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Efficiency Improvement and Productivity Enhancement in Tier II Automotive Companies: Review and Analysis

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Abstract—*Major Automobile Original Equipment Manufacturers (OEMs) in India have shown significant transformation in the recent past. These OEMs outsource majority of the components of their products from Tier I, II and II supplier companies. With increasing demand for more product variants and short delivery times, short lead times in production have become dire necessity. One of the possible ways for achieving the same is reduction in changeover time of dies. Present work reviews the application of Lean Tool – Single Minute Exchange of Dies (SMED) and its outcome specifically for Tier II and Tier III supplier companies for manufacturing giants in Automotive Sector in India.*

Keywords*: SMED, OEMs, Automobile Industry, Tier II, changeover time.*

1. INTRODUCTION

All the major Automobile OEMs which are already established or are establishing their manufacturing units in India are looking for localizing the components of their products by outsourcing their manufacturing to local suppliers. India has now become a manufacturing hub for various Automobiles OEMs of the world. Made in India vehicles are being exported to various countries across the globe. Due to dynamic and highly competitive market, manufacturing industries are compelled to deliver different variants and models in limited time [1]. While OEMs and some Tier-I supplier companies are producing effectively with short lead time, there are many Tier-II suppliers which are not able to meet the demand due to inefficient working causing higher lead times.

The problems identified at Tier II suppliers are:-

- Non Optimum usage of available resources.
- High Rejection rate and breakdown
- High Inventory levels and rework.

One of the possible ways to rectify these problems is by using SMED (Single Minute Exchange of Dies) methodology proposed by Dr. Shigeo Shingo in 1950s.

2. SMED (SINGLE MINUTE EXCHANGE OF DIES)

SMED is a lean tool which proposes reduction of elimination of waste by reduction in changeover time/setup time of a machine [1]. SMED doesn't mean that the changeover should take place in one minute but in other words it means "Single Digit Minute Exchange of Dies" i.e. the changeover time should be less than 10 minutes. SMED helps in increasing manufacturing capacity and improving flexibility further allowing to produce in small batch sizes with different varieties of products [2]. It also helps in reduction in cost since production cost is directly related to machine performance [1-3].

Shingo mentions that setup operations are divided into two types [2]:-

1. Internal Operations: This can be only performed while the machine is stopped.
2. External Operations: This can be performed while machine is operating.

3. PARAMETERS CONSIDERED FOR ANALYSIS

With reference to the literature following parameters were identified which were considered for the analysis in majority of the cases.

1. Changeover time: - It is the time period between the last "OK" product produced by the previous setup and the first "OK" product produced by the new setup after changeover is complete [1-11].
2. Value Adding Activities: - These are those activities which add value to the product from the customer's point

of view. These are the activities which increases the effectiveness of the product for which customer is willing to pay [4].

3. Non-value Adding Activities: - These are those activities that only add cost but no value to the product. For such an activity, the customer is not willing to pay [4].
4. Run up Period: - It is defined as the time taken to re-attain the optimum product quality after the change in setup is done. For E.g. – Minor adjustments and Quality Checking [2].

The methodology of SMED is shown in Fig. 1.

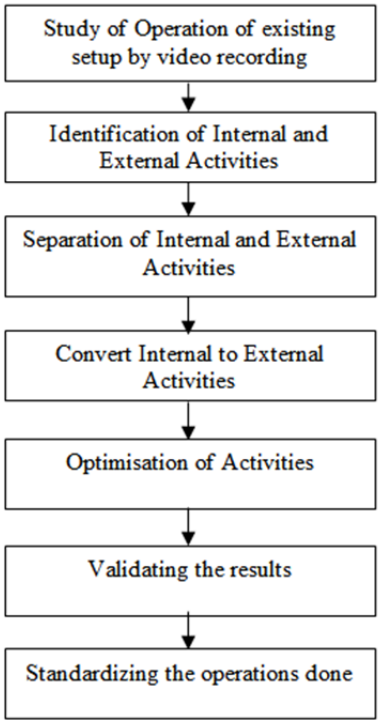

Fig. 1: SMED Methodology

4. RESULTS AND DISCUSSION

Application of SMED is identified in processes and areas like welding, sheet metal work, stamping, gear manufacturing, elevator manufacturing, air conditioners manufacturing etc. Some of the key findings are shown below in table 1.

Table 1: Key Findings

S. No.	Key Findings
1.	SMED methodology proposed by Shigeo Shingo is not the most efficient method to reduce set-up times in all situations. So a tailored SMED approach needs to be designed as per the industry requirement.
2.	By Implementing Organizational improvements only major reduction of changeover time of can be achieved. With implementation of hardware improvement, further reduction in changeover time can be achieved.
3.	Training of employees involved in the SMED process is important to make SMED implementation successful.
4.	Key Parameters to work on are Cycle Time, Time spent in Bottlenecks, Time spent in unnecessary motion of material, Movement of tools etc. These are some non-value adding activities.
5.	SMED makes multi-product manufacturing easy. Helps in achieving Economic Batch Quantity and reducing Inventory carrying Costs.

5. CONCLUSION

In India, large scale Automotive OEMs are surviving with the support provided from Tier 1, Tier 2 and Tier 3 vendor companies. Therefore development at Tier 2 and Tier 3 level companies is necessary to ultimately increase productivity and quality of the OEMs. Instead of buying new equipment or machinery to increase the production, one must first examine whether the available capacity is being fully utilized. A large amount of precious production time can be saved by reducing the changeover times. It indicates that if one can reduce changeover time, then one can increase production capacity. Therefore, bottlenecks are the first priority for setup time reduction.

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