



PROJECT REPORT

ON

ACE 700 cc ASSEMBLY OPTIMIZATION

&

Procurement at Tata Motors Pantnagar

AT

TATA MOTORS LTD.

PANTNAGAR

SUBMITTED TO:

Mr. AMRENDRA PAL SINGH
(DGM)

SUBMITTED BY:

CHAHAT (IIT ROPAR)
(MECHANICAL ENG.)

CERTIFICATE

This is to certify that **CHAHAT**, a student of **IIT ROPAR**, has successfully completed a project titled “ **ACE 700 cc ASSEMBLY OPTIMIZATION** ” at Tata Motors Limited, Pantnagar.

During the period from **25th June 2024** to **10th July 2024**, she has demonstrated excellent performance and dedication in the assembly of the ACE 750 cc model.

The project involved various aspects of the assembly process, optimization techniques, and quality control measures.

She has shown a keen understanding of the practical and theoretical aspects of automotive assembly, and their contributions have been highly valuable to our team.

We wish CHAHAT all the best in their future endeavors.

SIGNATURE:

Mr. AMRENDRA PAL SINGH
(DGM)

SIGNATURE:

Mr. KUNAL KARTIKEY
(HR MANAGER)

ACKNOWLEDGEMENT

I am deeply thankful to **CHANDAN SIR , AMRENDRA PAL SIR**, for their invaluable guidance and support throughout my internship. Thank you Sir for arranging shops visit for me. It is really very interesting to visit different shops and understand all the working process. Their insights and expertise have been instrumental in shaping this project.

I also extend my gratitude to the entire assembly team at Tata Motors Limited for their cooperation and assistance, which greatly enriched my learning experience.

My heartfelt thanks goes to **NAVEEN SIR (DGM PURCHASE)** for his continuous support and for providing this valuable opportunity.

Lastly, I would like to thanks to all the workers and employees who are the family of TATA MOTORS PANTNAGAR for their constant guidance and support.

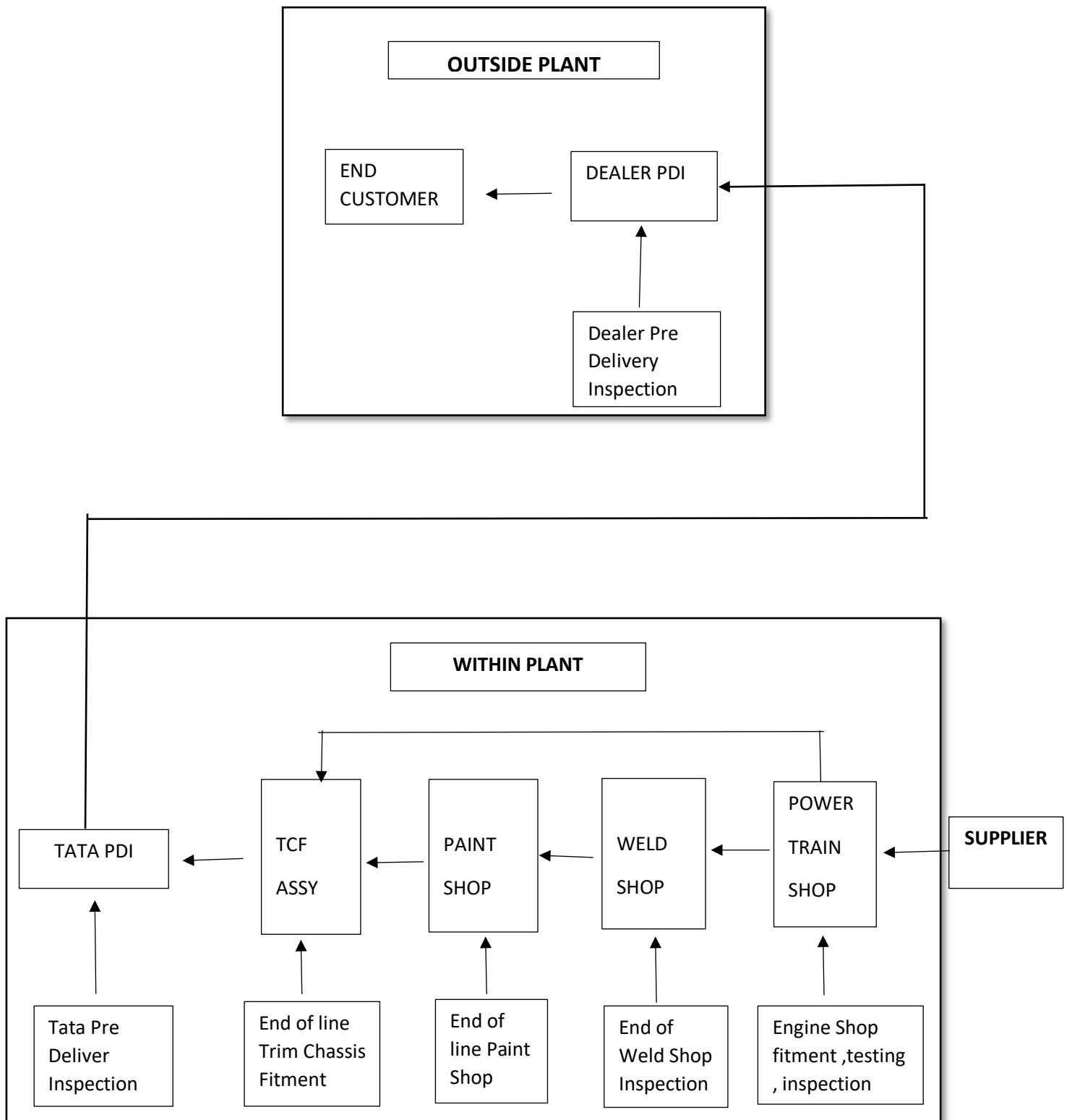
THANK YOU ALL !

