Automotive Component Supplier Development Programme (ACSDP)
Case Studies
2011 - 2013
Introduction

South African companies are increasingly exposed to global market pressures. This forces the companies to continuously improve their business processes and strategically implement and design processes which can help improve product quality, reduce costs and enhance delivery performance. These improvements can only be achieved through strategic planning and innovative thinking coupled with direct interventions at shop floor level.

The AIDC was established to address the needs of the industry, with an objective to provide a programme of Continuous Improvement. The AIDC developed a manufacturing competitiveness programme in 2002 in partnership with CII (Confederation of Indian Industries) and UNIDO (United Nations Industrial Development Organisation) named ‘Tirisano’, for South African Automotive Suppliers. The Tirisano programme has since been one of AIDC’s key programmes for supplier development and has been implemented in more than 120 South African Automotive Suppliers. In 2009 due to the success of the programme, the dti approved a 3 year contract project managed through UNIDO whereby the AIDC is contracted to implement an Automotive Component Supplier Development Programme (ACSDP) with 65 national automotive companies within South Africa over a three year period.

The focus of this programme is to improve supplier competitiveness through the implementation of lean manufacturing tools targeting safety, quality, cost, delivery, energy efficiency and morale whilst simultaneously transferring the Continuous Improvement skills and tools to the clients’ selected teams. This is done through the training of the selected teams on the shop floor, in the targeted areas, addressing the wastes and bottlenecks. During the programme a learning-by-doing approach was taken. At the end, the improved processes were measured and quantified in a selection of measures. Due to the nature of the Automotive Component Supplier Development Programme, process/competitiveness improvement can be associated with benefits like reduced overtime, increased productivity, reduced energy consumption, and improved utilities management.

The case studies contained within this document highlights the journey and achievements of 11 companies that participated in the Automotive Component Supplier Development Programme. The case studies aim to provide an insight into how the programme is implemented within an organisation from conception through to implementation and final handover to the company. There is also a summary of the benefits and savings that each company realised at the end of the programme. A comprehensive report about the whole ACSDP is also available.

Acknowledgements

The AIDC would like to acknowledge the following personnel for their contributions and assistance in compiling and reviewing the case studies contained within this document:

- The dti for affording the AIDC an opportunity to implement this programme
- ALL 65 companies that participated and contributed to the success of the programme
- UNIDO for their support as the programme managers
- NAACAM, the OEM Purchasing Council and NAAAMSA for their advisory role on this programme
- All AIDC project managers, interns as support staff for their dedication and assistance in realising this programme
- Nkumbuzi Ben-Mazwi, Arthur David, Bianca Jagger, Claude Pillay, Lance Schultz and Zahier Ebrahim for reviewing the individual case studies.
Company Background

Atlantis Foundries produces automotive castings in the form of engine blocks for the commercial vehicle industries. The company supplies light, medium and heavy duty engine blocks to Mercedes-Benz, MAN, Ssangyong Motors, Perkins and Detroit Diesel. Atlantis Foundries is wholly owned by Mercedes-Benz South Africa and was established on the 12th of March 1979.

The Atlantis Foundries plant is situated in Atlantis, approximately 50 km north of Cape Town. The foundry has the capacity to melt 450 tons of cast iron per day with engine blocks ranging in size from 200 - 500 kg.

The company’s business certifications include ISO/TS 16949 and VDA 6.1, which is a German quality management system.

Key Challenges Faced

Atlantis Foundries is one of the highest energy consumers in the Western Cape. The company is faced with the challenge of reducing the energy consumption in the form of:

- Electricity Consumption
- Gas Consumption
- Demand Control

Goals

- Reduce the company’s overall energy bill by R 5,000,000 per annum.
- The Implementation of a sustainable Demand Control system.

Programme Journey

The AIDC met with the Senior Foundry Manager for Atlantis Foundries in June 2011 to discuss the feasibility of a Cleaner Production Programme at the company. The company requested that an initial audit should be performed to highlight potential areas for improvement.

As a second step a SWOT analysis was completed to establish opportunities for improvement in terms of:

- Lighting Optimisation
- Motor Optimisation
- Demand Control Optimisation
- Compressed Air Optimisation
- Production Load Shifting
- Gas waste reduction

Based on the findings in the AIDC SWOT analysis, Atlantis Foundries signed up for a Cleaner Production Programme.
Programme Journey Continued

A project plan was drawn up to prioritise the implementation of identified projects and a Value Stream Map was completed of the Foundry to identify more potential projects. The project implementation plan followed in the order of:

1) Replacement of factory and office lights

Activities: The project was implemented during the plant shut-down in December 2011. Over four thousand energy saving lights were installed.

Benefits: The installation of energy saving lights saved Atlantis Foundries 1,183,069 kWh per year with a return of investment of less than 3 months. The project did not only allow for significant energy saving but it also improved the overall plant lighting and office lighting.

2) Switching off – Furnace extraction Fans

Activities: The initial setup in the plant did not allow for the extraction units to be switched off when no extraction was required causing the units to idle and waste energy. The new panels installed allow for the switching off of the furnace extraction fans when no extraction is required.

Benefits: The project generated savings of over 232,000 kWh per year with a return of investment of just under 3 months.

3) Demand Control Optimisation

Activities: The project required production to be stopped in the Foundry for a day to connect the new demand controller to the melting furnaces. The project also required contractors from Germany to assist with the implementation in the Western Cape.

Benefits: The demand controller was successfully implemented and the installation was the first of its type in South Africa saving Atlantis Foundries 5,000 kVA per month. The demand controller regulates the electricity usage of the melting furnaces, reducing the overall maximum demand while ensuring melting continues uninterrupted.

4) Ladle Heater Optimisation

Activities: This project scheduled for implementation at the company was focused on reducing the gas usage in the melting area, the ladle heater used to maintain the high temperatures of the transport ladles was inefficient. A new efficient ladle heater was implemented in May 2012.

Benefits: Reducing the gas usage of the ladle heater by 17%, saving 9 kg of gas per hour in the form of LPG. The implementation of this project yielded saving of 40,000 kg of gas per year with a ROI of 4 months.

5) Production Load Shifting

Activities: The AIDC also implemented a production load shifting program in June to August 2012 to reduce to electricity consumption in the peak zones to avoid high electricity costs. The project included the stoppage of melting in the plant from 7am to 10 am weekly. During these times training of employees, cleaning and maintenance were performed.

Benefits: The project had no implementation cost and generated savings of 2,100,000 kWh for the winter period of June 2012 to August 2012.
Atlantis Foundries Cleaner Production
Tirisano Cluster Programme

Before

After

Figure 4 & 5: The Before and after pictures of the office lighting optimisation project with energy savings and improved luminance. Note the increased lighting visible

Figure 6 & 7: The before and after pictures above of the Demand Control Project.

Master Programme Plan

<table>
<thead>
<tr>
<th>Item</th>
<th>Objective Description</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inception reports and business case</td>
<td>S O N D J F M A M J J A</td>
</tr>
<tr>
<td>2</td>
<td>SWOT Analysis and feedback workshops – Goal Alignment</td>
<td>S O N D J F M A M J J A</td>
</tr>
<tr>
<td>3</td>
<td>Subproject 1: Lighting Optimisation, Compressed Air Supply and Demand Project</td>
<td>S O N D J F M A M J J A</td>
</tr>
<tr>
<td>4</td>
<td>Subproject 2: Switching Off Unused Motors, Demand Control and Ladle Heater implementation</td>
<td>S O N D J F M A M J J A</td>
</tr>
<tr>
<td>5</td>
<td>Subproject 3: Production Load Shifting and Power Factor Correction</td>
<td>S O N D J F M A M J J A</td>
</tr>
<tr>
<td>6</td>
<td>SWOT analysis and planning for Cleaner Production Phase II</td>
<td>S O N D J F M A M J J A</td>
</tr>
</tbody>
</table>

Benefits (KPI’s)

The AIDC implemented savings at Atlantis Foundries of over 7,000,000 kWh and 40,000 kg LPG gas per year with a total project return on investment of under 10 months. These savings were also confirmed by the company’s finance department who tracked the savings off the monthly energy bills.

<table>
<thead>
<tr>
<th>KPI</th>
<th>Before</th>
<th>After</th>
<th>% Improved</th>
<th>Value of Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting Optimization</td>
<td>0 energy saving lights installed</td>
<td>&gt;4000 energy saving lights installed</td>
<td>80%</td>
<td>1,183,069 kWh</td>
</tr>
<tr>
<td>Demand Control</td>
<td>29,000 kVA</td>
<td>24,000 kVA</td>
<td>17%</td>
<td>5000 kVA</td>
</tr>
<tr>
<td>Ladle Heating</td>
<td>9 kg/hour wasted</td>
<td>0 kg/hour wasted</td>
<td>50%</td>
<td>40,000 kg LPG gas</td>
</tr>
<tr>
<td>Switching Off – Furnace Extraction Units</td>
<td>0 hours per week</td>
<td>24 hours per week</td>
<td>14%</td>
<td>232,000 kWh</td>
</tr>
<tr>
<td>Training – Demand Control</td>
<td>0 employees</td>
<td>10 employees</td>
<td>100% for department</td>
<td>N/A</td>
</tr>
<tr>
<td>Production Load Shifting</td>
<td>0</td>
<td>3 hours per day</td>
<td>60%</td>
<td>2,100,000 kWh</td>
</tr>
</tbody>
</table>
Atlantis Foundries Cleaner Production
Tirisano Cluster Programme

Key Learning Points
The lighting optimisation project was the first project for the programme since it assisted in generating quick savings and creating investment for other cost generating projects. Capex was raised for more energy saving projects at the company as a result of the successful implementation of the lighting project.

Worker involvement and management support is essential in ensuring process improvements are sustained. All departments need to work together in order to solve problems effectively.

Sustainability
The AIDC has programmed the Demand Controller to ensure the sustainability of demand optimisation at Atlantis Foundries. The program automatically regulates the maximum demand of the plant with no human input required. The team leaders and supervisors of the company’s melting department have also been trained to operate and program the demand controller.

After the installation of the lighting-optimisation project the AIDC changed the current stock codes for the Foundries Maintenance team to ensure only energy saving lights will be used to replace old inefficient lights in the future. This includes a three year maintenance plan on all energy saving lights in the plant and offices to secure sustainability of lighting optimisation at Atlantis Foundries.

Way Forward
Atlantis Foundries has increased their environmental awareness since the start of the Cleaner Production Programme at their facilities. The company has extended the AIDC’s contract for another 12 months until end of August 2013.

The AIDC Cleaner Production Phase II Programme at the company will focus on further energy savings in the form of electricity and gas. The scope of work will also include water waste reduction and the implementation of an energy management system for the company.

The Phase II Programme will also include a renewable energy project for the company. This project will include a feasibility study of constructing a renewable energy plant consisting of wind, solar and bio-fuel power.

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Autocast Port Elizabeth
Tirisano Cluster Programme

Company Background

Autocast Port Elizabeth is an iron cast foundry situated in Neave Township Port Elizabeth. Autocast produces engine components and is a Tier 1 supplier to Ford, VW and Toyota. The foundry was established in 1981 by Murray and Roberts and later acquired by Halberg Guss Germany in 2007. The company was recently taken over by Standard Bank and renamed Autocast South Africa.

The iron cast foundry’s material competencies include SG and SiMo Grey cast iron. Autocast manufactures over 25 different automotive components including exhaust manifolds, catalytic converter cones, axle components, bearing caps and crank shafts.

