



Indian Machine Tool Manufacturers' Association (IMTMA)

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Annexure: A

IMTMA-ACE MICROMATIC PRODUCTIVITY CHAMPIONSHIP AWARDS 2024

FORMAT FOR SUBMISSION OF CASE STUDY

FOR LARGE & MEDIUM COMPANIES ONLY

(Unit level / SBU level turnover > Rs.100 Crores)

Title of the Case Study: **Painting capacity increase by 2X times to meet Tractor business demand**

1. Name of company: **Tractors and Farm Equipment Limited**

Address of the Plant / Site location: **Plot 1 KIADB Industrial Area, Bashettihalli, Bangalore**

Tel No.: **9538895171**

Turnover (in Rs. Cr) **INR 12,500**

No. of employees: **1079**

Industry sector (mandatory): **Automotive/Farm Equipments**

2. Name of the project leader: **Murugadas P.**

Designation : **Divisional Manager**

Mobile No.: **95388895177**

Email ID: **murugadas@tafe.com**

Alternate contact person: **R Vasu**

Designation : **Divisional Manager**

Mobile No.: **9538895171**

Email ID: **rvasu@tafe.com**

3. Project implementation

Start date : **16.01.2021**

End date : **28.02.2023**

Is it in continuous operation now? (Yes/No) : **Yes**

We certify that the project described here is factually correct and is in continuous operation.

We confirm that we have read the rules and guidelines governing this competition and agree to abide by the same.

We agree to nominate a member of our senior management to make the presentation, in case this entry is short listed for final evaluation of the award.

We have no objections in IMTMA publicising our case study in their programs / website and other event promotional collaterals. **For TRACTORS AND FARM EQUIPMENT LIMITED**

Name : _____
(Head of Company/Business Unit / Division)

Designation: **S. SATISH SINGH**
Sr. GM (OPR Operations)

Date: **30.04.2024**

Electronic Signature: _____





IMTMA-ACE MICROMATIC PRODUCTIVITY CHAMPIONSHIP AWARDS 2024

Annexure: B

Tick(✓) the appropriate box(es) that best describe your Case study

1. **Scope of the project:** (Please tick as appropriate)
 - Multiple Value streams** (Improvements in Multiple Value streams/ product families resulting in breakthrough benefits).
 - Single Value stream** (Improvements in a Value stream / product family with significant benefits).
 - Localized improvement within a Value stream** (Improvements in identified processes / pockets within a value stream, with incremental benefits).
2. **Project sponsor:** Top management Senior management (CEO / CXO level)
Middle management (GM/ DGM/ AGM level)
3. **Project trigger:**
 - 3.1 External conditions Internal competitiveness
 - 3.2 **Market conditions:**
 - Uncertain demand Cyclical demand Low volume- High variety Sudden increase in demand
 - 3.3 **Project approach selection**
 - Primarily driven by the costs involved
 - Based on financial benefits, gains
 - Based largely on adoption by peers/ Industry standard
4. **Project focus :**

<input checked="" type="checkbox"/> Manufacturing System Redesign (MSR)	<input checked="" type="checkbox"/> Better Asset Utilization (BAU)
<input type="checkbox"/> Productivity Through Quality improvement (PTQ)	<input type="checkbox"/> Optimizing Metal working Process (OMP)
<input type="checkbox"/> Digital Manufacturing & I 4.0	<input type="checkbox"/> Total Productive Maintenance (TPM)
<input type="checkbox"/> Total Quality Management (TQM)	<input type="checkbox"/> Green & Clean

Other innovation (Please specify)- Innovative training facility
5. **Quality / Analytical tools:** Please tick If you have used any of the tools listed below for developing productivity improvement solutions.

<input checked="" type="checkbox"/> Statistical Process Control (SPC)	<input type="checkbox"/> Design of Experiments (DOE)
<input type="checkbox"/> Eight Disciplines of problem solving (8D)	<input checked="" type="checkbox"/> Root Cause Analysis (RCA)
<input checked="" type="checkbox"/> Standard problem solving tool	<input type="checkbox"/> Theory of Constraints (TOC)
<input type="checkbox"/> Six Sigma	<input type="checkbox"/> 7 QC Tools <input checked="" type="checkbox"/> Lean

Others (Please specify) – 3S Map, VMAP, Flow tools and Force Field Analysis
6. **Project implementation includes**
 - All activities within the organization
 - Upstream and Downstream partners/ suppliers
7. **Productivity improvement includes:** Enhanced output Reduced inputs Manpower Rationalization
 Others.

Project Title: Painting capacity increase by 2X times to meet Tractor business demand

About TAFE:



FARM MACHINERY



TAFETRACTORS



MASSEY FERGUSON



EICHERTRACTORS



IMT



AGRISTAR

GEARS & TRANSMISSIONS



HYDRAULIC PUMPS & CYLINDERS



TMTL ENGINES



ENGINES

TAFE POWER



GENSETS

BATTERIES



AMCO

ENGINEERING PLASTICS



VEHICLE FRANCHISE



TATA MOTORS

TAFE ACCESS LIMITED OFFICIAL

PLANTATIONS



TAFE – Tractors and Farm Equipment Limited, is an Indian tractor major incorporated in 1960 at Chennai, with an annual turnover of INR 93 billion (2014-15). The third-largest tractor manufacturer in the world and the second largest in India by volumes, TAFE wields about 25% market share of the Indian tractor industry with a sale of over 150,000 tractors (domestic and international) annually.

