

Lean Thinking - TOC-Lean Tools & Techniques

Lean is typically all about targeting waste within any type of system. Examples of 'waste' could include shipping defective parts, wastes in processing, delays within the production area, transportation, over-production and excess inventory. Lean is therefore focused on the eradication of waste, but in our experience, that requires a clear and precise definition of waste. For example a machine standing idle is not necessarily wasteful if to keep it producing adds to the queues and cost through excess inventory. So what are the primary Lean principles?

- I **Specify value from the perspective of the customer** – which also means we need to define who the customer is, and this might be both internal and external customers and also the supply chain in which they sit; a key aspect here is that high levels of due date performance (>95%) and a reducing lead time have a beneficial effect on both the company and the market.
- I **Identify the value stream** – all processes along the chain must be included, this is key to the identification of the weakest link in the chain.
- I **Make value flow** – in other words keep material flowing as much as possible from supply base to the client, again this is linked to the importance of addressing issues related to due date performance and the reduction of overall lead time which is a critical dimension of any constraint management environment.
- I **Use PULL not push** – pull in line with demand and schedule accordingly, which is why all schedules in a constraint management environment start with the due date and volume of customer orders.
- I **Perfect the process** – the application of quality management enters here.

What Robs us of Fast (Value) Flow?

As seen from the lean principles described above, making value flow is clearly one of the most crucial. In our work with many different types of companies where flow is critical to success we have come across one very interesting phenomenon – capacity thieves. As one of the key aspects of Lean and Theory of Constraints (TOC), flow is where we focus our attention. If organisations wish to win new markets and retain existing customers, then being able to deliver right first time, every time and on-time is critical. At the same time there is continuous pressure to reduce the overall lead time without jeopardising delivery performance, so a fast flow must be maintained too. Hence our interest in what we have called a capacity thief – defined as *'that which robs flow of capacity and thus slows, or even stops, flow in its tracks'*. The capacity thieves that we deal with most often are:

- **Material**
- **People**
- **Breakdowns**
- **Set-ups**
- **Defects**

In order to address these capacity thieves we at I & J Munn have been active in integrating the key tools and techniques of Lean with TOC techniques:

Material is dealt with through the application of the Drum – Buffer – Rope approach contained within the TOC Operations methodology.

People - issues related to People are dealt with through the application of Buffer Management and changes to the measurement systems, removing efficiency measures and replacing them with measures that determine flow and the effectiveness of the flow management system to the bottom-line.

Breakdowns are addressed by Total Productive Maintenance (TPM) - or Production Led Maintenance. This is where we focus on the equipment used throughout the company in order to ensure that it remains capable of doing the work it was originally purchased to do. Maintenance is a necessary condition for ensuring that schedules are not disrupted by breakdowns or having to run the machine slower than the specification etc. Where the machine is a constraint this has considerable implications for the flow, and the ability of the system to make money.

The six big losses addressed through this approach are:

- Breakdowns
- Set-Up and Adjustments (see **SMED** below)
- Idling and minor stoppages
- Reduced Speed Losses
- Start-up Losses
- Quality Defects (see **Kaizen** and **DMAIC** below)

We run a programme for the implementation of TPM which over five days comprises some in-company training for key staff and the development of simple spreadsheet-based tools to track what is happening out on the shop floor and how that relates to the two key measures used within maintenance – Mean Time Between Failure (MTBF) and Mean Time To Repair (MTTR).

We have used this approach in a number of companies with great success, bringing control to an area that is usually given little or no priority and focus by senior management. We work with the maintenance team, helping them to develop more robust procedures for all aspects of maintenance, from daily checks through to the main service overhauls. We work with the scheduling team to make sure that the time for maintenance is properly set aside.

The data capture system we provide comprises maintenance records on a daily, weekly and monthly basis, defect reporting on the machine (this links with our Kaizen and DMAIC activity), and 5S activity (see below). Weekly incident reports reference breakdowns etc.

Set-Ups are addressed by Set-Up Reduction (SMED)

The importance of set-up reduction cannot be underestimated. In many types of organisations we see the ability to move from one product line to another constrained by two factors: firstly, having to work according to a 'large batch' system and secondly, having to maintain high levels of efficiency on each machine. Both of these aspects lead to considerable waste within the system. Through a simple understanding of "internal set-up

time” and “external set-up time” and the use of video to capture the actual set-up it is possible to reduce the time taken to move from product line A to product line B.