Key Challenges Faced

Autocast is one of the highest consumers of energy in the Eastern Cape region with energy consumption of over 45,600,000kWh per annum.

The company needed to conserve energy with a focus on:

- High levels in demand
- High energy consumption in kWh’s
- Gas waste
- Inefficient machinery
- Lack of energy performance measurements

Goals

The recent large increases in energy costs in South Africa have resulted in Autocast losing its competitive advantage in relation to its German competitors, hence the critical importance of energy savings. Autocast approached the AIDC based on recommendations by other participants in the Cleaner Production cluster. The Cleaner Production Programme at Autocast focuses on Energy and Fossil Fuel waste reduction in order to reduce costs by 10% to avert retrenchments. Areas of high focus include the melting efficiencies, smelter utilisation and process waste.

Overview of Company Profile

Company: Autocast
Location: Port Elizabeth
Number of employees: 260

Core products & processes: Grey cast iron die-casting

Main Customers: VW, Ford, Toyota, BMW and VW Germany

Programme period: October 2011 to September 2012

“Good results have been achieved thus far and the programme shows promise of exceptional success”

Kobus Krog
Energy Manager
Programme Journey

The programme was started by conducting a SWOT analysis using both subjective and objective data to determine where the opportunities for energy efficiency projects are. The development of the current state Energy Value Stream Map was done during the SWOT analysis phase and this was presented in a Strategy Alignment meeting with Senior Management.

Project goals and Key Performance Indicators were then agreed on by both parties. The projects that did not require large capital investment, and in some cases required no investment, were done first. Some of these projects include:

- Identification and repair of compressed air leaks
- Installing heat pumps on geysers
- Repair of core drying ovens
- Use of more efficient lighting technologies
- Predictive maintenance of furnace lids
- Tariff structure simulation

The company, being under severe financial strain, could not afford to spend large amounts of money on energy saving projects. The programme’s focus is thus to improve energy usage by spending as little as possible. The following are some of the low investment cost projects done at Autocast:

- Pouring ladle preheating Standard Operating Procedure
- Load shifting to more efficient curing oven
- Energy waste elimination on HWS line
- Restricting supply to fettling extraction system
- Automatic fan and temperature control on cooling towers
- Balancing melt rates to production line speeds
- Visual control measures for melting efficiency

In addition, Autocast modified their installed showerheads internally to be energy saving showerheads and are currently in the process of implementing custom made air restriction valves in order to further save energy.
Autocast Port Elizabeth
Tirisano Cluster Programme

Programme Master Plan

<table>
<thead>
<tr>
<th>Item</th>
<th>Objective Description</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Awareness sessions</td>
<td>[ ]</td>
</tr>
<tr>
<td>2</td>
<td>SWOT Analysis and feedback workshops – Strategy and Goal Alignment</td>
<td>[ ]</td>
</tr>
<tr>
<td>3</td>
<td>Subproject 1: Melting efficiency improvements</td>
<td>[ ]</td>
</tr>
<tr>
<td>4</td>
<td>Subproject 2: Matching melt rates with production rate</td>
<td>[ ]</td>
</tr>
<tr>
<td>5</td>
<td>Subproject 3: Extraction systems energy saving</td>
<td>[ ]</td>
</tr>
<tr>
<td>6</td>
<td>Subproject 4: Fossil fuel use reduction</td>
<td>[ ]</td>
</tr>
<tr>
<td>7</td>
<td>Subproject 5: Cooling towers optimisation</td>
<td>[ ]</td>
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<tr>
<td>8</td>
<td>Project close out and handover</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

Benefits (KPI's)

The Cleaner Production team at Autocast have saved over R 3,700,000 in energy and fossil fuel saving projects and are continuing their drive towards energy efficiency competitiveness. The programme also aims to increase the involvement from the shop floor employees to improve quality output and reduce energy waste.

Key Performance Indicators were selected based on the cost saving requirements of the company in the various focus areas selected at the projects inception stage.

<table>
<thead>
<tr>
<th>Area</th>
<th>Before</th>
<th>After</th>
<th>% Improved</th>
<th>Value of savings per annum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Consumption per month</td>
<td>3,621,643 kWh</td>
<td>3,259,478 kWh</td>
<td>10%</td>
<td>R 3,589,864</td>
</tr>
<tr>
<td>Average gas consumption per month</td>
<td>12000 kg</td>
<td>7000kg</td>
<td>42%</td>
<td>R 207,331</td>
</tr>
<tr>
<td>Energy Awareness Training</td>
<td>0</td>
<td>130</td>
<td>50%</td>
<td>n/a</td>
</tr>
<tr>
<td>Total Savings</td>
<td></td>
<td></td>
<td></td>
<td>R 3,797,195</td>
</tr>
</tbody>
</table>
Autocast Port Elizabeth
Tirisano Cluster Programme

Key Learning Points

Without continuous training and coaching of all engineering and maintenance staff from the top down, the process of energy efficiency will always be hampered by regression due to old habits becoming the easier option. Management need to always be the driving force and guidance to which the maintenance and shop floor employees follow.

Sustainability

Autocast has appointed an Energy Manager and is in the process of establishing an Energy Saving Forum that will continue implementing energy saving projects. Future projects have already been identified that should be implemented after the programme ends. An automated demand control system was implemented to limit the melting department’s maximum demand to 6.5 MVA during peak and standard times. The AIDC continues to involve the company’s representatives in any and all attempts to improve the automotive industry’s energy efficiency competitiveness. The AIDC will also conduct a six month post energy gap analysis to ensure the sustainability.

The Way Forward

An Energy Manager position has been created to manage the identification and implementation of Energy Efficiency improvements. The company will strive to implement most of the projects identified by the Cleaner Production team and expert Energy Auditors. The company is using the visual control measures as energy management tools to take advantage of ‘time of use’ energy tariff rates to save cost.

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CRH Africa
Tirisano Cluster Programme

Company Background

CRH was founded as a family business in 1946 and has been a supplier of flanges for exhaust manifolds, seat structures and other metal pressings to the automotive industry. The cornerstone of their success has always been quality and innovation. CRH can control the complete product development process, from the design and production of the individual components to the integration of the complete seat system. This allows CRH to develop cost-effective and exceptionally innovative design solutions.

CRH have over 30 yrs experience in pressings. They do in house design and manufacture of progression dies and manual and machine transfer tools. CRH is currently developing new innovative progression die concepts for process optimisation. All tool development is done in house from concept to realisation.

50% of the business is seating manufacture and assembly, fine blanking and robotic welding and some of the other processes include Co2, Tig and Spot Welding, Fine Blanking, Production surface finishing, CNC Machining, Laser Cutting & fabrication, CMM Measuring, Press/Fine blanking tool manufacture. Factory size takes up a space of 8500 square metres.

Key Challenges Faced

- No focused lean manufacturing approach and a lack of understanding of the methodologies
- The production line with the highest turnover was not achieving the required output.
- No accurate performance management system.

Goals

- Training of staff on selected lean concepts based on key performance indicators, to improve shop floor employee involvement in moving the company towards global competitiveness.
- Increase the output on the L7 BMW line seat assembly line by 20%.
- Introduce an accurate performance management system.

Programme Journey

The improvement journey at CRH Africa was introduced with a meeting involving senior management. The purpose of this meeting was to understand the challenges facing the company, what their reasons were for joining the programme and what their expectations were.

The meeting was followed by a walk through the plant with the management in order to see the areas that were considered by management to be their key challenges. During this initial plant walk through it was quite evident that the basics of a continuous improvement culture was not in place. Work areas were cluttered and generally there was no workplace organisation in most areas. It was clear that this was one of the areas that needed to be urgently addressed.

Following from this, an assessment and analysis was conducted in the operational areas to ascertain which area should be the first model area. This analysis was then presented to management and it was decided that the first area, chosen on the basis of highest turnover, would be the BMW L7 seat assembly line. During the analysis phase, supervisors were trained on lean methodologies in order to get them to start thinking about possible improvements in their areas and for them to spread the knowledge to their subordinates.
CRH Africa
Tirisano Cluster Programme

Programme Journey Continued

The L7 seat assembly line, a high volume production facility, is a fixed, conveyor driven, automated line. There were problems of high downtime, high scrap and reject rates, not achieving required outputs and poor operator morale being experienced. The team opted to use the lean line design methodology in this area.

A cross functional team was formed at CRH Africa. The team consisted of the plant manager, supervisor, store person, line feeder and operators. The AIDC also had a support team present during the workshop days that were held at the company. During the workshop days, relevant line data was brought in and confirmed by all present. The type of data used was primarily process data such as cycle time, number of people, customer demand rates and stock quantities, amongst others. During this time, the operators were also given basic lean training to make them aware and understand why improvement was necessary. All operators were also brought into the workshop days at intervals to show them the process that was being followed in order to develop improvements. This helped to create acceptance and buy in from the operators.

Each work station on the L7 seat assembly line was analysed and the outcomes showed that the workloads amongst the operators was not balanced, downtime and production output were not being recorded. The team then constructed a simulation model of the assembly line and started playing around with possible work station combinations in order to create stability and flow on the line. Once the new line design was finalised, the team started making the physical changes on the line. Coupled with this visual management boards were put up on the production line to track production output and record reasons for line downtime. Initially the operators were resistant to track their performance but as the changes were being made on the line and they could see a physical improvement in the output and flow, they automatically started taking a keen interest in the entire change process.

The visual management data was collected from the shop floor on a daily basis, analysed and information packs were given to management, who were then able to prioritise and solve downtime and production issues. Management could straight away see the benefit of having this information to make critical decisions and they requested the AIDC to roll out the system to the other key focus areas. The production output on the L7 seat assembly line increased by 23%, downtime reduced by 28% and scrap reduced by 27%. The line was able to meet production targets and was able to do this consistently.

The other projects focused on 5S workplace organisation. Four areas were selected for these projects. The first step was to train the shop floor personnel on the methodology. Thereafter the entire team would go to the shop floor and put the learning into practice by identifying small improvements in the specific work areas. An action list was then drawn up with the proposals from the team and responsibility was given to the appropriate persons to carry out the actions. These areas in the plant began to take on a different character as the actions were implemented. Operator morale improved and so did their participation.