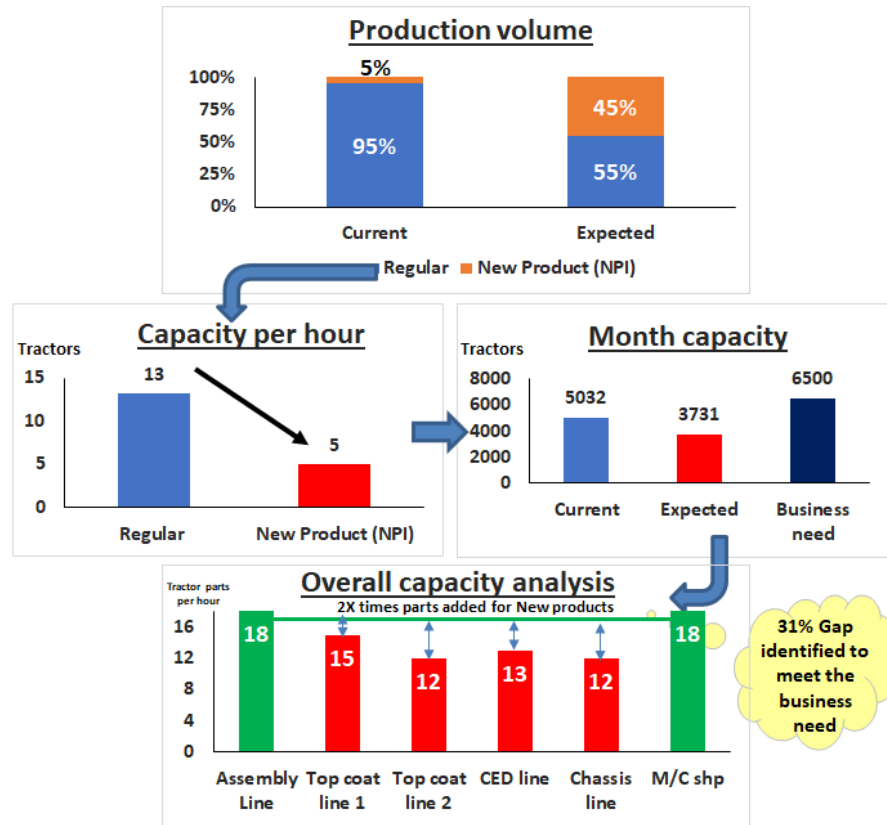
Brief Description of the Project:

In response to the growing demand for **New model of tractors (NPI tractors) from 5% to 45%** in the market and to uphold its commitment to customer centricity, our company is embarking on a project to optimize the delivery process of tractors to dealers. The challenge lies in ensuring the right model of tractor reaches the right dealer at the right time. This necessitates a thorough assessment of manufacturing plant capacity to accommodate new product adoption without compromising regular production volume. Hence This project will be focusing the bottleneck areas within the production process and implement targeted improvements to reinforce our dedication to exceed the customer expectations to uphold organization core value and to play a market leader in the industry.

Trigger for the Project:

As our production volume primarily comprises 95% regular model tractors and 5% New Product tractors (NPI models), optimizing the success of New product tractors (NPI tractors) is critical to boosting overall production by up to 45% in addition with the regular production volume. However, the transition to producing NPI model tractors in the same production line often leads to a capacity decrease and risking our ability to meet the required production rate of 16 tractors per hour to meet the monthly plan of 6500 tractors. Through Overall capacity analysis for Gap identification, it's evident that three out of five key

