Theoretical and practical development of a new paint application model with multiple micro-spray and nozzle adjustment

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Abstract

The painting process in the automotive industry requires a lot of energy to carry out. The painting or surface finishing of the components has the objective of protect the parts of the automobile from the environmental conditions to which they will be exposed, mainly corrosion and to complying with their aesthetic appearance and presentation. Painting processes generate a large amount of contaminated water, air and filters by residual paint that was not deposited on the painted piece, due to the overspray generated in the application process. The overspray is generated by spraying the liquid paint with the aim that this paint in the form of particles reaches and adheres to the piece, however, the application guns require a distance between the point of application and the piece to be painted, in this distance forms a cloud of paint particles in the air that has no contact with the piece, this cloud is called overspray. The size and shape of the overspray is related to the size of the gun, the flow of paint being applied, and the air pressure. Therefore, it is important to ask how can overspray generation be reduced or eliminated. With the intention of reduce the consuming resources such as paint or compressed air and generating less contaminated air, water and filters, while continuing to provide the requirements of quality, application times and costs, which the current painting process demands in the automotive industry. . This research aims to theoretically develop a new paint gun and simulate a paint application model in CFD software to reduce overspray in the application.

Keywords
Overspray, Paint gun, Automotive painting, Overspray-free.