In order to create sustainability in the 5S workplace organisation project, an audit system was set up in conjunction with the quality department. Pre and post audits were done in the chosen areas and the results showed a marked improvement in the audit scores. This also tied in nicely with some of the customer quality requirements and definitely improved the customer perception as could be seen from their audit results.
CRH Africa
Tirisano Cluster Programme

Programme Master Plan

<table>
<thead>
<tr>
<th>Item</th>
<th>Objective Description</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Management Awareness</td>
<td>S O N D J F M A M J J A</td>
</tr>
<tr>
<td>2</td>
<td>Plant Awareness</td>
<td></td>
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<tr>
<td>3</td>
<td>Supervisor Training</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Assessments, analysis and management feedback</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Subproject 1: L7 seat assembly line</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Subproject 2: 5S Workplace Organisation: Fine Blanking &amp; Tool room</td>
<td></td>
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<tr>
<td>7</td>
<td>Subproject 3: 5S Workplace Organisation: T6 &amp; ABB</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Subproject 4: Visual Management System: L7</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Project close out and handover</td>
<td></td>
</tr>
</tbody>
</table>

Benefits (KPI's)

<table>
<thead>
<tr>
<th>KPI</th>
<th>Before</th>
<th>After</th>
<th>% Improvement</th>
<th>Value of Savings per Annum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production output on L7 seat assembly line</td>
<td>373 per day</td>
<td>483 per day</td>
<td>23% increase</td>
<td>R 28,545,026.40 (increase in turnover)</td>
</tr>
<tr>
<td>Scrap Rate on L7 seat assembly line</td>
<td>96 seats per month</td>
<td>76 seats per month</td>
<td>27% decrease</td>
<td>R 303,919.20</td>
</tr>
<tr>
<td>On time in full delivery (OTIF) on L7 seat assembly line</td>
<td>70%</td>
<td>100%</td>
<td>30% increase</td>
<td>R 2,490,216.00</td>
</tr>
<tr>
<td>Downtime on L7 seat assembly line</td>
<td>487 minutes per month</td>
<td>350 minutes per month</td>
<td>28% decrease</td>
<td>R 1,344,258.00</td>
</tr>
<tr>
<td>Total Savings</td>
<td></td>
<td></td>
<td></td>
<td>R 4,138,393.20 (excluding increase in turnover)</td>
</tr>
</tbody>
</table>
CRH Africa
Tirisano Cluster Programme

Key Learning Points

Establishing cross functional teams in order to address large projects makes the entire process very productive and helps to create buy in very quickly. This was evident during the lean line design improvement project. People become motivated and become involved when they can see physical changes in their work environments and more importantly see the advantages and benefits of change. Management involvement and “going to see on the shop floor” emerged as an important factor in driving successful implementation of the lean improvements. Management were also requested to spend more time on the shop floor.

Sustainability

In order to ensure sustainability of the project at CRH Africa, the following processes were established:

- A visual management system was introduced and weekly reports generated for senior management so that decisions taken can be based on facts. Also to ensure transparency, performance responsibility and ownership from shop floor level to management.
- 5S audits were introduced to monitor and track sustainability of this project. The various audit sheets were introduced with the quality department being the custodians. Reports from the audits are generated as they take place and are also presented to management.
- Whilst the AIDC was conducting training on lean principles at CRH Africa, the engineering intern placed at the company was also being coached at the same time to deliver such training in the future. CRH Africa has employed the engineering intern and is using him to deliver training on lean principles throughout the company.

The Way Forward

The implementation of the visual management system in the model areas has been a huge success. It has more importantly brought in a measurement system for management which never existed prior to this project.

The system has enabled management to track progress and make important decisions with regards to daily operations. The system has proven to be so beneficial to management that they have requested that it be rolled to all production areas within the company.

The engineering intern placed by the AIDC at the company has been employed on an extended contract to be able to roll out this system and support in horizontal deployment of projects such as the lean line project to other production areas.
Federal Mogul Power Train Systems
Tirisano Cluster Programme

“Employees on the shop floor need to be engaged in all levels of lean activities, and thereby understand and contribute to the benefits of the company’s lean manufacturing systems. Management must take the lead to successfully deliver such a result.”

Evan Slack,
Plant Manager

Overview
Company: Federal Mogul – PTS
Location: Westmead, Pinetown
Kwa-Zulu Natal, 3600
Number of employees: 500
Core products & processes: Manufacture of Crankshaft and Camshaft Bearing, Inlet and Exhaust valves.
Programme period: Oct 2011 to Sept 2012

Company Background
Federal-Mogul Corporation is a $6.2 billion leading global automotive supplier. They offer a comprehensive portfolio of quality products and trusted brands. They also provide creative solutions to the world’s foremost original equipment manufacturers of automotive, light commercial, heavy-duty and off-highway vehicles, as well as in power generation, aerospace, marine, rail, industrial, and the worldwide aftermarket.

The Company, founded in 1899, is headquartered in Southfield, Michigan, and employs nearly 45,000 people worldwide.

The Pinetown operation in Durban, South Africa is a major supplier of valves and bearings to the automotive industry including Original Equipment Manufacturers.

Key Challenges Faced
● Entrenching an understanding and thinking of lean manufacturing from shop floor to management level.
● High inventory levels, poor delivery, poor performance and high costs.
● Inaccurate performance management.

Goals
● Training 25% of staff on selected lean concepts based on key performance indicators, to improve shop floor employee involvement in moving the company towards global competitiveness.
● Increase productivity and reduce cost of production, inventory and handling.
● Introduce more effective and accurate performance management systems and controls.

Programme Journey
Initially a meeting was held with the Plant Manager, and all his managers to understand the challenges that the company faced. This session supported the development of a roadmap that the company would follow. Assessments in the form of SWOT analysis, Value Stream Maps, Activity Sampling, together with discussions with shop floor management were carried out in order to get a clear indication of how the company was performing in terms of their:

● Production
● Logistics
● People
● Quality
● Organisation
● Process
● Standardisation.
Based on the assessments done, the programme at Federal Mogul PTS was divided into 4 sub-projects. Training on Lean Manufacturing concepts was identified as the first step to ensure lean understanding and thinking from shop-floor to management level. Training was conducted for company employees from the shop floor, support departments and high level management. Training sessions created awareness and participation from the shop floor employees who were normally not involved when it came to operational problems and finding solutions. The targeted 25% (125 heads) of the overall labour compliment of 500 employees were trained. At Green Area meetings, employees were given the opportunity to bring forward their ideas and these ideas were converted to projects. These identified projects included Work in progress (WIP) reduction, First in first out (FIFO) application, reduction of tool change times, Kanban re-introduction, facility layout, cyclic material ordering etc.

One of the first areas for improvement was the high WIP inventory reduction in the Valves plant. To address the high WIP problem, the Tirisano team had to investigate the main reasons for the excess WIP. As part of the problem solving training, the Tirisano team brainstormed reasons for high WIP. The root causes for high WIP were identified by the team. The kanban system was re-introduced with training being given to the affected team members. This resulted in a 46.66% reduction in WIP inventory on the model component, thereby producing a saving of R 420,000.00 per annum through reducing the WIP from 15 days to 8 days inventory holding. Based on the success to the model component, this practice will be rolled out to the other high value and high volume components, thereby generating savings similar to the model component. Refer figure 1.

The second area for attention was at Zone A (valve prep area), the rod cutting operation of valve production. In this operation the operator did not have a dedicated set of tools or tooling. After conducting studies and making improvements, the operators walking distance to and from the tool room was reduced from 180m to 0m, and the tool change time was reduced from 25.12 minutes to 13.06 minutes. This meant a 48.24% improvement in tool change. Based on the success of this project, the same application principle will be rolled out to similar machines throughout the plant. Refer figure 2A, 2B & 2C.

The next area that required action was the identification of FIFO in the valve manufacturing process. When stock was moved between processes, it was not clearly identified in what order it needed to proceed to the next process, which forced the operator to make his own decision on priorities. The introduction of FIFO identification tags ensured that the operator action was controlled by the FIFO indicators therefore removing any room for error and eliminating lost production and late delivery. This initiative eliminated the current location time for the next component for the operation sequence in the work cycle from 15 mins to zero. Refer figure 3A & 3B.

The equipment and facility layout for the Forging process operation of the valve manufacturing area was found to be non conducive to ideal work flow, operator utilisation, and machine efficiency. After investigation and analysis it was decided to re-arrange various machines within that area to facilitate, even and constant work flow, improved machine utilisation and optimised operator efficiency. This resulted in a through-put time reduction from 33.15 mins to 14.23 mins (57.1%) and a reduction in material travel distance from 315m to 272.5m (13.5%). Through an overall workload balancing exercise and proper utilisation of all resources the area headcount was reduced from 17 to 14 heads. Refer figures 4A, 4B, & 4C.

Federal Mogul has now decided to pursue the benefits identified in the various projects, by rolling out to other areas within the factory, including the Bearings plant. With the various projects identifying potentially high financial savings, it has become Federal Mogul’s goal to successfully continue with this type of approach as passed on by the AIDC, and aggressively target areas of improvement to ensure realisation of tangible and intangible benefits.
Federal Mogul Power Train Systems
Tirisano Cluster Programme

Programme Master Plan

Benefits (KPI’s)

It is evident that in addition to the very substantial and tangible improvements listed in the chart below (a return on investment of 575% to the company on its investment of R110500), the company has also reaped a large portion of intangible benefits in the form of training, shop floor involvement, a very amiable relationship between shop floor and management and improved overall morale throughout the company.
Federal Mogul Power Train Systems
Tirisano Cluster Programme

Key Learning Points

The shop-floor training is essential to eliminate resistance to change from the shop floor and it actually improves employee involvement when implementing projects. Cost saving projects such as the WIP reduction, Tool change time reduction, reduced operator and component movement through improved flow process and facility layouts should also be an on-going process to generate quick savings and create investment funding for other projects.

Sustainability

Existing Visual Management was enhanced on the entire shop floor to ensure transparency, and performance responsibility and ownership from shop floor level to management.

Team member training proved an invaluable tool to ensure rapid improvement and continued sustainability to ensure steady growth to WCM.

Lastly, with the introduction of performance management, control, and tracking documents, all operations have been documented for performance tracking and accurate production planning and will be part of induction training for current and future staff. If any changes are made within the processes, a change control procedure will be followed with immediate training for all impacted staff.

AIDC goals were to ensure that once we left the company, they would be able to continue with the training provided and be able to apply and use the lean manufacturing tools and techniques. It was therefore critical to ensure that continuous quality circles and suggestions were addressed by the management team timeously to ensure that they could continue with the rapid improvement process to ensure that the targeted WCM standards are achieved.

Way Forward

Due to the success of the various projects FM PTS has improved its labour utilisation thus allowing the excess labour to be utilised for future projects. Delivery schedules also improved creating room for further improvements. With the implementation of JIT systems (Kanban), FIFO, and horizontal deployment of 5S the delivery schedule achievement of 100% should be reached.

Due to the success of the current project Federal Mogul Power Train Systems would seriously consider extending or renewing its contract with AIDC if it becomes an available option.

CONTACT DETAILS

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Fischer South Africa
Tirisano Cluster Programme

Company Background

Fischer South Africa is part of an international German-based group. There are a total of 7 subsidiaries all around the world. Fischer South Africa is based in Centurion, which is between Gauteng’s two major cities, Pretoria and Johannesburg.

The Group has been in existence in South Africa since 1990, initially starting with Fischer Stainless Steel Tubing (Pty) Ltd, which manufactures longitudinal, laser-welded, stainless steel tubing from 15.0mm to 76.2mm in diameter.

In 2001 Fischer South Africa saw the opening of Fischer Tube Technik (Pty) Ltd. This plant specialises in bending, end forming and manipulation of stainless steel tubing.

In 2002, Fischer Tube E.C. (Pty) Ltd. was established, expanding the diameter capability from 76.2mm to 160.0mm. Additionally Fischer Tube E.C. (Pty) Ltd. has expanded their laser capacity since 2007.

In 2011 Fischer South Africa went through various expansion phases and has increased factory facilities by a further 6500 square meters and accomplished substantial streamlining of manufacturing.

The Tirisano programme focused on the Fischer Tube Technik plant and the pipe manipulation processes.

Key Challenges Faced

Fischer South Africa has seen rapid and steady growth over the years, both physical growth of the factory floor space and increased output.

This rapid growth created the following challenges:

- Inefficient material handling due to functional layouts
- Excessive work in progress between processes
- Inefficient workflow and process layouts

Goals

- Increase plant efficiency by 10%.
- Reduction of scrap rate by 5%.
- Training of staff in model areas on selected lean concepts in order to improve shop floor employee involvement in the change process.