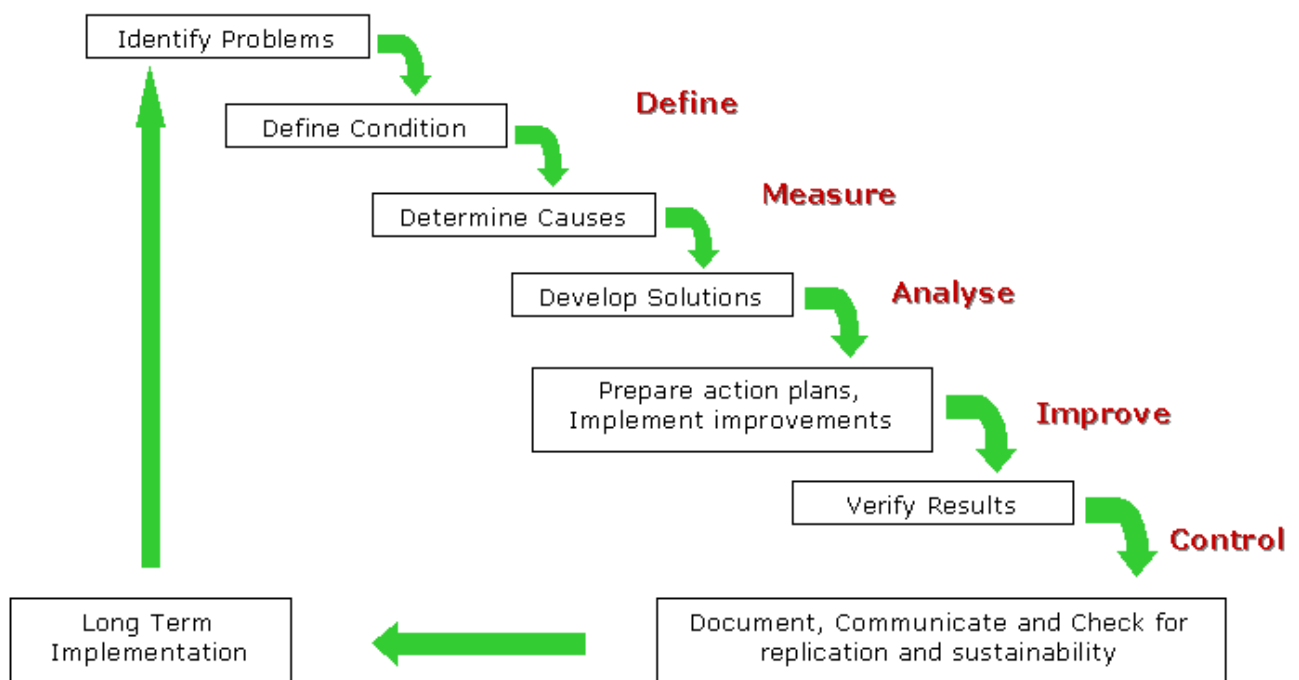
Our programme of set-up reduction focuses on working with the setters and the operators in order to fully understand the change-over procedure and to then produce a quicker and more robust set-up procedure.

Defects are addressed by Quality Improvement (DMAIC Kaizen and Deming)

Defects are the bane of almost all environments, not just manufacturing. Considerable investment is made each year to try to gain control over working environments that are deemed to be statistically out of control. The rise of techniques such as 6 Sigma is testament to this need to produce zero defects. However, tools and techniques such as Six Sigma are not enough - they need to be integrated into an organisational culture and process.

DMAIC

This is the key process contained within the Six Sigma approach. It comprises five steps: Define, Measure, Analyse, Improve and Control.



Kaizen

Of the techniques contained within the umbrella of Kaizen we have found the following to be the most useful when trying to understand and improve the performance of any system:

- The 3-MU checklist, comprising Muda (waste) Muri (strain) and Mura (discrepancy)
- The 4M checklist, comprising Man, Machine, Material, Method
- The 5 Whys – asking the question “Why?” five times with respect to something is a powerful tool for delving behind assumptions and developing greater clarity.

Other aspects of Kaizen are detailed below.

