

At a Glance

This project investigates the synergy between Lean Enterprise and Clean & Green Production. Specifically, it tests the approach of overlaying energy and other resource inputs and effluent outflows onto a Value Stream Map or Process Map, so that a more holistic approach can be taken. There is the potential to identify changes to the manufacturing process that would simultaneously make it leaner (i.e. requiring less labour, inventory and floorspace) and also making it greener (i.e. requiring less energy and/or generating less effluent). This approach was tested with a network of three manufacturing companies in South-East Ireland. Overall it was found that taking this approach reduced energy consumption, reduced key effluents and paid for the effort within one year.

CGPP2004/16

Clean & Lean manufacturing network



CARTEN



Lake Region

Waterford Chamber of Commerce, No. 2, Georges St. Waterford

The Clean & Lean Project was undertaken by a group of three companies within the South East Lean Forum (SELF). SELF is a network of over 40 companies in the South East who have a shared interest in implementing Lean Enterprise. The primary aim of the project is to investigate whether cleaner production can be achieved through the application of Lean principles and whether an analytic tool can be developed to highlight areas of most benefit. The three participating companies are Carten Controls Ltd, Frentech Engineering Ltd. and Lake Region Ireland Ltd. A Lean consultant, Raymond McEvoy, of Manufacturing Excellence, supported the companies. Manufacturing Excellence is a training & consultancy company specialising in the areas of Lean Enterprise and Six Sigma process improvement.



Companies who took part in the Clean Lean Manufacturing project (clockwise), Kathleen Fitzgerald, Waterford Chamber President, Siobhan Rafter, Waterford Chamber, Colman McCarthy, Clean Technology Centre CIT, Ray McEvoy, Manufacturing Excellence (on behalf of Frentech), Caitriona Sinnott, Carten Controls, Noel Hennessy, Lake Region and Monica Leech, Waterford Chamber.

South East Lean Forum (SELF)

Carten Controls Ltd.

Carten Controls Ltd. is recognised as a global leader in the design and manufacture of ultra high purity gas valves and system components for the semiconductor industry. Based in Waterford city, it employs approx 40 people on the manufacturing site. CCL is a wholly owned subsidiary of the Fujikin Company and has been implementing lean principles for the past five years.

Frentech Engineering Ltd.

Frentech Engineering Ltd. is a privately owned, Irish company producing a range of precision metal fabricated components, assemblies and full solutions for the Information Technology, Medical and Process sectors.

Lake Region Manufacturing Ireland

Lake Region Manufacturing Ireland, located in New Ross, Co.Wexford, is a wholly-owned subsidiary of an American company, manufacturing minimally invasive medical devices. The company currently employs over 600 people in a modern facility.

Aim of this Project

The fundamental aim of this project is to reduce both energy consumption and generated waste at source by applying Lean Principles. Lean Principles as practised by Toyota and documented by Womack & Jones (1996), focus on producing what the customer wants, when they want it, using the minimum amounts of labour, inventory, floorspace and other resources. Much of the emphasis so far has been on minimising the labour, inventory and floorspace elements. A specific tool to be investigated is whether the combination of Value Stream Mapping and effluent & energy audit data would focus change and improvement efforts in areas that would make the manufacturing operations both "Leaner" and "Cleaner" at the same time.

Project Description

The innovative aspect of this project was to look for improvements that are both Clean & Lean, by overlaying input and output streams on the backbone of a Value Stream Map, and to identify the key drivers of each input or output. The steps are as follows:

- Create the Map using a small group of three to six people that are familiar with some or all of the process. Use brown paper and 5"x3" Post-its®. The Post-its are easy to rewrite or reposition as required
- Identify the sequence of activities that are performed on the main product
- Classify activities into Value-Adding, Non-Value-Adding (pure NVA) and Necessary NVA
- Identify the significant inputs (resources and energy) into each step and the significant outputs (waste materials and heat)
- If data is readily available, quantify the volumes of each input and output
- Identify the driver for each input and output i.e. is it truly proportional to the amount of product or is it set by an hourly rate or number

of changeovers? This information is sometimes best obtained from the process operators. The “why-why-why” approach is particularly useful at this stage

- Review the map to look for opportunities. The best opportunities are those where eliminating pure NVA can also eliminate waste outputs or energy inputs. However, other opportunities may also become apparent

Although the maps can be saved in soft-copy form, it is not essential to transfer the map into a computer. However, it is worthwhile maintaining it because it becomes a living document and should be updated (in whichever form it exists) as the process evolves. All three companies noticed the positive impact of getting the relevant group of people to actually map the process under review. A long length of brown paper was taped up to the wall in a meeting area, as close to the real process as practical. Each process step was written onto a 3” x 5” Post-it® with a marker and organised in sequence. Rework or repeat loops were identified. All real steps were included, irrespective of whether they matched the “official procedure” or not.

