am doing my job right."

Raymus Povey

Balancing production

There were 23 fibreglass parts to be made to specification for each fit-out and two sets required per day. These parts were made following a DPS. Quality was checked daily to ensure that any defects were addressed immediately and processes refined.

The 23 parts varied in size, complexity and material. This meant that the preparation, glass cutting, resin mixing, gel coat application, lay-up, and curing times all needed to be balanced systematically to ensure the required 2x23 parts could be produced within a 9 hour working day.

In the beginning production of individual parts was unbalanced and sporadic, meaning smaller, easier parts were oversupplied while more complex moulds took longer to produce, delaying production.

The team was aware of the issue and addressed it by applying TRY-Z measuring tools to achieve a just in time production of all required parts. Today the production of fibreglass parts can be described as well balanced. (see Figure 8) The team was able to catch up on a backlog of larger parts and finished 150 sets on schedule with only a 3% defect rate.

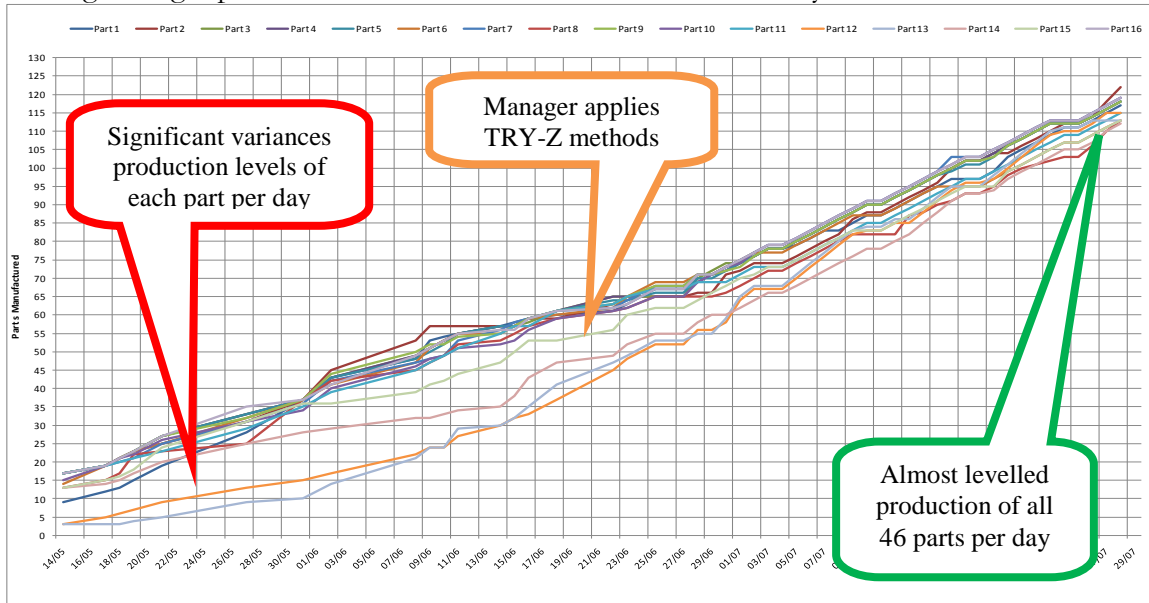


Figure 8: Variances of production levels of each fibreglass part, mid-May to end of July 2010



Figure 9: Some of the team ready to take on the fit-out of 250 campervans

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“The implementation of the QCDSM system has seen Jucy By Design transform its business. We have seen a marked increase in productivity and decrease in defects which has ultimately resulted in a better product for a cheaper price. The buy in from our staff has been key and the daily Green Room meetings have given them the opportunity to make suggestions and also deal with any issues there and then rather than days or weeks down the track. The transformation has been great to see.” **Dan Alpe, Chief Executive**

“I have found the QCDSM system and templates valuable instruments in recording, evaluating and enhancing the efficiency of the processes that we have in place. The support, advice and encouragement provided by Willem and Peter have assisted greatly in upgrading and/or implementing systems and procedures. Processes are only as good as the people driving them. Daily monitoring and following up on issues and ideas promptly encourages everyone to buy-in to the ideology of continuous improvement. This culture is fundamental in the success of any company. My hope is that we will continue to improve ourselves, each other and the way that we operate as a company. By continuing on this trajectory we are set to take on the world!” **Anita Ruhe-Hodge**

Training focussed on specific unit standards

- 8087 – Use core quality tools,
- 21501 – Apply CM practices,
- 21502 – Sustain Process Improvements,
- 21503 – Manage Change,
- 21504 – Apply quick changeover,
- 21505 – Apply Just in Time,
- 21515 – Root cause analysis,
- 21507 – Interpret costs
- 21332 – Establish improvements
- 21333 – Basic workflow.

These enabled all members of the team to actively participate in identifying and initiating improvement actions.

Specific skills and tools used were:

7 quality methods, QCDSM measures, check-sheets, Internal external changeovers, Flow and pull authorisation, customers and suppliers, workplace improvement, visual management,

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 |
|---------|---|-------|--------|
| 8087 | Use core quality management tools | 3 | 5 |
| 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 |
| 21505 | Apply Just in time procedures in a competitive manufacturing organisation | 2 | 5 |
| 21507 | Interpret product costs in a competitive manufacturing organisation | 3 | 5 |
| 21515 | Undertake root cause analysis in a competitive manufacturing organisation | 3 | 5 |
| 21332 | Demonstrate basic knowledge of establishing improvements in a manufacturing environment | 3 | 2 |
| 21333 | Demonstrate basic knowledge of workflow management in a manufacturing environment | 3 | 4 |

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