Programme Journey

Fischer SA realised that with the rapid expansion that had taken place, they needed assistance with aligning the company objectives to world class standards.

The programme at Fischer SA commenced with a meeting that was held with the senior management team. The purpose of this meeting was to understand the challenges facing the company, what their reasons were for joining the programme and what their expectations were. The AIDC was requested to support the company’s expansion project by introducing lean methodologies into the pipe manipulating processes before the manufacturing lines could be relocated.
Programme Journey Continued

The meeting was followed by a walk through the plant with the management, where management explained what their long term vision for the company was. During this initial walk through of the Fischer Tube Technik plant, it was evident that the basics for a lean factory, was not in place. It could be clearly seen how the rapid growth had affected the manufacturing processes within the plant. There was no proper flow of processes; large quantities of work in progress were visible, cluttered work areas and walk ways.

Following from this, an assessment and analysis was conducted in the operational areas to ascertain what methodologies existed and how the AIDC could assist. This analysis was then presented to management to highlight the possible areas for improvement and the first model area and team were identified.

During the analysis phase, supervisors were trained on lean methodologies in order to get them to start thinking about possible improvements in their areas and for them to spread the knowledge to their subordinates.

The activities started with a value stream mapping exercise. The analysis revealed the following:

- Long travelling between processes
- Excessive quantities of work in progress between processes
- Inefficient utilisation of manpower and machinery
- High reject rates
- Inefficient production flow and material handling
- No designated walkways

During the detailed line analysis the operators were trained on lean principles in order to obtain their buy-in and to make them a part of the change process.

The findings were presented to management and a consensus was reached as to the approach to the project. The model area as well as the project team were agreed upon. Management were very receptive to the recommendations presented by the AIDC. Since Fischer was looking to expand their current production capacity, the team decided to convert the existing functional layout into cellular layouts whilst utilising lean methodologies. The reason for this decision was based on the fact that different models were manufactured on different pipe bending machines. The core machine in the manufacturing process was the pipe bending machine. Analysis was conducted to identify which model groups should run on specific machines. Each bending machine was then allocated specific models and loaded sufficiently in order to improve utilisation.

The recommendation to management following the analysis in the model area was to follow a cellular manufacturing approach. This approach would greatly reduce travelling distances, work in progress, reject rates and improve resource utilisation and material handling.

Management gave the go ahead to implement the first cellular production facility. Once this facility was set up, it was easy for management to see the benefits of such a manufacturing process as this approach also included lean manufacturing principles with measurable cost reductions.
Fischer South Africa
Tirisano Cluster Programme

Before

Figure 4: Off line Inspection created excessive work in progress

After

Figure 5: Inspection brought online and productivity improved by line balancing.

Figure 6: Trend graph showing reducing scrap costs.

Programme Master Plan

<table>
<thead>
<tr>
<th>Item</th>
<th>Objective Description</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Management Awareness</td>
<td>O N D J F</td>
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<tr>
<td>2</td>
<td>Plant Awareness</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Supervisor Training</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Assessments, analysis and management feedback</td>
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</tr>
<tr>
<td>5</td>
<td>Subproject 1: Pipe manipulation cell design 1 (model line)</td>
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<tr>
<td>6</td>
<td>Subproject 2: Pipe manipulation cell design 2</td>
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<td>7</td>
<td>Subproject 3: Pipe manipulation cell design 3/4 and WIP stock holding analysis</td>
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</tr>
<tr>
<td>8</td>
<td>Subproject 4: Pipe manipulation cell design 5/6 and Model line relocation</td>
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</tr>
<tr>
<td>9</td>
<td>Project close out and handover</td>
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Benefits (KPI's)

<table>
<thead>
<tr>
<th>KPI</th>
<th>Before</th>
<th>After</th>
<th>% Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of parts per hour for pipe manipulation cell 1</td>
<td>42 per hour</td>
<td>57 per hour</td>
<td>36% increase per day</td>
</tr>
<tr>
<td>Scrap Rate for pipe manipulation cell 1</td>
<td>220 per month</td>
<td>66 per month</td>
<td>70% decrease per month</td>
</tr>
<tr>
<td>Work in progress for pipe manipulation cell 1</td>
<td>4 hours</td>
<td>1 hour</td>
<td>80% decrease</td>
</tr>
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</table>

Total Savings
Fischer South Africa
Tirisano Cluster Programme

Key Learning Points

The shop-floor training assisted in eliminating resistance to change from the shop floor and actually improved employee involvement when it came to implementing projects. People become motivated and become involved when they can see physical changes in their work environments and more importantly see the advantages and benefits of change.

Management involvement and “going to see on the shop floor” emerged as an important factor in driving successful implementation of the lean improvements.

Sustainability

In order to ensure sustainability of the project at Fischer SA, the following processes were established:

- Whilst the AIDC was conducting training on lean principles at Fischer, the engineering intern placed at the company was also being coached at the same time to deliver such training in the future.
- The new layout that has been put in place has required a minimal investment from Fischer SA in order to implement. It is for this reason that the new processes put in place will be sustained as well as the benefits that have been derived from this improvement decision.

The Way Forward

The AIDC assisted Fischer to motivate the creation of cellular production processes by conducting analysis and trials in the first model area. Due to the success of this project, Fischer SA has employed the AIDC engineering intern, who is co-ordinating the conversion of all the remaining pipe bending processes to the cellular manufacturing methodology.

With the creation of more capacity and space, Fischer has been able to take on more new business. Fischer has also announced that they will be investing in a few new machines to be able to produce for the new business.

CONTACT DETAILS

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Gillet Exhaust Technologies
Tirisano Cluster Programme

Company Background

Gillet Exhaust Technologies has many years experience and great expertise in the development and manufacturing of products for the automotive industry. As far back as 1927, the company started with the engineering and production of mufflers at the Edenkoben plant and operations were steadily expanded and improved over the years.

In 1962 the company introduced crankcase devices which were the fore-runners of today’s catalytic convertors. The company’s early success working with the Motor Vehicle Pollution Control Board enabled Gillet to commence with new research.

Gillet Exhaust Technologies started in 1985 within the automotive plant. Gillet then expanded its business and moved into new premises.

Today, the company designs and produces innovative components and systems for most of the major automobile manufacturers and helps to bring quieter, more comfortable and lower cost vehicles with improved properties to the market - worldwide.

Typical products manufactured by Gillet Exhaust Technologies include, exhaust pipe assemblies, converter assemblies and exhaust cold end assemblies with a manufacturing capacity of 3.5 million catalytic convertors per year.

Key Challenges Faced

Gillet Exhaust Technologies was mandated by corporate head office to reduce the company’s carbon footprint. This would be achieved by reducing the electricity consumption per part produced.

Goals

- Be the first production facility in South Africa to implement the new Energy Standard, ISO 50001.
- Reduce electricity consumption by 9% as agreed by the Gillet team over the next 3 years based on the newly approved energy policy.

James Tarr,
Engineering Manager

Overview of Company Profile

Company: Gillet Exhaust Technologies
Location: 62462 Struanway, Port Elizabeth 6001
Number of employees: 478
Core products & processes: Catalytic converter assemblies, exhaust pipe assemblies.
Programme period: January 2012 to December 2012

“The AIDC provided precise and impeccable advice and assistance to help Gillet Exhaust Technologies become one of the leaders in energy efficiency in the Eastern Cape.”

James Tarr,
Engineering Manager
Programme Journey

The AIDC Cleaner Production programme started in January 2012 at Gillet Exhaust Technologies. James Tarr who is the Engineering and EH&S Manager was elected as the Tirisano Champion for the Gillet Exhaust Technologies Tirisano project.

The first step was to develop a baseline for Gillet Exhaust Technologies. The baseline depicts a good indication of the production trends and facility efficiency. The team was able to determine and develop an accurate SWOT analysis for Gillet by determining the baseline of the plants electricity usage.

The next step was to identify projects that would assist Gillet Exhaust Technologies to reduce their energy costs and improve their production efficiencies. Projects that were identified by the AIDC and Gillet team included the installation of Power Factor Correction which was implemented within the first three months of the programme. An additional project identified was to replace their old compressors with a single Variable Speed Drive (VSD) compressor unit. These projects were completed during the first stages of the AIDC programme. Additional projects identified and implemented as four separate subprojects consisted of:

1. The replacement of mercury vapour high-bay lights with fluorescent mega bays in sections of the factory resulting in a saving of R 172 200 per annum, with a return on investment of 10 months. All factory lighting will be replaced by the end of 2013.

2. Compressor air system optimisation achieved an annual saving of R 143 227 with no investment required.

3. Installation of motion sensors in office areas resulted in a saving of R 38 800 per annum with a 4.8 year return on investment. This project was implemented as part of the plant’s awareness drive in order to promote energy efficiency in the workplace.

4. Installation of lux sensors and daylight harvesting in the warehouse areas were installed to compliment the new fluorescent lights providing savings of R 46 530 with a return on investment of 1.5 years.

Once these projects were completed Gillet started the investigation and implementation of more visible projects to not only help reduce their electricity cost, but also help make employees aware of the energy saving initiatives. Typical projects like these include energy efficient lights and replacing conventional geysers with heat pumps.

All of the above projects were prepared and implemented in preparation for the implementation of an Energy Management System (EnMS). This was a major requirement to obtain ISO 50001 certification. The standard specifies a structured process that the company would need to implement to reduce the energy consumption which would assist the company to obtain certification the first time. It also enables the company to demonstrate their commitment to improving energy performance.

Figure 1: A comparison between the old and new high bay lights at Gillet Exhaust Technologies. The fluorescent mega bay requires half the energy of the old mercury vapour high bay lights, while providing increase light output in terms of lux requirements.

Figure 2: Various sensors were installed to reduce the amount of wasted energy, by switching off lights when there is no occupancy in a particular area.

Figure 3: The figure above displays the heat pumps that were installed to replace resistive type geysers.
Gillet Exhaust Technologies
Tirisano Cluster Programme

Programme Master Plan

<table>
<thead>
<tr>
<th>Item</th>
<th>Objective Description</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inception Report and business case</td>
<td>J F M A</td>
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<tr>
<td>2</td>
<td>SWOT Analysis and feedback workshops – Goal Alignment</td>
<td>J F M A</td>
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<td>3</td>
<td>Subproject 1: Replace MV high bays with fluorescent mega bays and power factor installation.</td>
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<td>4</td>
<td>Subproject 2: Compressed air system optimisation.</td>
<td>J F M A</td>
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<td>5</td>
<td>Subproject 3: Installation of motion sensors in office areas.</td>
<td>J F M A</td>
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<tr>
<td>6</td>
<td>Subproject 4: Installation of lux sensors and daylight harvesting in warehouse areas.</td>
<td>J F M A</td>
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<tr>
<td>7</td>
<td>Subproject 5: ISO 50001 Certification and EnMS training.</td>
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<td>8</td>
<td>Project close out and handover</td>
<td>J F M A</td>
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Benefits (KPI’s)

<table>
<thead>
<tr>
<th>Area</th>
<th>Before</th>
<th>After</th>
<th>Target %</th>
<th>% Improved</th>
<th>Value of Savings</th>
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<tbody>
<tr>
<td>Training as a % of workforce (Total employees = 478)</td>
<td>3 people</td>
<td>112 people</td>
<td>20%</td>
<td>23%</td>
<td>N/A</td>
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<tr>
<td>Electricity usage</td>
<td>4 250 MWh</td>
<td>3 702 MWh</td>
<td>-9%</td>
<td>-12.9%</td>
<td>R 342 719</td>
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<tr>
<td>Demand</td>
<td>780 kVA</td>
<td>635 kVA</td>
<td>-9%</td>
<td>-18.6%</td>
<td>R 305 142</td>
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<tr>
<td>Total Savings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R 647 861</td>
</tr>
</tbody>
</table>

Figure 4: Power factor correction and power monitor equipment installed to monitor and measure the consumption at Gillet Exhaust Technologies.