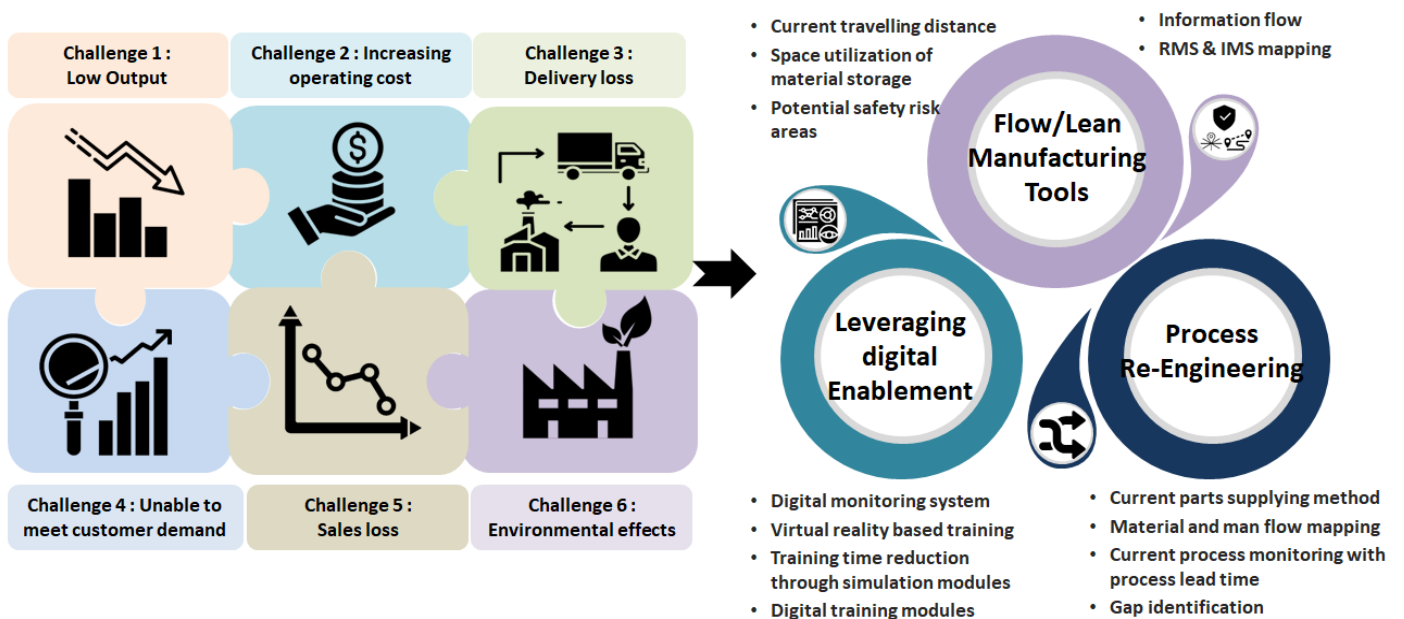
assembly production lines are struggling to bridge this gap, with Top coat and chassis line falling short by 4 tractors per hour and CED line by 3 tractors per hour. Therefore, this project aims to focus on enhancing productivity across these three lines (CED line, Top coat line and Chassis line) to ensure we meet our monthly capacity requirements while accommodating the introduction of NPI products.



Solution generation, Innovation and complexity:

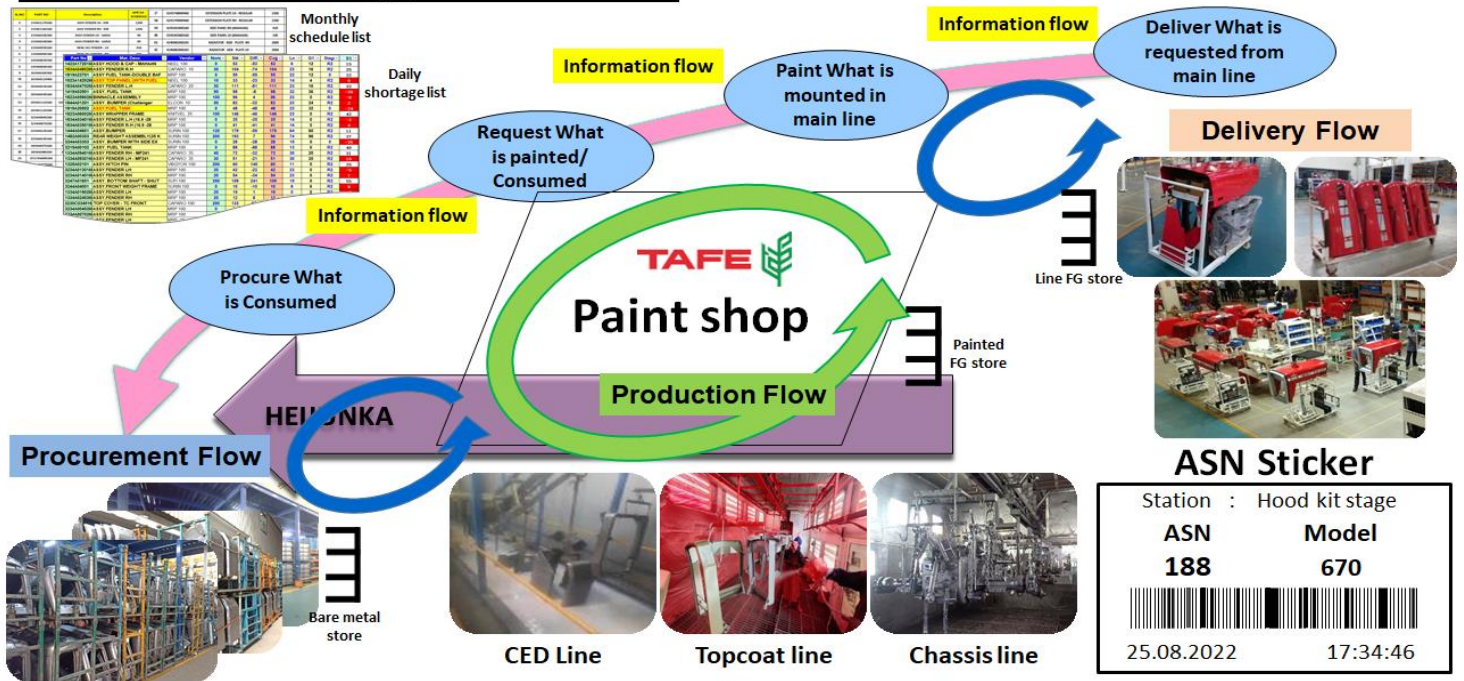
After thoroughly analyzing the project scope and identifying the current challenges hindering our target achievement, we embraced a new approach centered around Flow manufacturing principles, process re-engineering, and digital enablement.

