

Lean Six Sigma and Planned Maintenance:

Can it be the perfect marriage?

The globalisation of markets has resulted in ever-increasing pressures on manufacturing margins, while at the same time customer lead time requirements are ever-shrinking. Therefore, in order for a company to be competitive, it must optimise the efficiency of its operations and optimise the availability of all its plants. Given this environment, companies have responded by implementing Lean Six Sigma and Planned Maintenance systems respectively.

Sleeping in separate beds...

The financial benefits ascribed to successful Lean Six Sigma deployments have been widely published, especially in the process and manufacturing industries. Predominantly these benefits are as a result of increased production, increased quality, reduced waste and losses and reduced costs. Similarly, companies with mature Planned Maintenance programs have also realised significant financial benefits. These benefits typically arise from increased production due to reduced unplanned downtime and increased plant availability, as well as reduced costs through increased maintenance efficiencies and productivity of maintenance personnel.

However, very few success stories are published where both these programs are integrated in an organisation, resulting in a multiplying effect of the potential benefits. It is as if organisations view the two methodologies as mutually exclusive, with clearly defined boundaries between them – two potential partners with the same objectives, but sleeping in separate beds...

"How can a company integrate Planned Maintenance and Six Sigma, to create a multiplying effect of the potential benefits of each methodology? The ultimate aim should be to continually improve operational efficiency and plant availability, and do so faster than the competition."

Fuelling the divide

This is certainly not the first time that improvement programs have been seen as disconnected. For years, Lean and Six Sigma were seen in the same light – everyone thought you had to choose between one or the other. It certainly did not help that the consultants implementing these programs refused to acknowledge any common ground. It took thought leaders like Wheat, Mills and Carnell¹ to break down this barrier in 2003. Since then, virtually every Six Sigma consultant will offer Lean Six Sigma deployments – running Lean into

By Dr Wynand van Dyk



an organisation prior to a multitude of Six Sigma projects, in order to declare quick wins and pave the way for the Six Sigma projects.

Although few examples exist where Six Sigma is integrated with Planned Maintenance, it does seem as if certain practical and visual Lean concepts have been successfully integrated into planned maintenance programs. For example, 5S and Kaizen events are already being recognised as forming part of the pillars of Total Productive Maintenance (TPM). This "acceptance" of Lean concepts by the maintenance fraternity can be understood when one considers that most maintenance personnel are very practically

orientated. Through years of experience in dealing with breakdowns, they have developed their own techniques in order to "get the job done as quickly as possible". They have therefore become very adept at making changes without fully scoping the problem or using data to make decisions. In addition, they are so busy with their daily workload that it is virtually impossible to find time to understand Six Sigma concepts, let alone finding time to go through the whole DMAIC project methodology to solve a recurring problem.

A recent comment by a good friend who owns a factory, sums up the situation perfectly: *"At my factory we have a maintenance guy that is good at Lean, so the shop is well organised...they have dropped mould changeovers from 8 hours to 2 hours, but they are poor at keeping track of times to prove it. The Lean rolls right in, but the data analysis falls apart quickly"*.

About the author

Dr van Dyk was the original deployment leader for the Lonmin PLC Six Sigma deployment, which twice in a row was recognised internationally by winning the "Best achievement in manufacturing" category at the Global Six Sigma Awards, held in Las Vegas USA. In addition, he has more than 15 years of project management, process design and operational experience in the mining industry, and is currently a process consultant at MMS Consultants.



Thus the challenge: How can a company integrate Planned Maintenance and Six Sigma, to create a multiplying effect of the potential benefits of each methodology? The ultimate aim should be to continually improve operational efficiency and plant availability, and do so faster than the competition.

The perfect marriage

TPM can be traced back to the 1950's when preventative maintenance was introduced in Japan. Similarly, Six Sigma can be traced back to the late 1980's when it began in Motorola as an answer to remaining competitive in a globalising market. Since then, both methodologies have built up significant "know-how" in their respective fields. In order to make the integration work, each methodology should focus on its core strengths, while allowing the other to get on with doing what it does best.

