



Sustainable practices to metal forming processes: Literature review and case study

Julio H. C. Nobrega*, Rosley Anholon.

Abstract

The main objective of this research was identify in the literature sustainable practices associated to the metal forming processes. Besides, a case study was performed in a company selected. Eight sustainable practices were found and they were used to develop a research protocol. An interview with the industrial manager of the company was conducted. The results showed that the mentioned company had a low-medium degree of sustainable practices adoption.

Key words: Sustainability; Sustainable manufacturing; Metal forming processes.

Introduction

Sustainable development can be defined as “meeting the needs of the present without compromising the ability of future generations to meet their own needs”.¹ In the same context, emerge the concept of sustainable manufacturing² in which is possible to highlight the metal forming processes. According to Ingarao³, the mentioned processes can be more sustainable by evaluating energy consumption, the material used, emission of greenhouse gases generated, use of suitable lubricants to reduce the conformation efforts, among other points.

Thus, this research aimed to identify sustainable practices applied in metal forming processes and conduct a case study in a company.

Results and Discussion

To identify sustainable practices in metal forming processes, a literature review was conducted in the following bases: ScienceDirect, Emerald Insight and Springer. The terms used were combinations of “sustainability”, “forming”, “sustainable manufacturing”, “forging”, among others. Table 1 synthesizes the eight sustainable practices in the mentioned process.

Table 1. Sustainable practices in metal forming processes.

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|----|--|
| P1 | Techniques for lubricants selection and ecological lubricants (References: 3, 4 and 5) |
| P2 | Incremental metal forming (References: 6 and 7) |
| P3 | Use of customized blanks (References: 3, 8, 9 and 10) |
| P4 | Hydraulic metal forming (Reference: 7) |
| P5 | Prolonging the use of the die (References: 7, 11 and 12) |
| P6 | Reuse of discarded materials (Reference: 7) |
| P7 | Servo press technology (References: 13) |
| P8 | Innovation in die and blanks formats (Ref: 7, 14, 15, 16 and 17) |

Using the practices indicated in Table 1, a research protocol was developed and a case study was performed. An interview was conducted with the manager of the company selected, a manufacturer of automotive components. Regarding sustainable practices mentioned, it was possible to note a low-medium degree of sustainable practices adoption. Analyzing the interview,

we can conclude that is justified by the cost of implementation and the low customer’s interest regarding sustainable aspects.

Conclusions

The accomplishment of this research surveyed the eight sustainable practices applied to forming processes indicated by Table 1. These can be useful to academics and professionals that work in manufacturing companies. The company analyzed has improvements opportunities associated with sustainable practices in its processes.

The outcomes of this research can contribute to future studies regarding to sustainable manufacturing.

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