

## Chapter 38

# Single-Minute Exchange of Dies at a Kaizen Event

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### ABSTRACT

*Lean concepts play a fundamental role in the promotion of continuous improvement in the workplace. This chapter seeks to assess the impact of Kaizen events on an organization's bottom line, in the case of Single-Minute Exchange of Dies (SMED) that is a system for dramatically reducing the time it takes to complete equipment changeovers. In this case study, SMED was used in combination with other lean tools such as 5S and standardized work in a bid to promote continuous improvement of the "flawed" operations that occur in a world-class manufacturer plant. This analysis is critical in determining whether the path to achieving continuous improvement process for the team in the organization can be achieved through the use of SMED. The results have shown that a lean strategy like SMED, coupled with other lean strategies like 5s and TPM, plays a fundamental role in reducing process inefficiencies in the plant.*

### INTRODUCTION

Single-Minute Exchange of Dies (SMED) is a critical lean production method that is concerned with the reduction of waste in a manufacturing process (Dave & Sohani, 2012). The application of SMED is aimed at the achievement of the optimization of machine utilization, reducing the production times, stocks, and machine adjusting times, as well as the time that the machine is not operational, and it also works towards having small lot sizes (Ulutas, 2011). The concepts that are critical to SMED are put to work when trying to achieve a reduction of the setup times. An analysis of the set uptime is the first step that is done to assess the current state. This is followed by the elimination of the inefficiencies that are present as far as time is concerned. The next step then requires the identification of the internal and external setups, after which, the internal setups are converted to external ones. The final step requires

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standardization, where improvements were identified and plan to eliminate process wastes are provided. In combination with other lean tools like 5s, TPM, and standardized work, more as far as process improvements can be achieved with the application of SMED.

The essence of the SMED system is to convert as many change-over steps as possible to “external” (performed while the equipment is running) and to simplify and streamline the remaining steps. SMED can be said to be a process-based innovation that was brought to the publishing scene in the mid-1980s (Carrizo & Campos, 2011). SMED plays a fundamental role in instigating productivity in the firm (Carrizo & Campos, 2011). SMED is essential when it comes to converting a manufacturing process from running one product to running the next, in what is termed as a rapid change-over (Dave & Sohani, 2012). The rapid change-over is imperative in reducing the lot size and improving the production flow (Dave & Sohani, 2012).

When narrowing down to looking at what SMED in fact means, it is essential to note that the term is drawn from the goal that is concerned with the reduction of the changeover time, to the single digits, less than ten minutes to be precise (Vorne, 2016). This is possible, especially where the elements of a given changeover are analyzed to ensure that they can be eliminated, streamlined, moved or even simplified (Vorne, 2016).

One aspect that stands out in SMED is the essence of a quick changeover, which mainly captures the concept of time. It is essential to address what is, in fact, meant by the term “quick changeover.” A quick changeover is a process that is aimed at reducing the time that has elapsed from the production of the last good part to the production of the next good part after a set-up (Manufacturing Terms, n.d). In actuality, a quick changeover is an essential concept given that it allows the necessary flexibility that matches the production mix, to the existing demand (Vellation Continuous Improvement, 2016). Quick changeovers facilitate the production of smaller batches, and the presence of continuous flow (A Lean Journey, 2010).

The role of SMED in lean manufacturing is undisputed, particularly when looking at the concept of Total Productive Maintenance (TPM). As such, it is imperative to look at the essence of TPM in lean manufacturing keenly. TPM is fundamental to the implementation of lean manufacturing (Lean Manufacturing Tools, 2017). Note that process improvement is facilitated by the use of machines and equipment; therefore, the role of TPM can only be promoted with the reliance on machines (Lean Manufacturing Tools, 2017). When combined with 5S, TPM provides the basis for the improvement of business operations (Lean Manufacturing Tools, 2017).

TPM makes use of SMED in the pursuit of increasing availability of the Overall Equipment Effectiveness OEE (Weigh Label, 2017). The alignment of SMED and TPM priorities allows the understanding of OEE losses. TPM is necessary for the company’s bottom line given that it fosters critical improvement of the maintenance functions that take place therein, and which requires the involvement of human resources (Al-Hassan, Chan, & Metcalfe, 2000). As evidenced by Al-Hassan, Chan, and Metcalfe (2000), when it is implemented correctly in an organization, TPM precipitates an improvement in the quality, productivity, and a reduction of unnecessary costs. As a matter of fact, with the increment in the degree of automation in an organization, then chances tend to be high that a greater cost reduction that is generated from TPM occurs.

Financial implications that are attributed to TPM cannot be disputed. In reality, organizations should be aware that before TPM implementation, costs and benefits amounting to the lean concept ought to be understood (Smartware Group, 2016). It should be noted that costs that are attributed to time and hu-

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