Current Challenges :

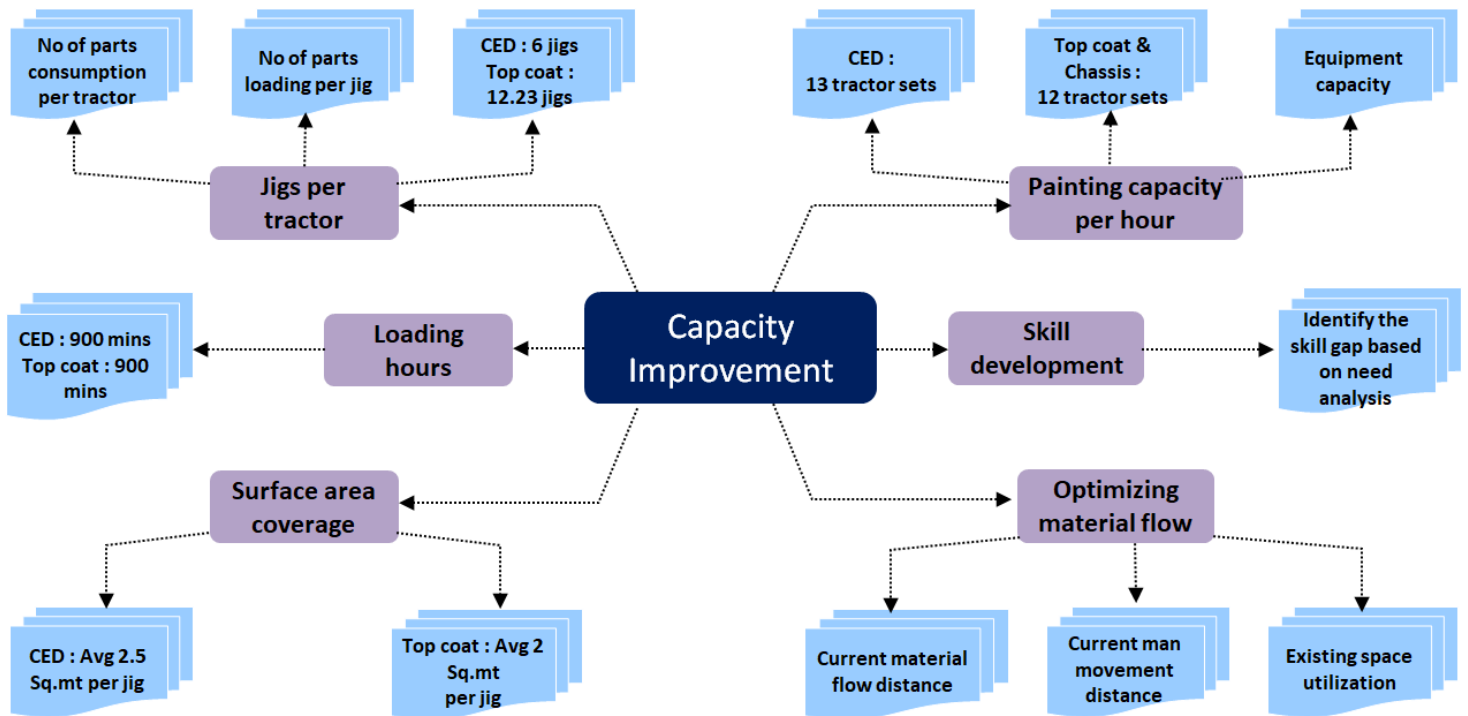


To gain a comprehensive understanding of our processes, we meticulously mapped out the entire paint shop process flow using VMAP 1, encompassing procurement flow, production flow and delivery flow. Utilizing this visualization map as a foundation, we developed relationship diagrams and generated numerous concept ideas and engineering trials aimed at enhancing capacity.

VMAP 1 – Painting process flow :