The brown-paper mapping exercise has proven to be a very powerful way to generate a common understanding of what actually happens. It also focuses the attention of the group onto the process rather than onto each other. It encourages participants to deal with the actual process “as-is” rather than allocating blame for what “should-be”. The fact that the process is mapped and discussed using only paper and markers means it is accessible to all. It is not dependant upon somebody’s computer skills and it means the discussion can flow more quickly. The staff of all three companies were trained both in the basic tools of lean manufacturing as well as specifics of Clean & Lean Production, using Value Stream Mapping.

Achievements

Carten Controls Limited environmental impact is primarily captured under the headings of water used in electropolish, waste treatment chemicals used and electricity used. The reductions in both water usage (61%) and energy usage (37%) are dramatic and reflect the results of actively right-sizing the processes to the current level of product throughput.

For Lake Region, by far the biggest benefit comes from the reduction in generation of paint-water. Another noteworthy point is that the introduction of re-usable grey boxes for the spools of wire eliminates over 11 tonnes of cardboard and plastic from the recycling stream which results in annual savings of over €45,000.

A significant part of the waste reduction in Frenotech is of recyclable metal. Due to a reduction in waste through improved nesting and smaller batch sizes, this also meant that

less material had to be bought in over the same period. Even though Frenotech are paid for any waste copper and aluminium that is recycled, the savings represented by the difference in price between virgin materials and recycled is very significant. The labour saving included is due to the elimination of non-value-adding dressing operations on boxes and busbars.

Frenotech supply a stamped aluminium shape in the shape of the human body to a local toy and games manufacturer. It is necessary to lubricate the stamping dies to ensure that they move smoothly and that shapes are cut cleanly. Traditional engineering grade lubricating oil was used, but this meant that parts had to be individually cleaned to ensure that all traces were removed prior to shipment. This oil has been replaced with light surgical grade oil. The bulk of this oil evaporates off the parts and any residue is quite harmless, both to children and adults. The slight increase in cost per litre of the oil has been more than offset by the elimination of the subsequent cleaning operations.

Observations

In each of the companies, the various improvements have been implemented at the shopfloor level (and in many cases, suggested from the shopfloor level) without any great resistance. Some Lean initiatives suffer resistance because people fear that they may improve themselves out of a job, because the focus is purely on labour productivity. In this case many of the economic savings come from reduced purchase of raw materials and energy, or reduced cost to disposal of waste. Therefore there is a widespread sense of cooperation and the company is seen to be tackling a “common enemy” by improving job security for everyone in the organisation.

Lessons

All of the participating companies are convinced of the benefits of reviewing energy usage and processing effluents in a holistic fashion i.e. as part of a complete manufacturing system, and they see the brown-paper mapping as a very powerful tool to enable staff to achieve with a greater visibility. Also, each of the companies experienced very considerable cooperation and buy-in at each level of the organisation because the lean improvement effort was clearly focused on a “common enemy” and was not seen as threatening to job security.

More Information

For more information on this project please contact:

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Cleaner Greener Production Programme

The Cleaner Greener Production Programme (CGPP) of the EPA was funded under the National Development Plan 2000 – 2006. The CGPP was launched in 2001 as a grant scheme to Irish organisations to implement cleaner greener practices while achieving significant cost savings.

Cleaner Greener Production is the application of integrated preventive environmental strategies to processes, products and services to increase overall efficiency and reduce risks to humans and the environment.

- Production processes: conserving raw materials and energy, eliminating toxic raw materials, and reducing the quantity and toxicity of all emissions and wastes
- Products: reducing negative impacts along the life cycle of a product, from raw materials extraction to its ultimate disposal.
- Services: incorporating environmental concerns into designing and delivering services.

The programme aims are focussed on avoiding and preventing adverse environmental impact rather than treating or cleaning up afterwards. This approach brings better economic and environmental efficiency.

Under Phase 2 of CGPP, 22 organisations were funded from a variety of sectors (e.g. chemicals, food, metals, electronics, service). The total achievements from the projects for the participating organisations included annual reductions of 250,000 tonnes in input/output streams (water/waste water), 660 MWh energy reduction and €1.6m cost savings.

The programme will continue to be funded by the EPA in the NDP 2007-2013.

This case study report is one of the reports available from the companies that participated in the second phase of the Cleaner Greener Production Programme. A summary of all the projects and CD containing all the reports are also available.

More information on the programme is available from the EPA:

Ms. Lisa Sheils or Dr Brian Donlon,
Environmental Protection Agency,
Richview, Clonskeagh Rd., Dublin 14, Ireland.
www.epa.ie/researchandeducation/research/

Programme Managers...

The Clean Technology Centre (CTC) at Cork Institute of Technology was appointed to manage the programme. Established in 1991, the CTC is now nationally and internationally regarded as a centre of excellence in cleaner production, environmental management and eco-innovation across a range of industrial sectors.

