



Sustainable practices applied in electrostatic powder coating processes: literature review and case study.

Stela T. Botêlho*, Robert Eduardo Cooper Ordoñez

Abstract

This work aims to identify, through literature review and case study, how the electrostatic powder coating process is developing in both the academic community and the manufacturing sector to achieve cleaner production. In general, it is concluded that although the industry is applying some techniques identified in the scientific literature, there is still a need for greater application in the industrial environment.

Key words:

Electrostatic powder coating, Cleaner Production, Sustainability.

Introduction

With the boost in the use of technologies for manufacture and the industrial race started in the second revolution industrial in 1940, there was a drastic increase of the consumption of natural resources, bringing immense consequences for the planet. This introduces a need to balance economic growth with two other pillars, social growth and maintenance of the environment in a fully harmonious way.

One of the productive processes most affected by this quest for higher productivity while maintaining good quality is surface painting, especially the electrostatic powder coating technique. In order to increase knowledge about this process but still keep the sustainability pillars in line, this paper aims to identify process variables in the scientific literature and to verify how practices are embedded in an industry and compare the results. This work is part of a macro project on sustainability in manufacturing processes coordinated by professors Robert Cooper and Rosley Anholon.

Results and Discussion

For the purpose to identify the main variables of the process, a bibliographic review was done in the main scientific databases. In sequence with the information obtained and systematically reviewed, a questionnaire was developed to provide a semi-structured interview of a company that uses this process. This questionnaire was approved by the Unicamp Research Ethics Committee under the number CAAE 02653618.8.0000.5404. Finally, after the data collection of the case study, a synthesis of the results was performed, verifying how the response of the field research is related between observed in the literature as with only the interview.

With the literature analysis was found the variables that is classified into three types: 1) ink, 2) operator health and 3) process sequence. The ink is a possibility of producing it from waste from another process or using catalysts to improve the application, the health of the operator takes into account from the solvent of the ink used to filters to collect the wastes, and the last type is in relation to how a process can be improved by adding or exchanging certain machinery.

With these variables, practices were established that bring greater sustainability to the process, being the pillar of the questionnaire and the semi-structured interview. The

volunteer in the interview was concerned about environmental standards and economic sustainability, so it is easy to him justify investments that improve the process, techniques such as reuse of the paint while the quality of the painting is not compromised and the reuse of the water used by the system are techniques largely used. However, some techniques are not applied by them, such as the use of chemical catalysts to facilitate the coating process, or the use of paints produced from waste or using the heat from the kiln that is wasted. It was also verified that there is a synergy between the top management and the needs of the market for a search for a more sustainable production showing that in this area there has already been a modernization.

From this study it can be inferred that the market is already in the process of sustainable adequacy in production with some techniques already in use, although others have not yet spread in the factory environment or have not received attention of the same to justify its application indicating that there is a greater need for communication between the factories and the academic area. In summary, this work is part of the objectives of sustainable development, helping to implement it, with an emphasis on the development of more sustainable production and consumption. The figure below indicates the main ones in which it is inserted.



Image 1. UN Sustainable Development Goals, The Agenda 2030 (UN)¹

Conclusions

The methodology used allowed to analyse both the academic literature and the manufacturing environment and verify that although there are sustainable practices identified in the literature its application still needs to be increased in the industry to reach a cleaner production.

Acknowledgement

The thanks are dedicated to the University of Campinas, School of Mechanical Engineering and CNPq.

MILLENNIUM, T.; GOALS, D. The Millennium Development Goals Report 2015.