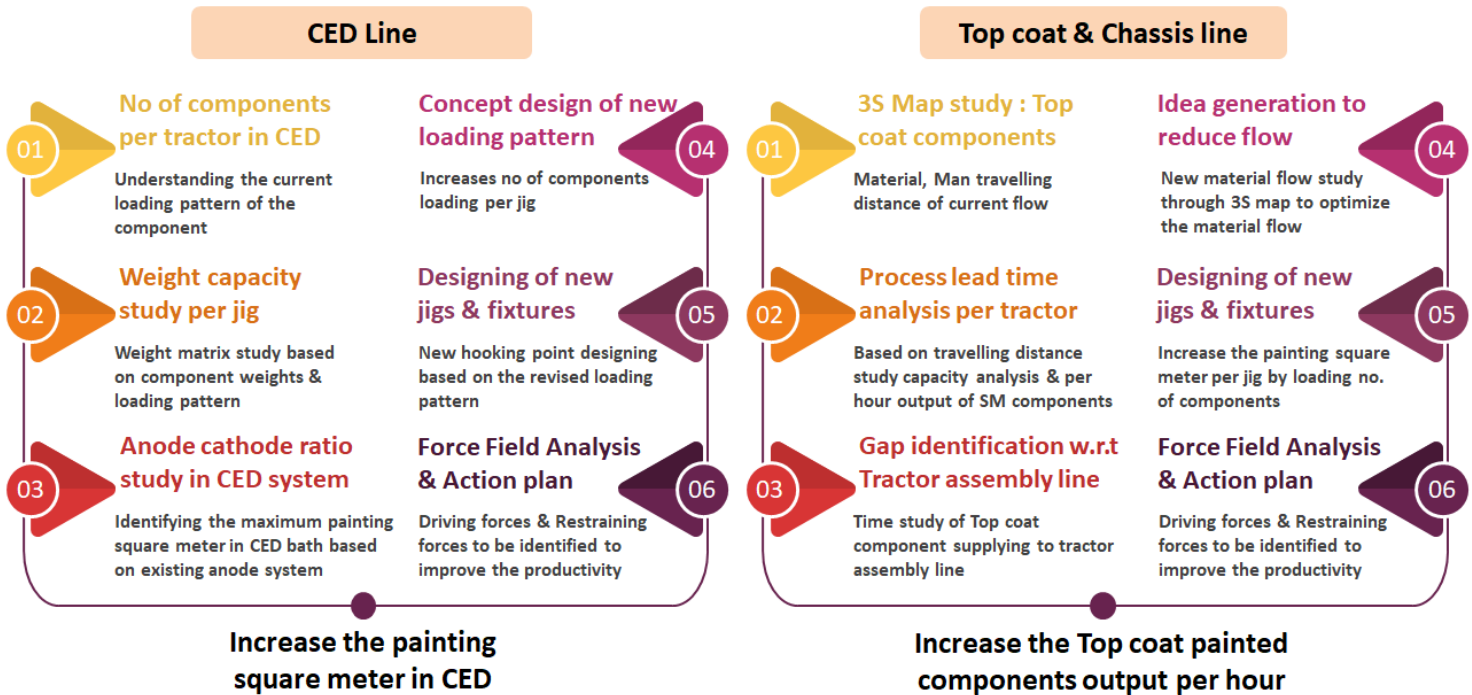


Relationship diagram :



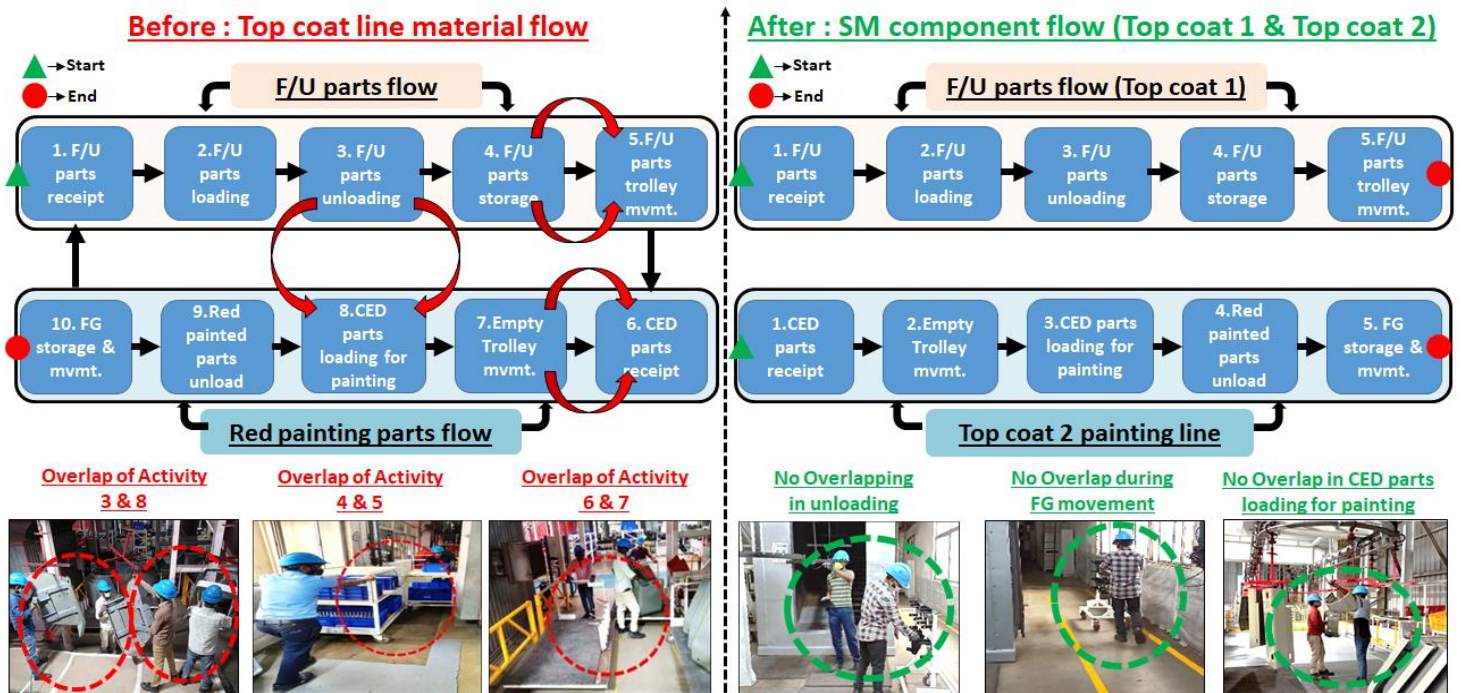
Throughout the project, we applied a variety of tools such as force field analysis to identify driving and restraining forces, and optimized material storage methods to streamline operations.

