Applying the SMED methodology in manufacturing

In recent times so much Lean Six Sigma application has centred around the benefits that can be gained in transactional working environments. That’s why it’s always great to have the opportunity to use Lean techniques in the place they were originally developed – on the factory floor.

Earlier this year Bourton Group led a project in manufacturing where we followed the SMED methodology very closely, and to great effect.

What is SMED?

SMED was first named and publicised by Lean guru Shigeo Shingo in the 1970s, based on work that had been taking place at Toyota in Japan over previous decades. It stands for Single Minute Exchange of Die, a reference to attempts within Toyota to reduce the die changeover in stamping presses to a single digit number of minutes (i.e. less than ten).

Order backlog impacting customer lead times

Our client was a manufacturer of high-performance heat proof materials. The product line we were looking at was essentially small cylindrical tubes, made using a vacuum forming process, where a vacuum is drawn through a mould as it is dipped into a tank containing liquid and fibrous chemicals, the result is a solid structure which sets when it is lifted back out of the tank into the air.

Our client’s problem was one of capacity. Even though the factory was working round the clock seven days per week they still had a backlog of orders so large it was impacting customer lead time. OEE (Operational Equipment Efficiency) studies had indicated that the best opportunity to increase output was to reduce time when the equipment was unused due to changeovers from one product to another.

Faced with this kind of dilemma there are two things that should be done

1. Schedule orders in such a way that it minimises the number of changeovers that happen.
2. Reduce the length of time the changeovers take.

In this instance, we were there to help with the latter. We utilised the Lean technique specifically focused on reducing setup time, SMED.

Usually when applying Lean methodology it is best to adapt it to the circumstances. However, in this instance there was such a close fit with this tool to the problem, we decided to follow the methodology precisely.
Following the SMED methodology

As is so often the case with Lean, the first step is to get a good understanding of the process, in this case not the production process but the changeover process. To do this we filmed the changeover in full, several times, from the moment the last product of an order was made until the first one on the next order.

We then analysed the content, identifying each task, how long it took, and classifying it as either ‘Internal’ or ‘External’ – this is a key step in SMED. Internal tasks are anything internal to the setup process, those things which can only be done when the equipment is stopped, such as removing the moulds. External tasks are ones which could in theory be done when the equipment is still running, such as returning moulds to the store and bringing new ones.

How to approach the two types of tasks

For external tasks you look at the availability of other resources to carry them out, because if the most value-added activity the operator can possibly be doing is running the machine, any other tasks which they’re doing which do not require the machine to be stopped would be better performed by someone else.

For internal tasks you look at the length of time they take and use techniques like brainstorming and the knowledge of subject matter experts to try to find quicker ways of doing them.

When we had a lot of data on the changeovers we’d filmed, we explained SMED theory to the operators and showed them the videos. Some of the footage was of lengthy walks across the factory to get tools and moulds, but everybody agreed that due to the scheduling of the jobs the need for these items was entirely foreseeable. It was clear that with better workplace organisation and planning these things could be ready at the side of the tank before the machine stopped. One of the internal tasks was unscrewing lengthy threads on the moulds, so it was decided that we would investigate the possibility of quick fit connectors.

Benefits achieved

After a short time spent implementing the list of actions on one tank as a trial, we went back to film another changeover.

The stores person was now responsible for placing the moulds on a newly created stand next to the tank, a shadow board with all the required tools was in place, quick fit connectors had been introduced, and multiple other changes made too. This resulted in the changeover time being reduced by 40 minutes, and with an average 12 changeovers per week that’s an impressive eight hours more production time on that one tank. With 13 vacuum forming tanks across the site that adds up to a significant potential increase in production without increasing labour, equipment or facility costs.

Conclusion

While this was a small project, without any massively complicated solutions; it’s an excellent example of how basic Lean application can have a big impact on a businesses’ problems. Without the focus given by the SMED structure the issues would not have been solved, and so quickly! But, more importantly as a high-profile activity within the factory, there’s the additional benefit of inspiring the people there to think of the potential for improvement in a different way.

SMED was developed entirely in manufacturing, and one challenge we always have when training Lean elsewhere is how to demonstrate that it applies equally everywhere. A great example of that is the use of SMED in the Housing and Residential Services sector to reduce the time houses are empty between tenants moving out and new ones moving in – the voids process. The theory is exactly the same. Internal activities are those such as cleaning which has to be done when the house is empty, external ones include much of the administration which can be triggered when the tenants give notice but are still resident in the house.

The application of Lean outside Manufacturing sometimes takes some imagination, but when done properly the improvement potential is limitless.

If you have a question about SMED, or if you’re looking for support with another situation, feel free to get in touch on 01926 633333 alternatively you can email us at info@bourton.co.uk.