Planned Maintenance should therefore focus on shifting the maintenance culture in an organisation from breakdown maintenance to preventative maintenance and, if required, predictive maintenance. In turn, Six Sigma should focus on the continuous improvement of the Planned Maintenance program by utilising the data generated by the planned maintenance software system. For example,

data on the mean time to repair (MTTR) of each maintenance task can be collated, and projects launched to reduce the variation in and/or reduce the mean time of each task. A similar strategy could be followed on the mean time between failure (MTBF) data for key equipment.

By assigning these projects to dedicated Six Sigma resources, maintenance resources can be freed up to focus on getting the maintenance job done and ensuring the data integrity of the maintenance software system. At the same time, sustainable solutions to increase plant availability can be produced through the structured, data-driven problem solving methodology of Six Sigma.

By dropping Six Sigma in once TPM has been established, the continuous improvement of the TPM program can be accelerated, thereby providing a competitive advantage to the organisation in a fast changing, globalised market – a perfect marriage indeed!

However, as in real life, a marriage does not just work simply because two potential partners are brought together. Apart from the usual bits of love and physical attraction, the partners need a common vision and a clear understanding of the role of each partner in the marriage. Similarly, the strategic alignment within the organisation, supported by a clear deployment plan, is required to realise the full potential of integrating planned maintenance with Six Sigma.

Strategic alignment

Surprisingly, a large amount of common ground exists on which to build the strategic alignment of Six Sigma and Planned Maintenance in an organisation. In order to reap this potential advantage, a clear deployment plan should be developed, built around the following principles:

- **Success depends on support from senior management:** The visible commitment and engagement of executives remains the single most important factor for successful Six Sigma and Planned Maintenance deployments. With a clear and common vision of the integration between the two programs, executives will be able to "walk the talk" and deliver a clear message to employees.
- **Reliance on quality data:** Most planned maintenance practitioners will very quickly admit that their biggest challenge is to ensure quality data in their maintenance management software system, irrespective of which software package is being used. Similarly, most Six Sigma Black belts will admit that their biggest challenge on projects is to obtain quality data originating from accurate and precise measurement systems. Through the clear

definition of roles and responsibilities, employees can be held accountable for the integrity of the data in the maintenance software system. A host of data will then become available to launch Six Sigma projects, thereby reducing Six Sigma project cycle time.

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- **Team-based approach:** Without proper change management, both Six Sigma and Planned Maintenance deployments will fail. Since both methodologies heavily rely on a team-based approach, natural synergies will exist in the change management process, and should be exploited. The key remains to get the team members to see it as "the way we work" rather than "more work".
- **Progress tracking:** The age old adage "You get what you measure..." is very true for both Planned Maintenance and Six Sigma. Both methodologies should therefore have tracking systems which track individual projects/activities, as well as the overall key metrics and performance of the deployment. Unfortunately, the software suppliers have seen this as two independent markets, and attention should therefore be given to the integration of the systems on the reporting level.
- **Benefits tracking:** Both Six Sigma and Planned Maintenance is aimed at impacting the bottom line of an organisation. However, without common protocols to estimate, measure and track the benefits, momentum will be quickly lost as the organisation struggles to ascribe value to the new way of working.

Planned Maintenance and Six Sigma deployments are therefore pretty much in the same boat when it comes to the strategic alignment and execution of such deployments within an organisation. Rather than an "us and them" approach (resulting in the organisation seeing "more work" to be done), significant traction can be achieved by an overarching strategic plan and deployment design which addresses all of the above factors. By applying these principles, Six Sigma and Planned Maintenance can be integrated successfully and live together happily ever after...

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*Barbara Wheat, Chuck Mills & Mike Carnell, "Leaning into Six Sigma: A Parable Journey to Six Sigma and a Lean Enterprise", 2003, ISBN: 0071414320