Concept Idea :



Furthermore, we also applied the 3S map tool to analyze material flow and minimize material distance, while also addressing operator fatigue and reducing travel distances.

Gap Identification & Idea generation through 3S map:

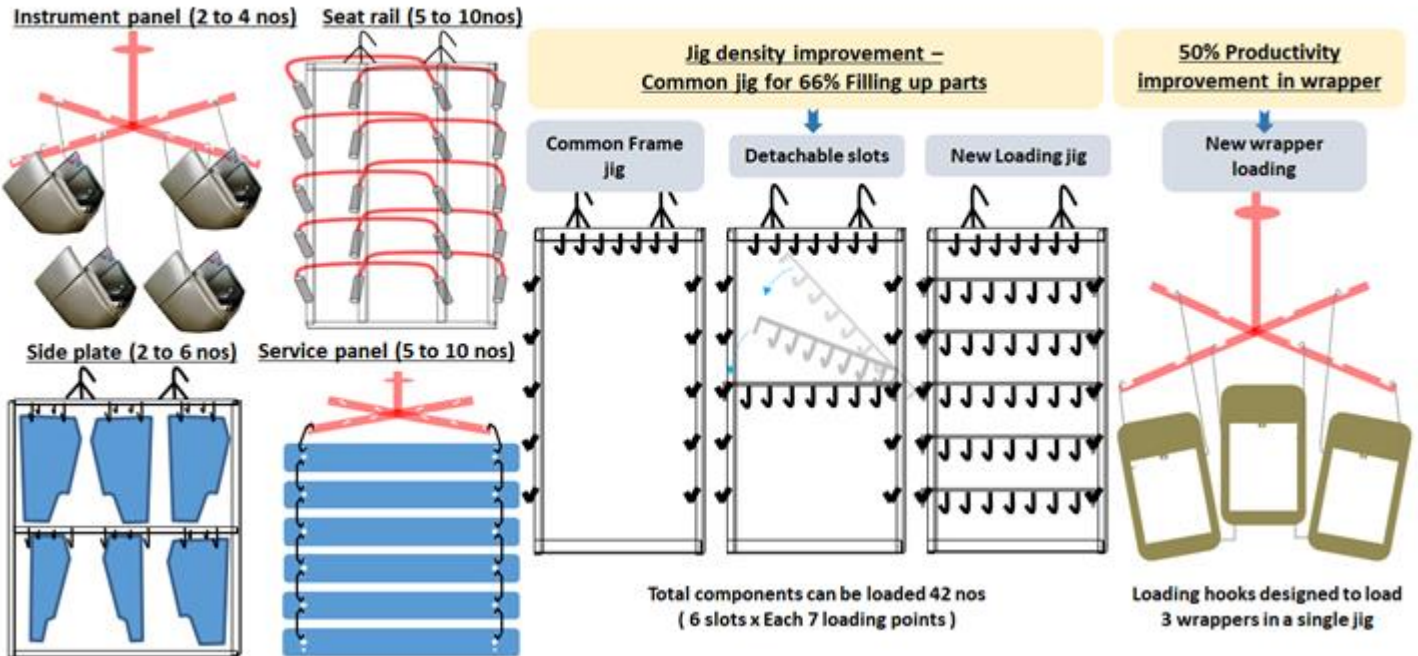


This holistic approach allowed us to systematically address inefficiencies and bottlenecks, paving the way for improved productivity and operational excellence in Chassis, CED and Top coat line.

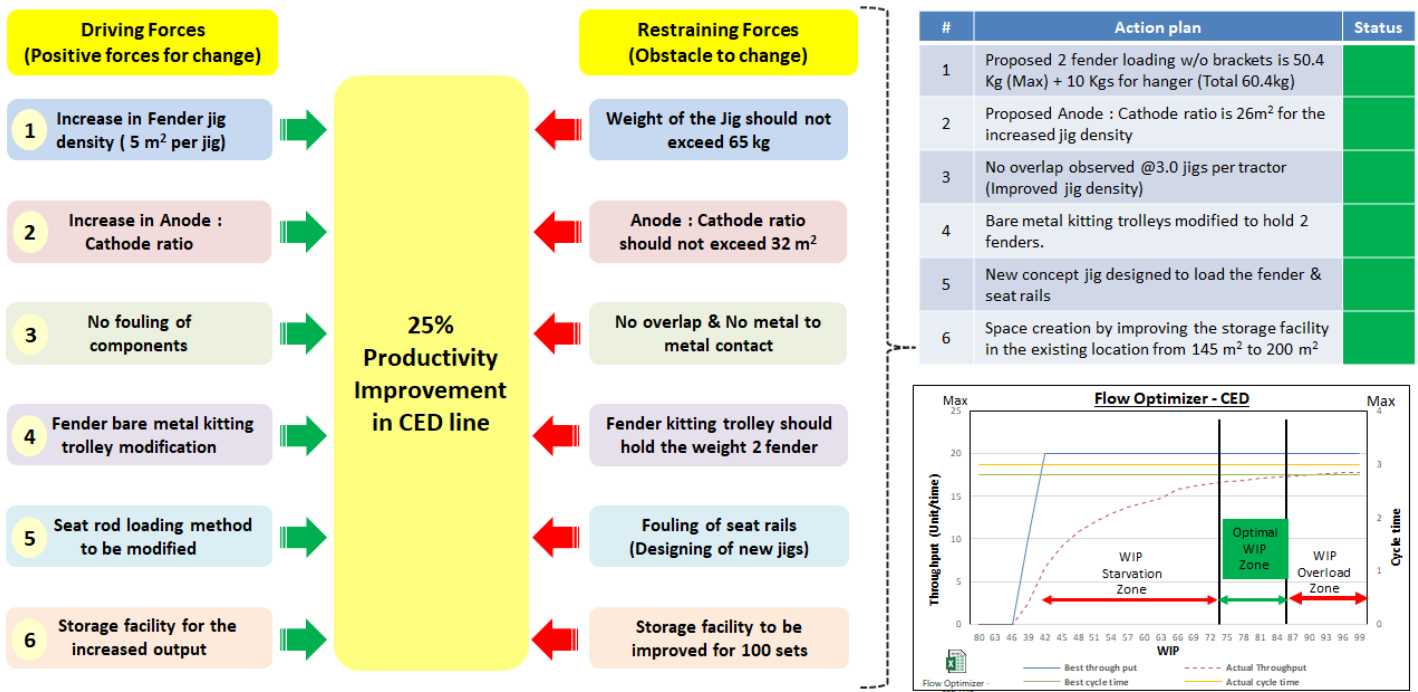
Implementation:

After conducting engineering trials based on concept ideas and performing a thorough force field analysis, clear action plans were developed to address identified challenges. The implementation phase commenced with the execution of these action plans, aimed at optimizing processes and enhancing productivity.

Engineering trial with Concept Ideas :



Force Field Analysis & Improvement status :



As production ramped up, a new challenge has emerged: the need to rapidly develop the necessary people skills. This challenge was swiftly addressed through targeted training and skill development initiatives, ensuring that the workforce was equipped to meet the demands of increased production.

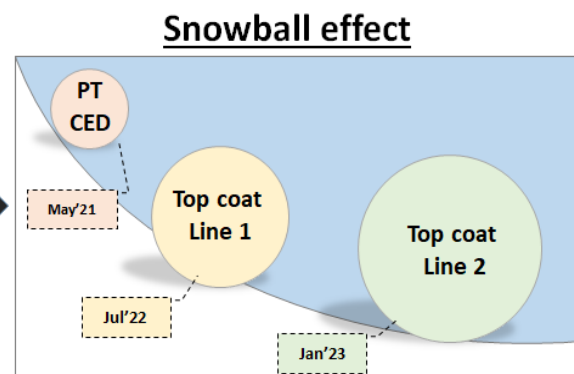
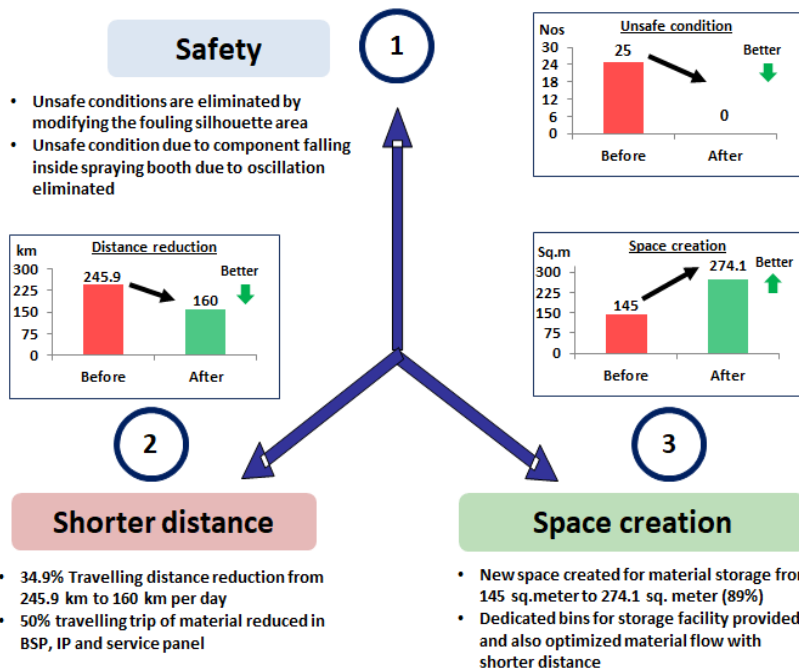
Skill training through DOJO simulation :



Throughout the implementation phase, a proactive approach was maintained, with regular monitoring and adjustment of strategies as needed. By effectively executing action plans and prioritizing skill development, the project successfully navigated challenges and achieved its objectives.