Figure 5: Daylight harvesting panels were installed at Gillet Exhaust Technologies. Lux sensors were also added to the high bay lights to ensure that energy is not wasted when illumination levels are high enough.
Gillet Exhaust Technologies
Tirisano Cluster Programme

Key Learning Points
The AIDC has assisted Gillet employees to consider energy efficiency in all their business aspects and decisions. Operator and employee awareness towards energy efficiency has also increased significantly. A total of R 647 861 has been saved thus far at Gillet through the AIDC Cleaner Production programme with a Capex investment of R 891 768 for the new energy efficiency equipment.

Sustainability
After the 12 months programme has elapsed, Gillet Exhaust Technologies will ensure that the formed energy teams remain sustainable, through the implementation of mandatory meetings and project tasks. Major focus would be geared towards the continuation of the implemented Energy Management System and the expansion and tracking of the ISO 50001 energy system. ISO 50001 certification would ensure sustainable energy improvements by Gillet Exhaust Technologie.

The Way Forward
Gillet Exhaust Technologies will mainly focus on the sustainability of an Energy Management System (EnMS). The EnMS simplifies the monitoring of the organisation’s energy profile and quantifies where and when all major sources of energy are being used.

With all the energy data per area available, projects and problem areas can be identified much easier. This will allow Gillet to determine the cost per part per area, enabling them to manage their production at an optimal level.

Gillet Exhaust Technologies will be implementing ISO 50001 commencing with the preparation of the AIDC programme, and should be certified by June 2013.

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Magnetto Wheels South Africa
Tirisano Cluster Programme

Company Background

Magnetto Wheels South Africa (MWSA) is a steel wheel manufacturing company with the parent company based in Italy. The company was established in 1971 and was known as Guestro Wheels (PTY) LTD. In 2008 the company established a joint venture with Dorbly Limited giving them 50% ownership and the name was changed to Dorbyl Magnetto Wheels (PTY) LTD. Magnetto Wheels Italia SpA - (The parent company) bought all shares from Dorbly Limited in May 2011 and the name changed to Magnetto Wheels South Africa (PTY) LTD. Over the years the group has invested into other countries, namely Turkey, Russia, Roma, Poland, Malaysia, Gabon, France, Germany, China and South Africa (Port Elizabeth). Magnetto Wheels has fourteen manufacturing sites worldwide.

They manufacture passenger wheels for small to medium vehicles as well as commercial wheels for trucks and other large vehicles, which are supplied to Original Equipment Manufacturers (OEMs) in South Africa such as Toyota, Nissan, Ford, Renault and General Motors.

All MW Division European production sites have Stuttgart DEKRA Process Quality System and ISO-9001, ISO-14001 and ISO/TS-16949 certification. Some have also obtained KBA German After Market Certification and the South African plants have SABS Certification for ISO/TS 16949 and ISO-14001.

Key Challenges Faced

- Entrenching an understanding and thinking of lean manufacturing from shop floor to management level.
- High rework and scrap rates which lead to high inventory levels, poor delivery, poor performance and high costs.
- Lack of accurate performance management.

Goals

- Training of all staff on selected lean concepts based on key performance indicators, to improve shop floor employee involvement in moving the company towards global competitiveness.
- Increase plant efficiency by 10%.
- Reduction of scrap and rework rates by 5%.

Programme Journey

Initially a meeting was held with the Managing Director, and all his managers to understand the challenges that the company faced. This session supported the development of a roadmap that the company would follow. As a second step a SWOT analysis was completed in order to get a clear indication of how the company was performing in terms of:

- Production
- Logistics
- People
- Quality
- Organisational
- Process
- Standardisation.
Magnetto Wheels South Africa  
Tirisano Cluster Programme

Programme Journey Continued

Based on the SWOT results, the programme at Magnetto was divided into 5 sub-projects. Training on Lean Manufacturing concepts were identified as the first step to ensure lean understanding and thinking from shop-floor to management level. Training was conducted for all company employees from the shop floor, support departments and high level management. Training sessions created awareness and participation from the shop floor employees who were normally not involved when it came to operational problems and finding solutions. A total of 186 employees were trained. During the training, employees were given the opportunity to bring forward their ideas and these ideas were converted to projects, which the AIDC team, shop floor employees, management and the maintenance department worked on together to ensure that they were implemented. This helped in creating a culture where every single person in the company has a voice and can contribute to the success of the company.

To address the rework problem, the Tirisano steering committee had to investigate the main scrap and rework causes. As part of the problem solving training, the AIDC team in partnership with the MWAS’s production employees brainstormed reasons for scrap and rework. The root causes for scrap and reworks were identified by the combined team. Projects identified and implemented by the team thus far have resulted in a decreased model area reject rate of 6% based on model area monthly reject records. After project implementation and training, problem solving visual management boards were installed in the green areas to ensure that the same problem solving approach was used in all the departments on the shop floor and also ensure sustainability.

Plant efficiency studies highlighted that Magnetto Wheels S.A was also struggling with downtime tracking as the shop-floor supervisors did not upload correct information onto the OEE software installed. The daily production figures uploaded clashed with actual figures between work stations and the reasons for not meeting targets were not indicated. The AIDC team launched an investigation using time and method studies as well as Value Stream Mapping in the model area. The highest contributing factor to downtime was identified as change over time amongst other process inefficiencies. These times were then recorded whilst they were being improved upon to track the impact of the mini projects (Please refer to figure 4 for Press line results & figure 5 for Rim line 1&2 results on the next page). Projects identified and implemented allowed for savings to the value of R 1,201,207.00 and potential savings of R 2,155,606.19.

The second highest contributor to plant inefficiency related to labour utilisation. A Man Assignment Labour Optimisation project started in February 2012 and continued for the remaining three months of the programme. All processes in all production departments were timed and standardised. This exercise proved that the plant was running at low productivity ratios, and each line had bottleneck operations that could be overcome by correct distribution of work. A full Standard Operating Procedures (S.O.P) intervention was completed in one of the production lines, and then middle management (Department leaders) was trained on how to deploy the same concept in their respective departments.

In addition, the Magnetto Wheels programme also included elements of Cleaner Production. An energy quick scan was performed and an AIDC resource was deployed for three months to generate quick savings and implement identified projects. These improvement areas included changing of lights to energy saving lights whilst using daylight harvesting methods during the day (please refer to figure 7). Air leak tracking and repairing was also identified as one of the quick wins. A total of 16 air leaks were found and tagged for maintenance attention. Total energy savings implemented amounted to R 42,361.80 and the potential savings of R 1,312,689.00 from projects that are still being implemented.
Magnetto Wheels South Africa
Tirisano Cluster Programme

Programme Master Plan

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<td>Management Awareness</td>
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<td>2</td>
<td>SWOT Analysis and feedback workshops – Goal Alignment</td>
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<td>3</td>
<td>Subproject 1: Training and shop floor exercises on problem solving, 5S*, SMED* and S/O/Ps*</td>
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<tr>
<td>4</td>
<td>Subproject 2: Quality Management System improvement.</td>
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</tr>
<tr>
<td>5</td>
<td>Subproject 3: SMED &amp; 5S application</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Subproject 4: Cost savings through Man Assignment Correction.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Subproject 5: Cost savings through Energy optimisation</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Project close out and handover</td>
<td></td>
</tr>
</tbody>
</table>

Benefits (KPI's)

Judging from the involvement and participation received from the shop floor, employee morale had improved. Additionally, projects completed resulted in a safety enhancement of 33% less incidences (Results based on 2010 vs. 2011 occupational safety results). Knowledge was also transferred between middle management and shop floor during train the trainer workshops, facilitated by the AIDC team.

<table>
<thead>
<tr>
<th>KPI</th>
<th>Before</th>
<th>After</th>
<th>% Improvement</th>
<th>Value of Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model area production plan achievement</td>
<td>52% average target vs actual output</td>
<td>79% average target vs actual output</td>
<td>52% improvement</td>
<td>Not Available</td>
</tr>
<tr>
<td>Quality improvement</td>
<td>Reject record = 10.2%</td>
<td>Reject record = 4.57%</td>
<td>55% improvement</td>
<td>R 86,713.92</td>
</tr>
<tr>
<td>Utilisation (people)</td>
<td>55 labour resources</td>
<td>40 labour resources</td>
<td>28% increase</td>
<td>R 617,760.00</td>
</tr>
<tr>
<td>Capacity Utilisation</td>
<td>Assembly line utilisation 52%</td>
<td>Assembly line utilisation 73%</td>
<td>21% increase</td>
<td>R 261,792.00</td>
</tr>
<tr>
<td>Downtime Reduction</td>
<td>Press line downtime 41%</td>
<td>Press line downtime 31%</td>
<td>26% improvement</td>
<td>R 238,119.55</td>
</tr>
<tr>
<td>Change Overs time reduction</td>
<td>Ave. time lost 4 hrs</td>
<td>Ave. time lost 2.5 hrs</td>
<td>25% decrease</td>
<td>R 50,154.34</td>
</tr>
<tr>
<td>Training on selected lean modules</td>
<td>No of people trained = 0</td>
<td>No of people trained = 186</td>
<td>65% people trained</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Total Savings</td>
<td></td>
<td></td>
<td></td>
<td>R 1,201,207.00</td>
</tr>
</tbody>
</table>

* MED - Single Minute Exchange of Dies
* SOP - Standard Operating Procedures
* 5S - House keeping & workplace organisation
Magnetto Wheels South Africa  
Tirisano Cluster Programme

Key Learning Points

The shop-floor training assisted in eliminating resistance to change from the shop floor and actually improved employee involvement when it came to implementing projects. Cost saving projects such as the Man Assignment project should also be one of the first projects for the programme since it assisted in generating quick savings and creating investment for other cost generating projects.

Sustainability

Visual Management was rolled out on the entire shop floor to ensure transparency, and performance responsibility and ownership from shop floor level to management.

A KAIZEN room has also been introduced for the production team meeting to monitor, evaluate and identify new projects and ensure that performance and projects are sustained. As part of the meetings shop floor audits will be conducted by a cross functional team to ensure that 5S and problem solving activities are sustained.

Lastly, with the introduction of Standard Operating Procedures (SOP), all operations have been documented for performance tracking and accurate production planning and will be part of induction training for current and future staff. If any changes are made within the processes, a change control procedure will be followed with immediate training for all impacted staff.

AIDC goals were to ensure that once we left the company, they would be able to continue with the training provided and be able to apply and use the lean manufacturing tools and techniques. It was therefore critical to ensure that train the trainer workshops took place in order to transfer the knowledge to the Magnetto team, to ensure that they could continue doing their own in-house training on the lean principles.

Way Forward

Due to the success of the Man Assignment project MWSA has improved its labour utilisation by 28% thus allowing the excess labour to be utilised for future projects in the pipeline. Delivery schedule increased from 52% to 79% thus allowing for further improvements. With the implementation of SMED, SOP (Standard Operating Procedures), and horizontal deployment of 5S the delivery schedule achievement of 100% should be reached.

