



# 10<sup>th</sup> INTERNATIONAL WORKSHOP ADVANCES IN CLEANER PRODUCTION

“TEN YEARS WORKING TOGETHER FOR A SUSTAINABLE FUTURE”

## **Eco-efficiency in a metalworking industry of Campinas/SP region: reduction of setup time and Carbon Footprint**

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### **Abstract**

Losses of time and resources, such as materials, infrastructure, financial capital, and labor can reduce productivity and competitiveness of industries. In order to promote cleaner production, lean solutions integrated to the sustainable manufacturing concept can be adopted to minimize such losses. This integration can generate competitive advantages not only in financial terms, but contributing also to reduction of environmental impacts, operational advantages, increasing productivity and creating more value to companies. In this context, aiming at reducing unproductive times, one can focus on minimizing setup time of machines and equipment. Considering a high precision mold making company from Campinas region of São Paulo State of Brazil, the following question arises: how to identify improvement opportunities to reduce setup times and activities on its machining processes? There are several approaches that could be applied to solve this question, however, this paper focused on the integration of sustainable manufacturing with lean manufacturing practices and, for this, an eco-efficiency study was carried out through the application of SMED tool integrated with Carbon Footprint of machining processes. The case study results showed that it was possible to reduce long setup times by up to 88.4%, while carbon footprint was also minimized by up to 81.3%. Simple improvements were performed at the evaluated machining processes based on simple changes, such as standardization of setup activities and time & methods procedures. Finally, the combined approach of SMED with Carbon Footprint can be used to assist more companies to improve eco-efficiency in manufacturing processes towards a more sustainable future.

**Keywords:** *Eco-efficiency. Carbon Footprint. Quick Tooling Change. SMED. Lean Manufacturing.*