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Evaluation of air flow pattern for conceptual design of automotive painting line using computational fluid dynamic (Cfd) for better dust particle reduction (Article)

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Abstract

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In the painting production process, repairing of paint work defects by running the part through repeat process, together with the essential requirement quality control routines, account for a very large proportion of the operating costs.The dust and fibre defects is ranged between 40% and 50% and found to be the highest rejection from one of the local industry painting line. Hence that, this research is focused to study the effectiveness of simulating this painting line using Computational Fluid Dynamic (CFD) method to identify the air flow and turbulence pattern which may help to understand the particle concentration and movement in the painting line. Six mechanical designs of ventilation system was proposed in order to study the particle movement and concentration to this automotive painting line. From here, the best design which suite the objective of minimizing the particle concentration and its dissipation into the painted part are justified. Hence, improvement action such as layout arrangement and mechanical design are factors involved to overcome and minimize the foreign particle from fall down into the parts during the painting process. The result from this study may also be a benchmarking for future design of new automotive painting line.

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