IAQ QUALITY SUSTAINABILITY AWARD 2021 - ONE-PAGE SUMMARY

The One-Page Summary should be filled in and submitted as Appendix 1 to your Application. It will also be published on the IAQ Quality Sustainability Award Homepage; http://iaqaward.com. The length of this document must not exceed 1 page.

Project and contact details

The name of the quality sustainability project (max. 100 characters)
Volatile Organic Compounds (VOC) reduction - A proactive approach

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Organisation(s), country, where the project-members are working, including Web-page links
Ashok Leyland Ltd. (India), https://ashokleyland.com

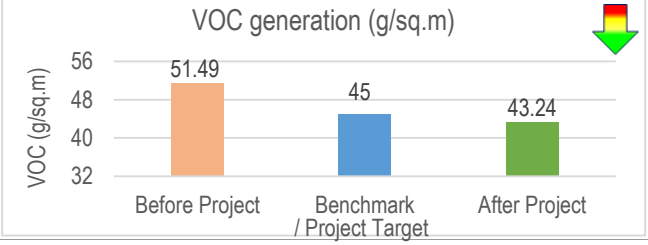
Project description

Essence of the project and Problem statement:
In Automotive industry, Paint shop is the most environmentally damaging area where massive amount of waste is generated. Mainly two types of hazardous waste are generated - (i) Hazardous sludge (ii) Volatile Organic Compounds (VOC).
This project details about reducing VOC. VOC has adverse impact not only on human health but also on environment. Though there is no mandatory legislation for VOC emissions in India, thrust on environment propelled us to explore possibilities of reducing VOC generation. Though we have already achieved European Union (EU) VOC norm of 55 g/sq.m for Cabin Truck industry, through this project we aimed at reducing them further and achieve the benchmark level of 45 g/sq.m set for Passenger cars.
Project baseline: 51.49 g/sq.m; **Target:** 45 g/sq.m
Methodology: Six Sigma DMAIC methodology is used to systematically solve the problem.
Analysis & Steps taken:
We consulted domain experts and studied technical literatures for best practices followed in the industry for containing VOC generation. We came across two best practices but both of them were not sustainable. Hence we relied on process innovation.
Eleven probable causes that could impact VOC generation are collected through Cause & Effect diagram. By investigating each of these causes with appropriate statistical tools we concluded that, (1) Variation in Viscosity levels of application paint (2) Poor transfer efficiency in Manual paint line are leading to higher VOC generation.
By optimizing viscosity while satisfying Quality & Cycle time requirements, VOC was reduced from 51.49 g/sq.m to 48.54 g/sq.m
To improve transfer efficiency, we needed to close Manual paint line. But it was possible only by increasing the robot line productivity by 66% which was a huge challenge. Using Design of experiments (DOE), we could optimise robot speed & paint flow rate thereby benchmark cycle time of 3.0 minute (in Stop & go conveyor) and complete capacity is achieved on Robot line.
Results achieved: Few of them are listed here. For complete list of results, kindly refer application form.
1) VOC generation reduced from 51.49 g/sq.m to 43.24 g/sq.m (16% reduction). Though we are Cabin Truck manufacturers (for which EU norm is 55 g/sq.m), we have achieved VOC lesser than the EU norm of 45 g/sq.m set for Passenger car industry.
2) Carbon emissions reduced by ~600 MT annually. 3) Power consumption reduced by 0.6 Million units annually.
4) Paint & solvent consumption reduced by 30 MT annually. 5) Paint Sludge generation reduced by ~10 MT annually.
Relevance to UN Sustainability Goals:
GOAL 9: Industry, Innovation and Infrastructure. Indicator 9.4.1: CO2 emission per unit of value added.
GOAL 12: Responsible Consumption and Production
Indicator 12.4.2: Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment
Indicator 12.2.2: Domestic material consumption.
Project Start & Completion date: The project started on 05-Apr-2019 and completed by 31-Dec-2020 in 2 stages.
Quality methods and tools used: Design of experiments (DOE), Simple Linear Regression, Fitted line plot (using Prediction intervals), Binary logistic regression, Measurement System Analysis (MSA) – GR&R method, Process capability study, Cause and Effect diagram, Histogram & Variable Control charts.

Project leverage potential

This project could be replicated with minimal investment in other organizations globally wherever liquid painting happens. Scope includes, All Auto OEMs, Consumer Durable companies, Home Appliance businesses, Packaging industry, Construction industry, Railway coach manufacturers, Mobile manufacturing companies.

Picture/Image describing the project



Note. More information about the award and how to apply can be found on the IAQ Quality Award homepage