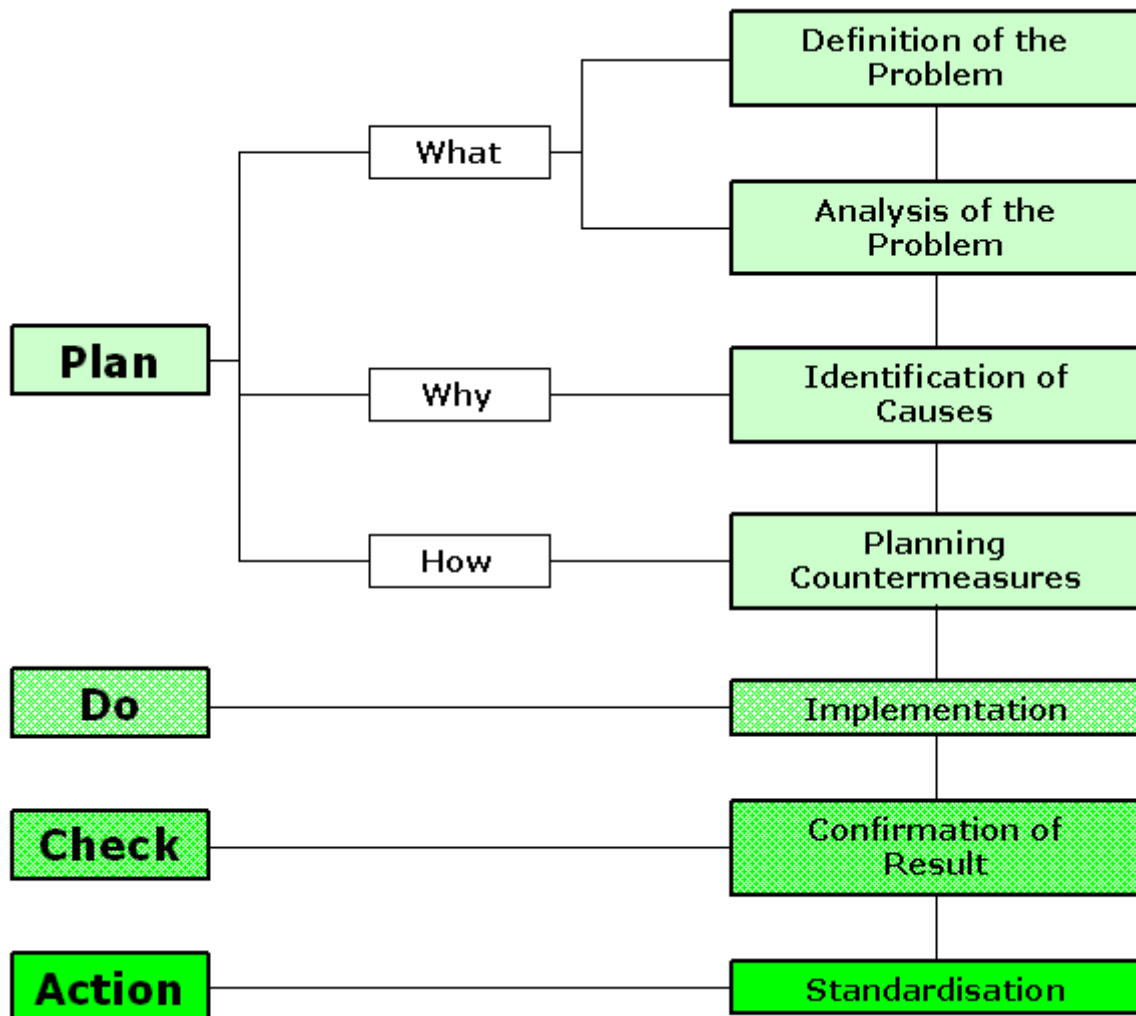
Statistical Tools

Within any quality environment it is necessary to use statistical tools. Via our programme of Quality Management courses we teach people how to use the following tools: Pareto, Cause and Effect, Histograms, Control Charts, Scatter Diagrams, Graphs and Check-sheets.

Our programme works through the DMAIC process, using a variety of techniques at each stage to ensure that the issues defined as problems are dealt with once and for all. There is a very clear link between our training in DMAIC and the Deming approach which is described below.

Deming

The Deming approach is primarily the four key steps of Plan – Do – Check – Action. We have developed that approach as can be seen from the diagram below.



Our training programme develops the skills and knowledge necessary to address issues related to quality and defects and thus improve flow, reduce costs and increase profitability.

5S

This is a technique used to establish and maintain a quality environment in any type of organisation. It should be used to improve not just the physical environment but the thinking processes as well. It comprises five key areas:

- Structure
- Systemise
- Sanitise
- Standardise
- Self-Discipline

We present a five day training programme, in-company, where we spend two days working with the internal 5S team. In that time we develop their skills in the understanding and implementation of 5S throughout the whole of the organisation. We have developed simple spreadsheet tools to assist with the implementation which can then be used by the team to maintain progress and the transfer the technique to other parts of the organisation. The remainder of the time is spent working directly with the 5S teams, developing their skills and application of the approach in each area of the company - shop floor, offices etc. We help them to develop a measurement system which can be used in all departments to monitor progress towards a clean and effective working environment.

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