Due to the success of the current project MWSA has extended its contract with AIDC as there is potential for even greater savings.

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Quantum Automotive Tirisano Cluster Programme

Company Background

Baisch Engineering, was founded in 1967 by Hans Baisch and grew from a company servicing the local lighting industry, to become an international player in the automotive supply industry, especially Europe. In October 2004 Formex Industries purchased Baisch Door locks, Door modules and Pulley divisions. Formex doubled the Baisch pulley capacity in 2 years and several new customers and products were added. The facility was relocated from Isando to the Ga-Rankuwa Industrial Township, north of Rosslyn, in June 2009 in an attempt to consolidate costs into an existing Formex facility.

On 1 June 2010 Quantum Automotive was established when a management buy-out of the pulley division was done by the Managing Director, Brendon Lowe. Quantum Automotive specialises in the manufacture of engine crankshaft and water pump pulleys. Their processes include CNC machining, metal pressing and spin forming. Spin forming is done on highly specialized Poly-V machines.

Key Challenges Faced

- International competition from particularly European suppliers has necessitated adopting a Lean approach to improve the efficiencies and reduce the costs of manufacturing.
- Lack of understanding and application of Industrial Engineering and Lean methodologies.

Goals

- Training and awareness for all employees on selected Lean concepts, to increase total employee involvement in the continuous improvement journey.
- Productivity Improvement of 20%
- Standardisation of work content in all manufacturing cells
- Reduction of Internal quality reworks and rejects by 10% by up-skilling of key personnel in Problem Solving Methodology.

Programme Journey

An initial session was held with the MD at the start of the project to fully understand the challenges and difficulties that the company was experiencing. This session, together with a SWOT analysis Value Stream Map (VSM) session, laid the roadmap for the project implementation and target setting.

The SWOT analysis highlighted the areas for improvement based on the qualitative questionnaires completed by the Project Manager and 15 key players in the company. In addition Cycle times, process maps Scrap and rework rates was also used to identify areas for additional improvement. The SWOT focused on Organisational, Production, Quality, People, Process, Logistics, Standardisation and Lean.

Additional to the company wide SWOT analysis, an Enterprise Lean Assessment was also conducted. This was to drill deeper into the company’s level of Lean understanding and integration. A management orientation session was delivered, feedback given on the analysis and the roadmap for implementation of the Lean Programme was developed for the company. The first step was to determine the area of highest importance to the company, based on percentage contribution to turnover and business. This was addressed during a Value Stream Map (VSM) workshop with top management and the shop floor supervisors. (Please refer to figure 1 for VSM creation)
Quantum Automotive Tirisano Cluster Programme

Programme Journey Continued

Training:
After selection of the Pilot / Model area, the workforce had to be trained in Lean principles. The 1st step was 7 Wastes and 5S training with practical implementation on the shop floor. This enabled the people to “see” the wastes around them that were always accepted as the standard. The 5S training and methodology enabled them to address and action on the wastes that they have identified in their own area. Red tagging of problems needed to from part of their culture. (Please refer to figure 7 for Red Tagging Log Sheet) To achieve this, a weekly audit is conducted to ensure that the new standards that were developed by the people are adhered to, and that the culture of continuous improvement is ever present on the shop floor. (Please refer to figure 10 for 5S Audit Weekly Trend Graph) Included in the training were Line Balancing and Continuous Improvement training to all staff. A total of 72 employees were trained on the above principles.

Gemba Walks:
Gemba (shop floor) Walks was introduced on a weekly basis. Every week Management, together with the supervisors, will select an area and record their Gemba walk, focusing on the machines. This Gemba Walk will be recorded on video, and analysis of the videos afterwards would then reveal the main areas for concern. Line balancing training was conducted in the Pilot / Model, focusing on the wastes. The wastes were identified during the weekly Gemba Walks. The wastes elimination project identified from the Gemba Walks was implemented on the VC-Cup line and resulted in R92,061.64 savings.

Line Balancing / Operator Utilisation:
Line balancing training was delivered to all employees working in the Pilot / Model area, focusing on the wastes - identification of wastes was done during the Gemba Walks. (Please refer to figure 2 and 3) Working according to the TAKT Time (customer demand rate), the line was balanced for 2 areas.
The 2 projects identified allowed for savings of R709,632.00. (Please refer to figure 4, 5 and 6 for Operator Utilisation graphs, and figure 8 and 9 for Layout changes due to line balancing) This concept will be deployed horizontally to all areas in manufacturing, resulting in further cost savings.

Standardisation of Work:
Quality Process Sheets (QPS) were developed for the standardisation of work. Initial studies showed that operator utilization was less that 50%, where part of this was contributed to the fact that there were no standards visible on the shop floor. The QPS ensured visual display of standards within the workplace and incorporated all relevant information such as work standards, time standards, layout standards etc. This ensured the sustainability of the utilization and 5S improvements.

Problem Solving and Decision Making:
Working in conjunction with Organisational Development International (ODI), the AIDC hosted a 4-day Rapid Process Improvement Workshop at Quantum Automotive. Problem solving and decision making tools and techniques were the main topics of the workshop, and actual problems from the shop floor were selected and it was required that these problems be addressed and a roadmap for closing these problems be established. Some of the benefits from this workshop were the identification of losses during in-house transportation of the products. Trolleys were re-designed in-house, and the benefits from this project were calculated as R56,400.00.
Quantum Automotive
Tirisano Cluster Programme

Programme Master Plan

<table>
<thead>
<tr>
<th>Item</th>
<th>Objective Description</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Management Awareness</td>
<td>M A M J J A S O N D</td>
</tr>
<tr>
<td>2</td>
<td>SWOT Analysis, VSM and feedback workshops – Goal Alignment</td>
<td>M A M J J A S O N D</td>
</tr>
<tr>
<td>3</td>
<td>Subproject 1: 5S and 7 Wastes Training and Implementation in Cell 122 and Cell 123</td>
<td>M A M J J A S O N D</td>
</tr>
<tr>
<td>7</td>
<td>Project close out and handover</td>
<td>M A M J J A S O N D</td>
</tr>
</tbody>
</table>

Benefits (KPI’s)

Increase in knowledge of the shop floor employees, supervisors and management in lean principles was the key success factor in the implementation of the Continuous Improvement activities within the organisation. Teamwork and successful implementation of improvements were the result of empowering the entire workforce to participate in the improvement activities.

<table>
<thead>
<tr>
<th>KPI</th>
<th>Before</th>
<th>After</th>
<th>% Improvement</th>
<th>Value of Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training (Employees trained in Lean Principles)</td>
<td>0</td>
<td>72</td>
<td>55% of workforce trained.</td>
<td></td>
</tr>
<tr>
<td>Productivity (Part 103)</td>
<td>30 parts / operator hr</td>
<td>51 parts / operator hr</td>
<td>70%</td>
<td>R532,224.00</td>
</tr>
<tr>
<td>Productivity (VC-Cup Phase 1)</td>
<td>16 parts / operator hr</td>
<td>22 parts / operator hr</td>
<td>38.46%</td>
<td>R92,061.64</td>
</tr>
<tr>
<td>Productivity (VC-Cup Phase 2)</td>
<td>22 parts / operator hr</td>
<td>33 parts / operator hr</td>
<td>47.51%</td>
<td>R177,408.00</td>
</tr>
<tr>
<td>Quality (Internal rework and rejects on Part 103)</td>
<td>0.55%</td>
<td>0.24%</td>
<td>56.4%</td>
<td>R56,400.00</td>
</tr>
<tr>
<td>Standardisation</td>
<td>0 Standards</td>
<td>6 Standards (QPS) Implemented</td>
<td>18% of production machines completed.</td>
<td>R858,093.64</td>
</tr>
<tr>
<td>Total Savings</td>
<td></td>
<td></td>
<td></td>
<td>R858,093.64</td>
</tr>
</tbody>
</table>
Quantum Automotive
Tirisano Cluster Programme

Key Learning Points

A Continuous Improvement environment cannot be forced onto the workforce. They need to participate in the continuous improvement activities, and this can only be done by training, coaching and mentoring on a continuous basis. They also need to be empowered to drive the required changes and they need to see their improvements become reality on the shop floor. By establishing the learning culture through the training this was successfully achieved, and the continuous improvement activities could be rolled out successfully.

Sustainability

Visual Management in terms of Performance Measures was rolled out to the shop floor to ensure total employee involvement in taking responsibility and ownership of their performance.

The implementation of the Quality Process Sheets (QPS) on the shop floor ensured that all procedures have been standardized, documented and made available to all staff on the shop floor to ensure standard work as well as to be used for training and induction of new employees. The weekly audits, conducted by engineering and involving management and shop floor supervisors, ensures that the focus on Continuous Improvements is sustained.

To ensure sustainability of the lean principles applied to the shop floor, training and transfer of knowledge had to be given to the Quantum team in a formal manner. Conducting training of management and supervisors on a detailed level (Train the Trainer) to ensure that the company can continue with their own training in-house once the project ended and the AIDC left the company.

The Way Forward

The implementation of the QPS and line balancing activities was a major success, and resulted in an average increase in people utilization of 60%. The additional resources can be re-deployed for the new projects that were secured, as well as future pipeline projects. By horizontal deployment of the above activities, as well as training of the rest of the workforce and 5S implementation, Quantum Automotive will be able to sustain their Continuous Improvement Projects and improve their international competitiveness.

Quantum Automotive already showed their interest in continuing their partnership with the AIDC for future Continuous Improvement projects.

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Willard Batteries South Africa
Tirisano Cluster Programme

Company Background


Willard Batteries holds the Ford Q101 rating which was awarded in 1995 and currently hold a VDA 6 rating of 88% (AB Rating - conducted by Delta Motor Corporation) and also a VDA 6 process audit rating of 92% (A Rating - conducted by VWSA). The company attained a unique position in the domestic battery manufacturing arena by becoming the first manufacturer to be awarded the Quality Management System listings for its automotive production facility. Willard batteries supply both OE and aftermarket with the production capability of around two million batteries per annum.

Key Challenges Faced

- The company was producing goods with excessive lead times and high inventory levels.
- Poor layout and process waste were identified as a problem area in the Charge Room within the factory.
- Process changeover times were highlighted as a major loss in terms of downtime causes.

Goals

- Training and shop-floor exercises on basic lean concepts based on key performance indicators. The aim of the training was to improve shop floor employee involvement in gearing the company towards global competitiveness.
- To increase plant performance by implementing improvements following the introduction of accurate performance measures.
- Training and implementation of SMED in the Battery Making and Charge Room factories.
- 5S and 7 waste implementation in the Charge Room factory.

Overview

Company: Willard Battery S.A
Location: Cnr. Stanford & Lindsay Rd, Korsten, Port Elizabeth, 6020
Number of employees: 473
Core products & processes: Automotive Battery Assembly
Programme period: January 2012- December 2012

“We wanted to show our employees that by applying some key principles we can reduce our down time and change over times. Using SMED and 5S we also managed to get morale improvements by brightening up the work place and removing waste “

Lourens de Beer, Factory Manager
Willard Batteries South Africa
Tirisano Cluster Programme

Programme Journey

The AIDC started with the Tirisano Lean Manufacturing programme at Willard Batteries in January 2012. Lourens de Beer who is the Factory Manager was appointed as the Tirisano champion.

