

Name of the Project: Sustainable reduction in Diesel consumption requirement at Cabin Paint shop

Name of the Organization hosting the project: Ashok Leyland Ltd. (India)

UN Sustainability Development Goal affected: Goal 12: Responsible Consumption and Production

Introduction: In Ashok Leyland, we continuously improve efficiency in our processes and reduce use of consumable materials (natural and hydrocarbon resources) while maintaining product quality to delight our customers. Diesel is one of the major item used in our utilities and processes.

Essence of the project and Problem statement:

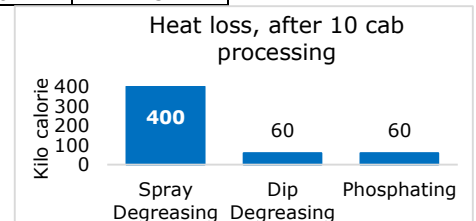
As Paint shop was the top consumer (38.4%) of diesel in our Hosur-2 plant, project was taken up to reduce its consumption from 18.92 Litre/cabin to 17 Litre/cabin. It was also in line with our Organization's environment policy.

Methodology: Six Sigma DMAIC methodology was used to solve the problem.

Observation and Analysis: As an initial step, we have analyzed the process capability of all processes where diesel is used and found all 5 processes are capable enough with required Cp and Cpk.

Manuall Deoxidation	Spray Degreasing	Dip Degreasing	Soft Water Rinse 1 & 2	Phosphating	Baking ED Oven	Baking Topcoat oven	Inspection
CP	2.17	2.47		2.95	2.11	1.79	
Cpk	1.9	2.45		2.33	2.04	1.37	

Further, CFT performed analysis using Quality tools and compared Heat loss among the sub processes of Spray, Dip degreasing and phosphating, we found that heat losses are significantly high in Spray degreasing which is causing extra diesel consumption.



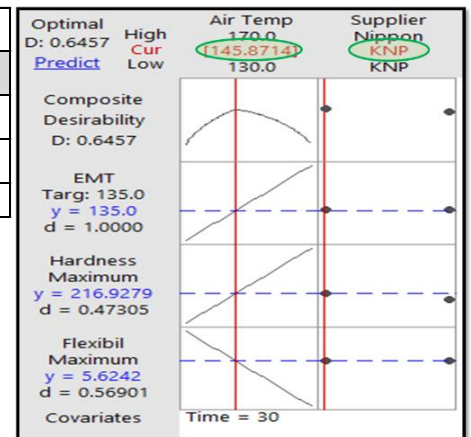
Improve (Finding, Implementing the solutions with resource used):

1. To reduce heat loss, Spray degreasing is replaced with dip degreasing.
2. To address diesel consumption in another process of Topcoat oven, we jointly developed Low bake Topcoat paint along with our paint suppliers which is having less requirement of **Effective Metal Temperature (EMT)** (130°C) from existing (150°C) for 15 Minutes.

While reducing EMT, Product Quality parameters (Flexibility & Hardness)

DOE (Full factorial) design				
Responses	Factors	UOM	Low Level	High Level
1) Paint Film Flexibility	Air Temperature	°C	130	170
2) Paint Film Hardness	Paint Type	--	KNP	Nippon
3) EMT				

Covariate: Baking time in oven



should not be compromised. To make the balance between EMT & Quality parameters, A **Full Factorial Design of Experiment (DOE)** is conducted with 2 factors each set at 2 levels. DOE results suggested that, Oven Air Temperature can be reduced by 10°C, which reduces heat loss from the system by 24.1% which in turn reduces Diesel consumption in the oven.

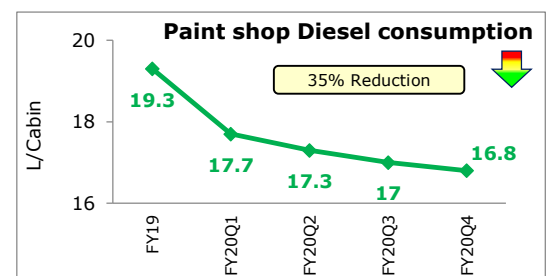
Results and Effects:

1. Diesel consumption is reduced by 2 litres per cabin (from 18.9 to 16.9 litres per cabin).
2. **CO2 emissions are reduced by 1542 MT.** Alkali fume generation is eliminated through this project.
3. Direct cost savings of INR 10.9 Million through this project.
4. Diesel consumption is reduced by 35% (from 1680 KL in 2018-19 to 1091 KL in 2019-20) in Hosur-2 plant.

Locking the Improvements: Operation controls procedures are changed, and training has been given to all associated members. Diesel consumption is taken up as Daily management KPI and being monitored.

Cloning the Improvements: Detailed case study is shared and communicated to **all plants of Ashok Leyland.**

We are in the process of **replicating the project at our supplier partners** for larger benefits to the society in line with UN Sustainability Development Goal of 'Responsible Consumption and Production'.



Problem solving tools used in the project:

Design of Experiment (DOE), Test of Hypothesis (2 sample t-test, Standard deviation test, Chi-square % defective test), Process capability studies, Variable Control charts, Pareto, Box plot, Risk analysis.