Results / Impact:

3S Map Results



Mandatory parameters:	Before	After	Unit of Measurement
1. Productivity details: Indicate metrics that showcase the productivity gains obtained. (Output in relation to the inputs used)- These could include reduction of material in various stages such as raw materials/ semi-finished goods/ WIP etc. that showcase efficiencies obtained	a. NPI volume : 5 b. 13 c. Production capacity: 200	a. NPI volume : 45 b. 25 c. Production capacity: 266	a. % b. Painted tractor parts per hour c. Tractors per day
2. Reduction of rejects and rework	205896	25298	PPM
3. Quality (Customer complaint)	5	0	Nos
4. Direct Cost saving (Recurring)	0	60	Lakhs
5. Manpower cost (Can include direct/ indirect labour/ contract/ temp resources and man-hours & overtime if any)	NA	NA	NA
6. Delivery & Safety	Monthly delivery capacity: 5200	Monthly delivery capacity: 6900	Tractors per month
7. Safety	25	0	Unsafe condition
8. Space creation	145	274.1	Square meter
9. Travelling distance reduction (Man & Material)	245.9	160	Km per day

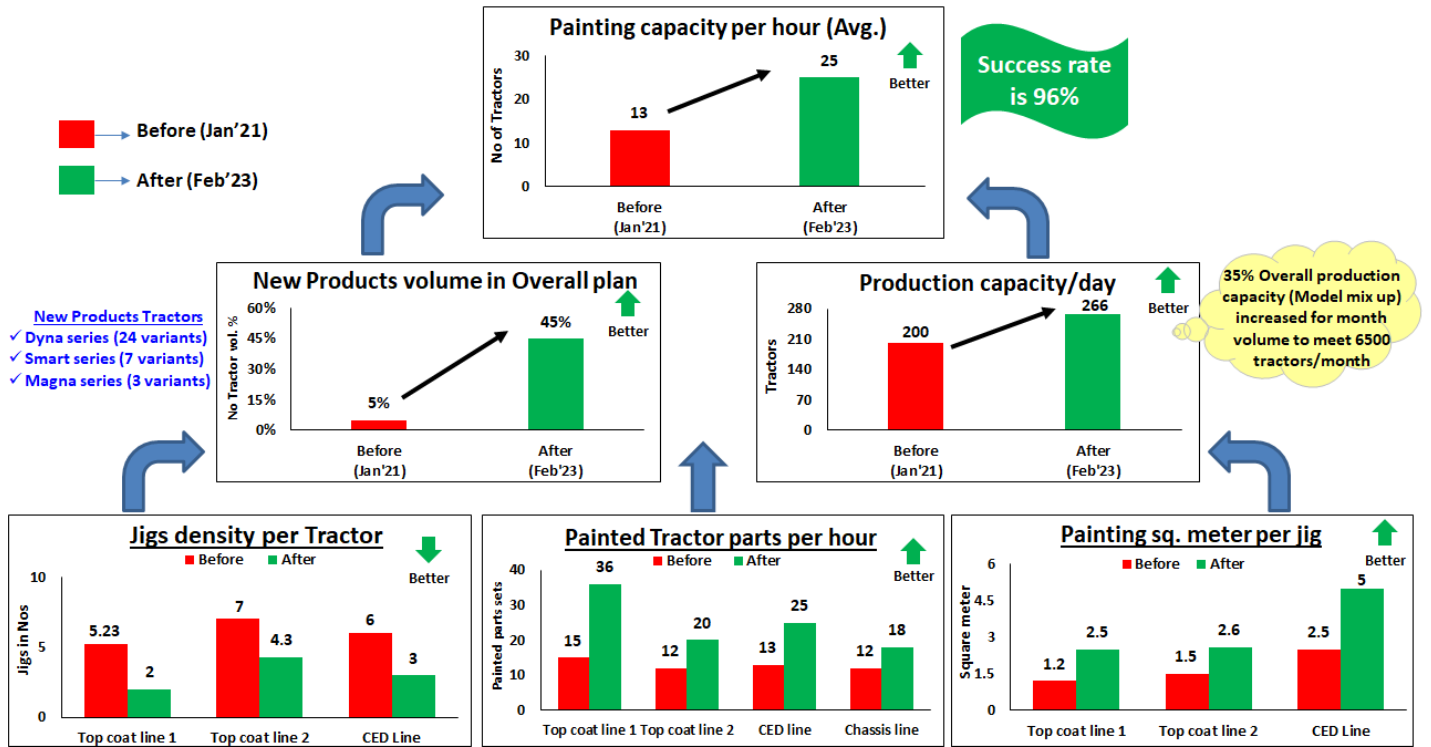
Business sustainability and Future Focus:

After implementing productivity improvements, the capacity of painted tractor sets per hour has significantly increased across all lines: from 15 to 36 in topcoat line 1, 12 to 20 in topcoat line 2, and 13 to 25 in CED line. This achievement not only surpasses the initial business requirement of 16 tractors per hour but also underscores our commitment to business sustainability and future growth. By exceeding targets, we demonstrate our dedication to innovation and operational excellence, setting the stage for continued success and opportunity in the future.

Resource Impact:

Parameters:	Before	After	Unit of Measurement
1. CO2 Reduction	2129	1277	Tons per annum
2. H2O Foot print Reduction	1.05	0.65	KL per tractor
3. Energy consumption (Renewable/Non Renewable)	99.01	91.10	Units per Tractor (KWH)
4. Compressed air reduction	56.8	51.6	CFM/Tractor
5. Solid Waste Reduction	43.63	37.46	Kg/Tractor

Business metrics:



Scope of Horizontal Deployment:

Way Forward & Future plan :