The SWOT analysis was the first step of the programme in order to understand the company’s performance in terms of:

- Production - to determine if production targets are being met;
- Logistics - to identify any improvement opportunities in the internal lead times and inventory levels;
- Training - Specific lean concepts;
- Quality - feedback loops to prevent defect reoccurrence;
- Downtime – Identification of root causes and solutions to eliminate downtime.

The implemented projects are as follows:

1. Assembly line SMED

   Activities: The Assembly lines had an extensive change over time which resulted in a SMED study being carried out in order to identify problem areas that could be eliminated.

   Benefits: Reduction in overall changeover time resulting in a total cost saving of R 1 606 108.73 per annum. Refer to KPI table on page 3.

2. Assembly line Production Studies

   Activities: The production studies were carried out on the Battery making line in order to identify minor losses that were not captured by the automated production system.

   Benefits: Downtime associated with weighing inaccuracy has been eliminated and the time spent on adjusting the sensors by the operators has been reduced.

3. Plate making Six Sigma Project

   Activities: The assembly lines were receiving sticky plates from plate making department. The study analysed the process in order to identify where the sticky plates in the plate making department originated from.

   Benefits: The results of the study identified the need to modify and service the ovens which led to the reduction of reworked plates. Figure 3 shows the trend of percentage reworks in plate making.

Figure 1: Assembly Line downtime trend.

Figure 2: The assembly line change over trend after the SMED improvements were implemented.

Figure 3: Rework rate of plates after six sigma project implemented in August 2012.
Willard Batteries South Africa
Tirisano Cluster Programme

Programme Master Plan

<table>
<thead>
<tr>
<th>Item</th>
<th>Objective Description</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inception reports and business case.</td>
<td>J F M A M J A S O N D</td>
</tr>
<tr>
<td>2</td>
<td>SWOT Analysis and feedback workshops</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Subproject 1: 5S and 7 waste training and implementation in the Charge Room department.</td>
<td>J F M A M J A S O N D</td>
</tr>
<tr>
<td>4</td>
<td>Subproject 2: SMED Implementation: Shop floor training and practical exercise with SMED teams on the battery making assembly lines.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Subproject 3: Production studies on the bottleneck processes and reduce the losses identified in the charge room department and battery making assemble lines.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Project close out and handover</td>
<td></td>
</tr>
</tbody>
</table>

Benefits (KPI's)

Based on the suggestions received from the shop floor, ergonomic issues and employee morale had improved. Knowledge was also transferred between middle management and the shop floor staff during the ‘train the trainer’ workshops facilitated by the AIDC team. The total cost saving amounted to R 2 799 264 per annum.

<table>
<thead>
<tr>
<th>KPI</th>
<th>Before</th>
<th>After</th>
<th>% improvement</th>
<th>Rand Saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity of assembly lines</td>
<td>42%</td>
<td>44%</td>
<td>2%</td>
<td>R 401 305.50</td>
</tr>
<tr>
<td>Downtime excluding Change over</td>
<td>39%</td>
<td>30%</td>
<td>-9%</td>
<td>R 791 850</td>
</tr>
<tr>
<td>Change Over</td>
<td>6%</td>
<td>4%</td>
<td>-2%</td>
<td>R 1 606 108.73</td>
</tr>
<tr>
<td>Total Savings</td>
<td></td>
<td></td>
<td></td>
<td>R 2 799 264.23</td>
</tr>
</tbody>
</table>

*SMED - Single Minute Exchange of Dies  
*SOP - Standard Operating Procedures  
*5S - House keeping & workplace organisation
Willard Batteries South Africa
Tirisano Cluster Programme

Key Learning Points

Basic lean manufacturing training eliminated the resistance to change from the shop floor employees and improved employee involvement when continuous improvement projects were implemented.

Attending production meetings was a good way to build relationships with employees who would form part of the improvement teams. It also provided an understanding of the overall problems that the company was experiencing which assisted in identifying additional kaizen projects.

Sustainability

The Continuous Improvement team has developed a kaizen steering committee which would meet on a weekly basis to discuss the progress of new continuous improvement projects that need to be implemented. The AIDC developed standard tracking sheets to monitor the progress of each individual involved in the project. Furthermore a suggestion scheme team would assist in identifying kaizen projects for implementation.

Way Forward

The company is planning to complete all outstanding projects identified by the AIDC. Willard batteries will continue to strive to become more involved with continuous improvement projects. The steering committee has also identified additional scrap reduction projects and will be following the six sigma methodology to reduce the scrap rate within its process.

Figure 6: Before and after toolboxes containing only the tools needed per station.

Figure 7: The assembly line scrap trend after the hourly quality check sheet has been implemented. Rework rate of plates after six sigma project.

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Zig – Enterprise
Tirisano Cluster Programme

Company Background

- Zig Enterprise was founded in 2011 as the logistics service provider for Ford South Africa. Today Zig-Enterprise plays a significant role in the South African automotive industry where their expertise includes, receiving of commodities, warehousing according to international quality standards, sequencing and various other line feeding processes and quality management. Zig-Enterprise supplies different commodities with a workforce of 18 employees and approximately 1,500 m² warehouse space.

- In 2010 Schnellecke was selected to participate in the AIDC Ford T6 BB-BEE Incubation programme. This Programme was set up through the use of a Government funded Incubation concept, where the Gauteng Provincial government, Department of Economic Development in partnership with Ford SA funded the set-up of a new JIT supply company at the premises of Ford Motor Company South Africa. The Incubation Facility is responsible for the JIT line side supply of all the parts manufactured at the Incubation facility for the T6 programme, as well as parts that will be supplied from Faurecia in the Automotive Supplier Park in Rosslyn. “This concept was developed, implemented and the facility is currently operated by the AIDC”.

- The role that Schnellecke is playing, is that of technical & logistical support during the start-up phase of the programme, and will continuously be supporting on a technical & logistical basis and transferring the skills to the BEE owner of the company to ensure that the Incubator will be able to run as a “stand-alone” company.

- With the Zig-Enterprise Incubation Facility being a Greenfield project, it required construction of a new building according to pre-determined specifications to ensure that the plant will satisfy the needs of the logistical JIT environment required by Ford as well as Zig-Enterprise Incubator.

Key Challenges Faced

- Long searching and sequencing times from the warehouse to Ford.
- Lack of Process standardisation & Low Stock Accuracy.
- Understanding the lean culture, tools and its demands.

Goals

- Reduce the stock searching times (sequencing) through standard operating procedures by 30%.
- Improve the stock accuracy from 0% to 45%.
- Train all employees on lean principles (7 wastes elimination & 5S workplace organisation) by the end of the program.

Programme Journey
Zig – Enterprise
Tirisano Cluster Programme

Sub-Project 1 (Receiving Process Flow)
In this project, chaotic non-standardised movements from receiving and into the warehouse were experienced and becoming a big problem to the effectiveness of the business. In many instances items which were stored into the stores were not recorded or were recorded incorrectly into the internal stock control system. This lead to late deliveries and the best way for the company to solve this situation was to overstock the commodities inside the warehouse in order to hide inefficiencies within their operations. In fact, the same chaotic issues were experienced at the dispatching area, but by default if the Engineers were resolving the issues at that receiving side, they were winning the battle for both areas. The counter measure established for this project was effective and a remedial solution for both receiving and dispatching problems.

Sub-Project 2 (Establishment of process standard Times)
During the ramp-up time it was difficult for Zig-Enterprise to decide if they needed to employ new staff or not, for the sequencing operation. The AIDC team was determined to understand the current plant capacity and the capabilities before the decision was to be made. All operations were investigated as to how they were carried out on normal basis or on average, as there were no standards set at the beginning. As expected, variable cycle times for a single operation were the results of observations. This variance in the operations needed to be stabilised in order to make accurate predictions on the upcoming ramp-up demands. Ultimately all value added processes for sequencing were increased by 17% Figure 7.

Sub-Project 3 (Process Standardisation)
From the Sub-Project 2 many flaws in the layout were identified during the analysis phase of sub-project 2 and the implementation phase of sub-project 2. Many of these flaws were transportation related as it took longer to sequence the parts because of these movements. The factory had to be divided into 4 quadrants; the idea here was to keep the same product family on a particular quadrant. This proved to have a significant improvement in the sequencing operation whereby high runners, mid-runners and low-runners on each cell were also realised, see Fig 6. The Idea was to keep the high runners at the front where operators would not struggle to get the parts as they are used more often than others and the mid runners parts are important but not as much as the high runners and lastly the low runners which will be stored at the back of each quadrant. The concept is illustrated on Fig 8 and Fig 9.

Sub-Project 4 (Stock Accuracy)
Ultimately all the above mentioned projects were envisaged to yield some sort of stock accuracy increase as a result of those project implementations. Still this was not enough to get Zig-Enterprise to a 100% stock accuracy yet the basics have already been covered during sub-project 1 to 3, so slightly more efforts was needed to be done to ensure a 100% stock accuracy. The Value stream map was drafted to identify the possible weaknesses in the current logistics support system. It was identified that still the system allowed the operators to bypass it and a poke-yoke needed to be installed in the system, this system used cards to control inventory. The data capturer control the parts needed to be scheduled by means of cards; this will signal the pickers on which parts to sequence into the trolley. The cards of the items sequenced will be evident at the back of the warehouse indicating that the stock needs to be replaced. Those cards will be collected at the end by the data capturer who will then adjust the stock from the system and re-order the parts.
Zig – Enterprise
Tirisano Cluster Programme

Programme Master Plan

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<td>Management Awareness</td>
<td>M J J A S O N D</td>
</tr>
<tr>
<td>2</td>
<td>SWOT Analysis and feedback workshop</td>
<td>M J J A S O N D</td>
</tr>
<tr>
<td>3</td>
<td>Lean Tools Training</td>
<td>M J J A S O N D</td>
</tr>
<tr>
<td>4</td>
<td>Subproject 1: Receiving process flow improvement.</td>
<td>M J J A S O N D</td>
</tr>
<tr>
<td>5</td>
<td>Sub-project 2: Establishment of process standard Times</td>
<td>M J J A S O N D</td>
</tr>
<tr>
<td>7</td>
<td>Sub-project 4: Stock Accuracy improvement</td>
<td>M J J A S O N D</td>
</tr>
<tr>
<td>8</td>
<td>Project close out and handover</td>
<td>M J J A S O N D</td>
</tr>
</tbody>
</table>

Benefits (KPI’s)

Reducing the time spent on sequencing was very important as it affected turn around time for sequencing, when Ford increased their volumes the current team/capacity would have been insufficient, resulting in customer dissatisfaction.

<table>
<thead>
<tr>
<th>KPI</th>
<th>Before</th>
<th>After</th>
<th>% Improvement</th>
<th>Tools Applied</th>
<th>Value of savings per Annum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door Panels location (WalkingDistance)</td>
<td>37 meters</td>
<td>19 meters</td>
<td>48% Decrease</td>
<td>Layout Redesign</td>
<td>R35 928</td>
</tr>
<tr>
<td>Centre Consoles location (Distance)</td>
<td>32m</td>
<td>15m</td>
<td>53% decrease</td>
<td>Layout redesign</td>
<td>R14 348</td>
</tr>
<tr>
<td>Stock Turn</td>
<td>1.8</td>
<td>5</td>
<td>64% improvement</td>
<td>Layout change &amp; scanners</td>
<td>R4 836</td>
</tr>
<tr>
<td>Forklift Utilisation (Distance travelled/ cycle)</td>
<td>59 m</td>
<td>40 m</td>
<td>33% Reduction</td>
<td>Layout Redesigned</td>
<td>N/A</td>
</tr>
<tr>
<td>Value Added (Sequencing)</td>
<td>2%</td>
<td>19%</td>
<td>17% improved</td>
<td>Process redesign</td>
<td>R44 640</td>
</tr>
<tr>
<td>Stock Accuracy (Audit Results)</td>
<td>0%</td>
<td>25%</td>
<td>25% increase</td>
<td>SMED &amp; 7 waste elimination</td>
<td>N/A</td>
</tr>
<tr>
<td>Total Savings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R99 752</td>
</tr>
</tbody>
</table>
Zig – Enterprise
Tirisano Cluster Programme

Key Learning Points

The Tirisano program showed the benefits of continuously improving; it also proved that through team work, small ideas have a great impact in productivity contributions.

Sustainability

Standard operating procedures were developed to ensure that the set standard does not decay. These SOP’S (Standard operating procedures) were developed for every major operation, from the receiving operation to the sequencing operation. Furthermore regular audits were performed in order to ensure that the standard is not derailed followed by the stock accuracy which was created as a monitoring tool to confirm standards are being maintained.

Initially the accuracy moved from 0% to 7% which was still very poor, and a value stream mapping was then formulated in order to depict where the flaws existed in the system. Through this exercise it was discovered that the system still allowed the operators to by pass: it and the mandate was to introducing an error free system.

Bar code scanners were also introduced to remedy the situation instead of manually booking parts in and out. Now operators can book parts in & out electronically. Not only did this process save time but also reduced the distance that operators used to walk from the sequencing station all the way to the data capturer and lastly prevented the wrong picking of parts as the bar code system confirms broadcast with scanned part. Other benefits that came along with the scanning system was also to assist in updating ZIG-Enterprise on the stock levels.

Way Forward

Zig Enterprise management are positive in maintaining the standards and willing to keep the spirit of continuous improvement. This was also experienced when the management commissioned the bar-code scanners which was a sign that they wanted to continuously improve their competitiveness. Currently the warehouse stock accuracy is sitting at an accuracy of 25% and the company have a goal of meeting a 100% target mark by the end of 2013. Tools such as value stream mapping have already been drafted and the barriers of meeting this target have been identified and projects have been put in place to eliminate the barriers in meeting the 100% stock accuracy mark.
SA Die and Pattern
Tirisano Cluster Programme

Company Background

SA Die and Pattern Co. (PTY) Limited is the flagship company within the Ukuvula group, with over 50 years’ experience in the manufacturing and assembly of mild steel and stainless pressed parts to Original Equipment Manufacturers and the aftermarket segment. SA Die and Pattern Co. (PTY) is South Africa’s top manufacturer and supplier for pressed parts including sub-assembly components for the body and interior of the vehicle. The components & sub-assemblies consist of park brake, brakes, pedal boxes, bonnet and boot hinges, exhaust shell components and catalytic converter pressing. SA Die and Pattern has been the name trusted and retained by some of the finest Automobile manufacturers like Toyota, Volkswagen, Ford and General Motors. SA Die and Pattern has been awarded the Ford T6 park brake, dashboard panel product and numerous other new Toyota products.

Key Challenges Faced

● Poor understanding of Lean methodologies,
● No standardization of work on shop floor,
● Time loss due to frequent Press Tool Change Overs,

Goals

● Training of employees on selected Lean concepts,
● Process Standardization,
● Productivity Improvement of 20% on Press Lines,
● Press Tool Change Over Time reduction of 25%,

Programme Journey

An initial meeting was held with the MD and the Plant Manager of the company to understand the key challenges that they were facing in their production facility. A SWOT analysis was also conducted with 19 key personnel within the facility to establish their level of understanding of how the company was performing in terms of the following areas: Organizational, Production, Quality, People, Process, Logistics, Standardization and Lean. A Lean Enterprise Assessment was also conducted by the AIDC to establish the strengths and weaknesses of the company on lean concepts.

Based on the outcomes of the SWOT and Lean Assessment, and with the knowledge from the initial meeting with the MD and Plant Manager, the programme was divided into 5 sub-projects. The first step was to give the entire management team Induction training on the overall programme as well as Lean concepts, to ensure their buy-in and support to the programme.

The training to management was followed with a plant awareness session in which the Unions were also involved. During these sessions, the entire shop floor workforce was introduced to the AIDC team and the programme goals were discussed. The employees then had a chance to ask any questions that they might have regarding the programme.
Automotive Component Supplier Development Programme
Case Study

SA Die and Pattern Tirisano Cluster Programme

Programme Journey Continued

Process Standardization
Standardization of processes was highlighted in the SWOT analysis as one of the key items that is lacking within the organization. By conducting detailed time studies and also incorporating the product specific requirements, the processes were standardized. A total of 156 detailed time studies were conducted. To ensure the sustainability of the standardization the information was captured on a Process Sheet & Operator Instruction. This sheet contained detailed information regarding how to perform the processes for a specific product. The operators formed part of the team on the shop floor that established the standard work. 77 Process Sheets have been created and implemented. (Please refer to figure 3 for Process Sheet & Operator Instruction)

Other information like Tool Change Over settings, PPE (Personal Protective Equipment) and safety issues was also incorporated in this sheet to ensure the maximum safety to the operators while also giving the operator the means to perform at maximum efficiency.

Training
After the awareness session, training for the shop floor employees was conducted. This included the foundation of the Lean principles like 7 Wastes and 5S training, as well as Introduction to Continuous Improvement. (Please refer to figure 1 for shop floor training) Red tagging is a process where operators are given the authority to identify current or potential problems or safety hazards on the production line. This forms part of their daily 5S routine. The advantages of red tagging are that the ownership of the maintenance of the machine is given to the operators, thus making it simpler for the maintenance team to identify the potential problems before breakdowns. (Please refer to figure 2 for Red Tagging exercise) A total of 39 employees were trained. The employees were expected to implement the 5S principles in their workplace, and a weekly audit was done in their areas to ensure awareness of their workplace and environment. Being a press shop environment, safety is always a very big factor. The implementation of 5S principles addresses certain key safety aspects and by actively following the 5S principles will ensure a safer work environment for the employees.

Tool Change Over Reduction
Training was given to key personnel on SMED (Single Minute Exchange of Dies). This is a concept that a company must strive to achieve a tool change over time of less than 10 minutes. 2 Pilot projects were identified and completed. (Please refer to figure 4 and 5 for SMED training and improvement concept) This was then used as the basis to establish a standard tool change over procedure. By implementing the standard tool change over procedure, an estimated annual saving of R464,162.40 can be achieved.

Line Balancing
Process standardization and training of workforce was the key to continuous improvement projects. However, a structured methodology still had to be implemented for the identification and elimination of wastes on the shop floor. This, together with detailed cycle times, triggered the line balancing activities. The AIDC team supported the different teams on the shop floor to identify and eliminate the wastes in their areas. This was done on a weekly basis, and the activities was formally recorded and presented to the plant manager. Upon approval, the cross functional team would be identified to implement the improvement activities. The line balancing activities resulted in annual savings of R161,329.64. This was identified in 19 different projects of which none required capital investment to implement.

Figure 1: 5S Training – Shop floor employees including managers were involved in the practical implementation.

Figure 2: Red Tagging – Shop floor employees trained to complete red tagging on a continuous basis to ensure sustainability of standards.

Figure 3: Process Sheet & Operator Instruction – this ensured the sustainability and knowledge transfer of all continuous improvement activities.
SA Die and Pattern
Tirisano Cluster Programme

Programme Master Plan

<table>
<thead>
<tr>
<th>Item</th>
<th>Objective/Description</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Management Awareness</td>
<td>J A S O N D</td>
</tr>
<tr>
<td>2</td>
<td>SWOT Analysis and feedback workshops – Goal Alignment</td>
<td>J A S O N D</td>
</tr>
<tr>
<td>3</td>
<td>Subproject 1: Process and cycle time standardization</td>
<td>J A S O N D</td>
</tr>
<tr>
<td>4</td>
<td>Subproject 2: 7 Wastes and 5S Training with Implementation in Model Areas</td>
<td>J A S O N D</td>
</tr>
<tr>
<td>5</td>
<td>Subproject 3: SMED Workshop and training with key personnel</td>
<td>J A S O N D</td>
</tr>
<tr>
<td>6</td>
<td>Subproject 4: Line Balancing Training and implementation</td>
<td>J A S O N D</td>
</tr>
<tr>
<td>7</td>
<td>Project close out and handover</td>
<td>J A S O N D</td>
</tr>
</tbody>
</table>

KPIs:

- **Training**: (Employees trained in Lean Principles)
  - Before: 0
  - After: 39
  - % Improvement: 17% of workforce trained.

- **5S Weekly Audits**: None
  - After: 68%
  - % Improvement: 68%

- **Tool Change Over**: (Estimate for all change overs)
  - Average Time: 60min
  - Average Time: 34min
  - % Improvement: 43.45%
  - Value of Savings: R464,162.40

- **Productivity**: (19 Cost Saving Projects)
  - % Improvement: 27.2%
  - Value of Savings: R161,329.64

- **Standardization**: (Process Sheets)
  - Before: 0 Process Sheets
  - After: 77 Process Sheets
  - % Improvement: 75% of all processes

- **Total Annual Savings**: R625,492.04

Benefits (KPI’s):

Standardization of work, training of all employees and knowledge sharing of the continuous improvement activities was the key factors in ensuring successful implementation of the projects. Providing SA Die and Pattern with the knowledge of Lean methodologies enabled them to give this training in-house and thus ensure sustainability of the programme.
SA Die and Pattern Tirisano Cluster Programme

Key Learning Points

Breaking the company down into smaller sized model areas was a key factor in the implementation of the improvements. Utilizing the model area as the pilot, the foundation was established on which the rest of the plant would be modelled on. It would have been near impossible to implement all the excellent improvement suggestions throughout the entire plant in a single attempt. The model area thus set the "tone" for changes; this in turn attracted the curiosity of the workforce and thus ensured a model of total employee involvement during implementation.

Sustainability

Visual Management was implemented on the shop floor to ensure total employee involvement in the changes that were required to be made. (Please refer to figure 6 for Visual Management concept) The shop floor employees are now responsible for their own performance measurement on an hourly basis, tracking production, quality and downtime. Establishing targets before the implementation of this system was crucial to the project.

Responsibility for the tool change over planning was also transferred from the production manager to the supervisors. This will ensure that the shop floor team - supervisor and press operators - will drive the tool change over on their own machines to ensure maximum efficiency. They can now proactively inform the setters of when and which tool needs to be changed.

The Way Forward

SA Die and Pattern was introduced to numerous Lean and continuous improvement methodologies during the programme duration. To ensure the sustainability of the project, they employed full time 2 Industrial Engineers working in the production and engineering department respectively. One of the engineers employed was the Junior Industrial Engineer that was placed by the AIDC at the company to assist during the duration of the Tirisano Programme on the shop floor activities. They will be responsible for the continuous improvement implementation on the shop floor, as well ensuring that the improvements are formalized and training given to the shop floor.

With the above in place, SA Die and Pattern will be well on their way to ensure not only a sustainable, but also a very effective continuous improvement programme that will drive their cost of manufacturing down and increase their competitiveness in the market.

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