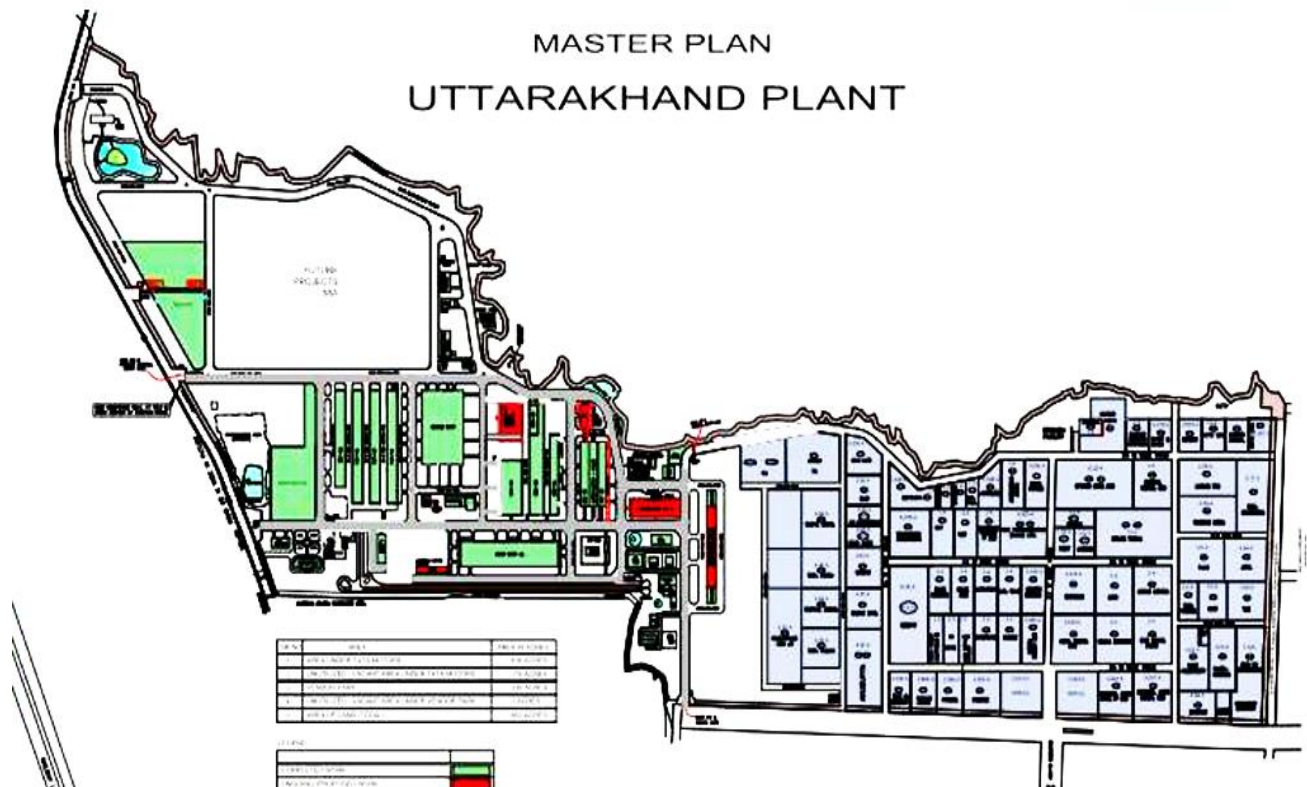
The family tree of the Tata family is as follows:

- JAMSETJI NUSSEERWANJI TATA** (1887 TO 1904)
 - SIR DORABJI TATA** (1904 TO 1932)
 - SIR NOWROJI SAKLATVALA** (1932 TO 1938)
 - J. R. D. TATA** (1938 TO 1991)
 - RATAN N. TATA** (SINCE 1991)

Years mentioned indicate the period of Chairmanship

PROCESS FLOW





Total area - 953 Acres

Roads length - ~ 15 km

TML Plant Area - 568 Acres

Vendor Park area - 385 Acres

OVERVIEW OF MY PROJECT

Introduction

The ACE 700 cc model is a robust and efficient commercial vehicle designed by Tata Motors Limited, catering to various transportation needs. This report details the comprehensive assembly process of the ACE 700 cc model at Tata Motors' Pantnagar facility. The assembly process involves a series of meticulously coordinated steps, ensuring that each vehicle meets the high standards of quality and reliability associated with Tata Motors.

Overview of the ACE 700 cc Model

The ACE 700 cc model is engineered to deliver optimal performance and durability. Key features of this model include:

- **Engine:** A 700 cc, fuel-efficient engine designed to provide excellent power and torque.
- **Chassis:** A sturdy and reliable chassis capable of handling heavy loads.
- **Transmission:** A smooth and efficient transmission system for seamless driving experience.
- **Suspension:** Robust suspension system for enhanced stability and comfort.
- **Brakes:** Reliable braking system ensuring safety under various driving conditions.

Assembly Process

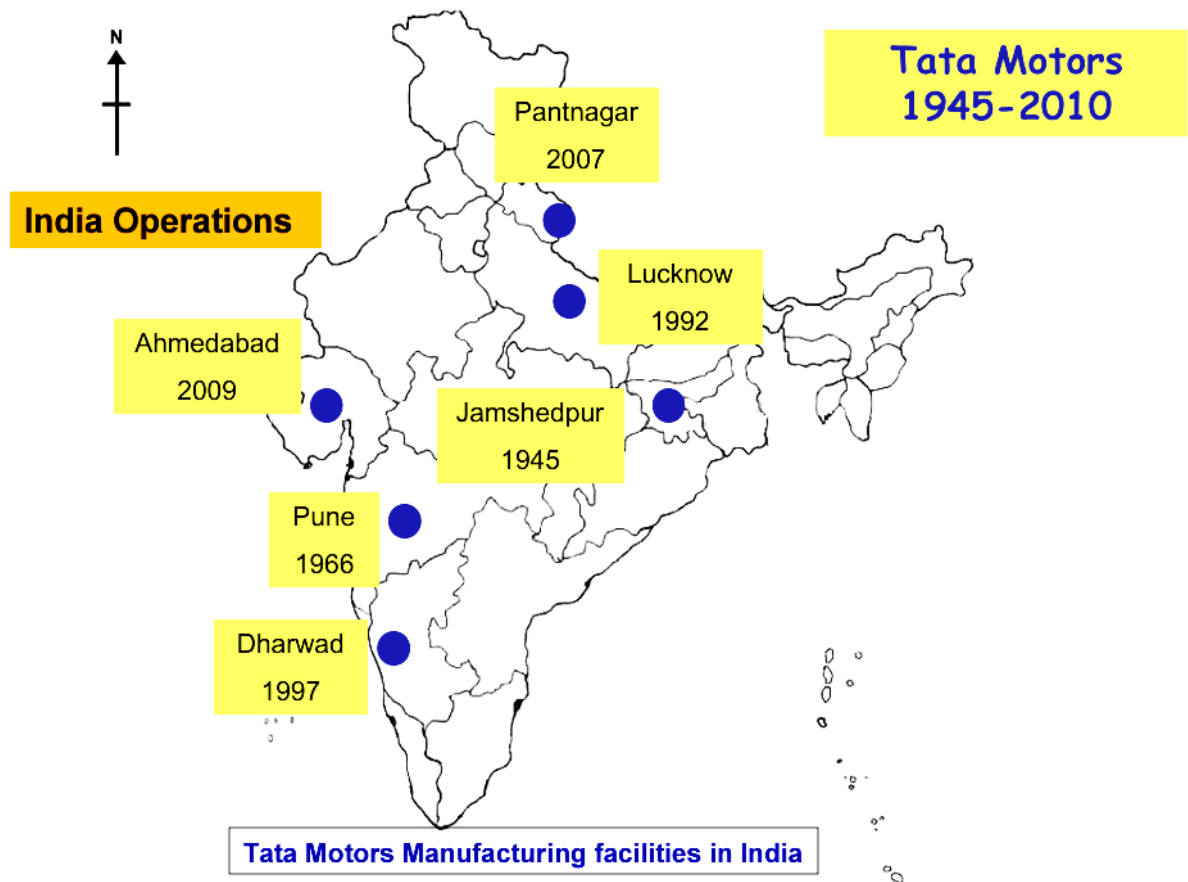
The assembly of the ACE 700 cc model involves several critical stages, each contributing to the final build quality of the vehicle. The major stages include:

1. **Chassis Assembly:** The assembly begins with the construction of the chassis, which forms the backbone of the vehicle. This stage involves welding, fitting, and inspection to ensure structural integrity.
2. **Engine Installation:** The engine, which is the heart of the vehicle, is carefully installed onto the chassis. This includes fitting the engine mounts, connecting the transmission, and ensuring proper alignment.
3. **Body Assembly:** The vehicle's body panels are assembled and attached to the chassis. This stage includes installing the cab, doors, and other body components, followed by rigorous alignment checks.
4. **Electrical Systems:** Installation of the vehicle's electrical systems, including wiring harnesses, lighting, and electronic control units. This ensures that all electrical components function correctly.
5. **Interior Assembly:** The interior components, such as seats, dashboard, and control systems, are installed. This stage focuses on comfort and ergonomics for the driver and passengers.
6. **Quality Control:** A comprehensive quality control process is undertaken to inspect the assembled vehicle. This includes mechanical, electrical, and aesthetic checks to ensure the vehicle meets all quality standards.

ABOUT TATA MOTORS LTD, PANTNAGAR

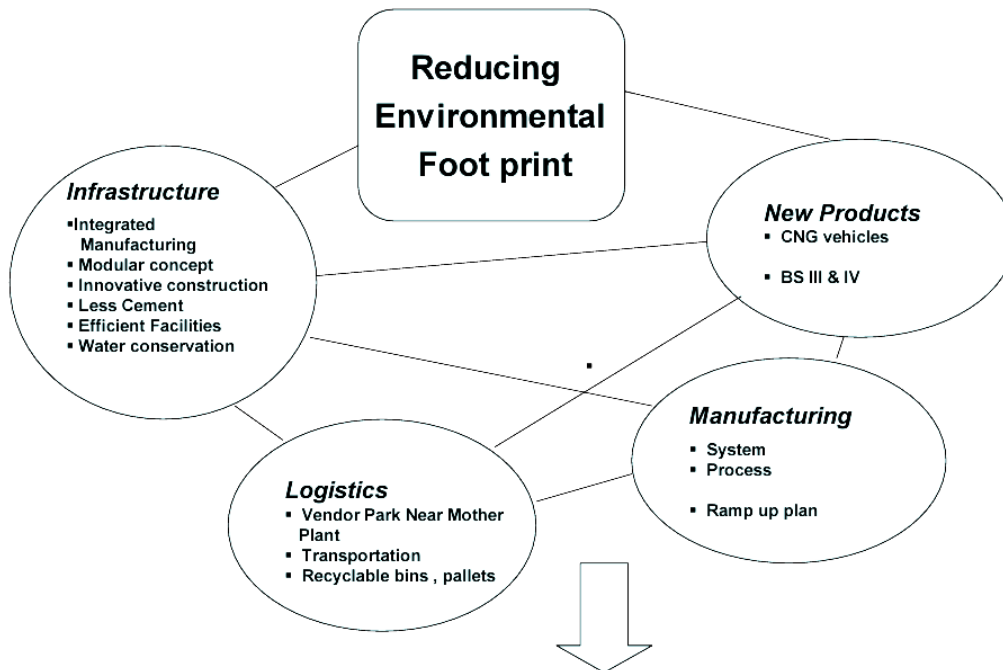
- The Group was founded by Jamsetji Tata in the mid 19th century, 96 plus operating companies.
- In seven business sectors:

IT	Consumer Products	Services	Material	Energy	Engineering	Energy
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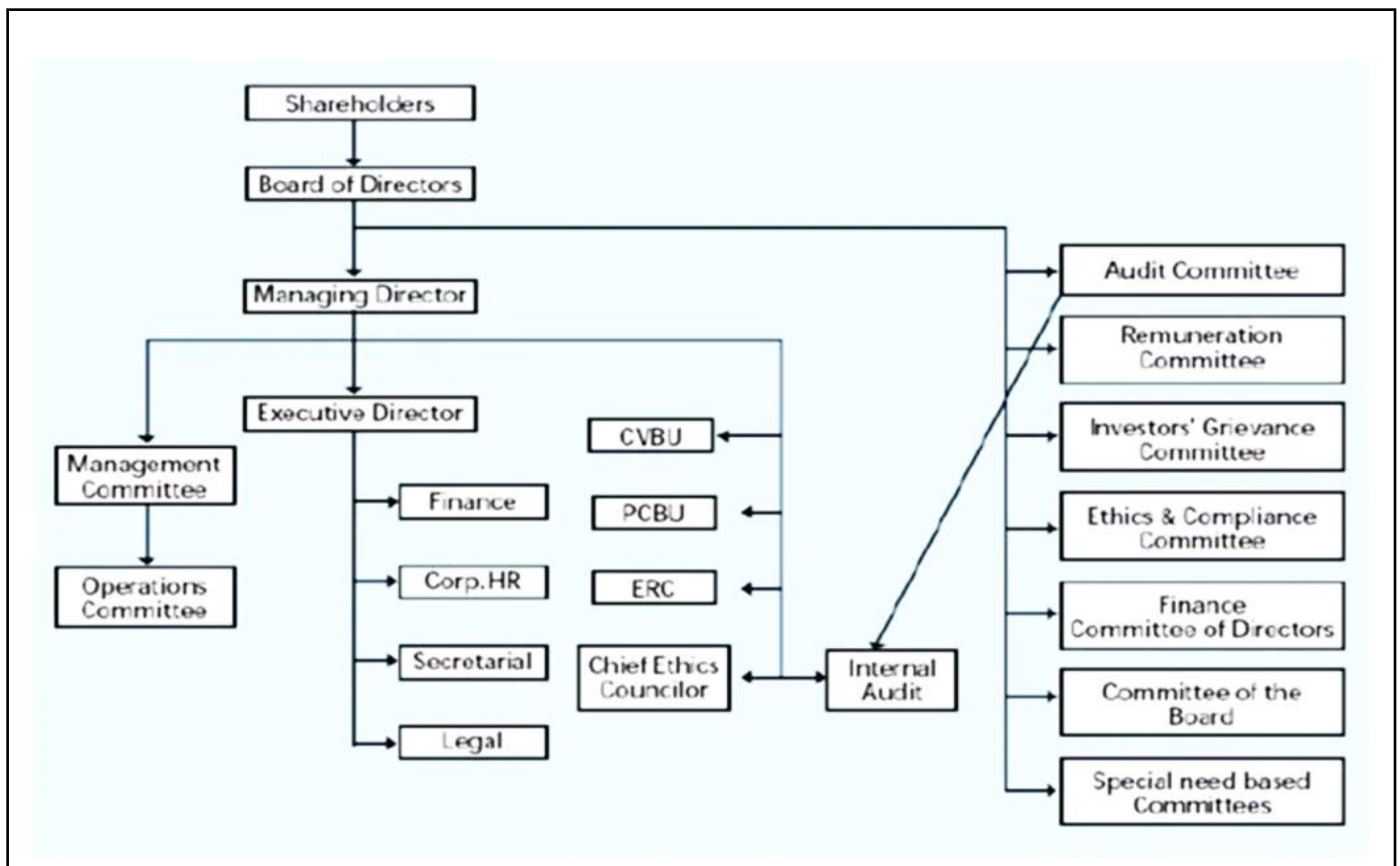


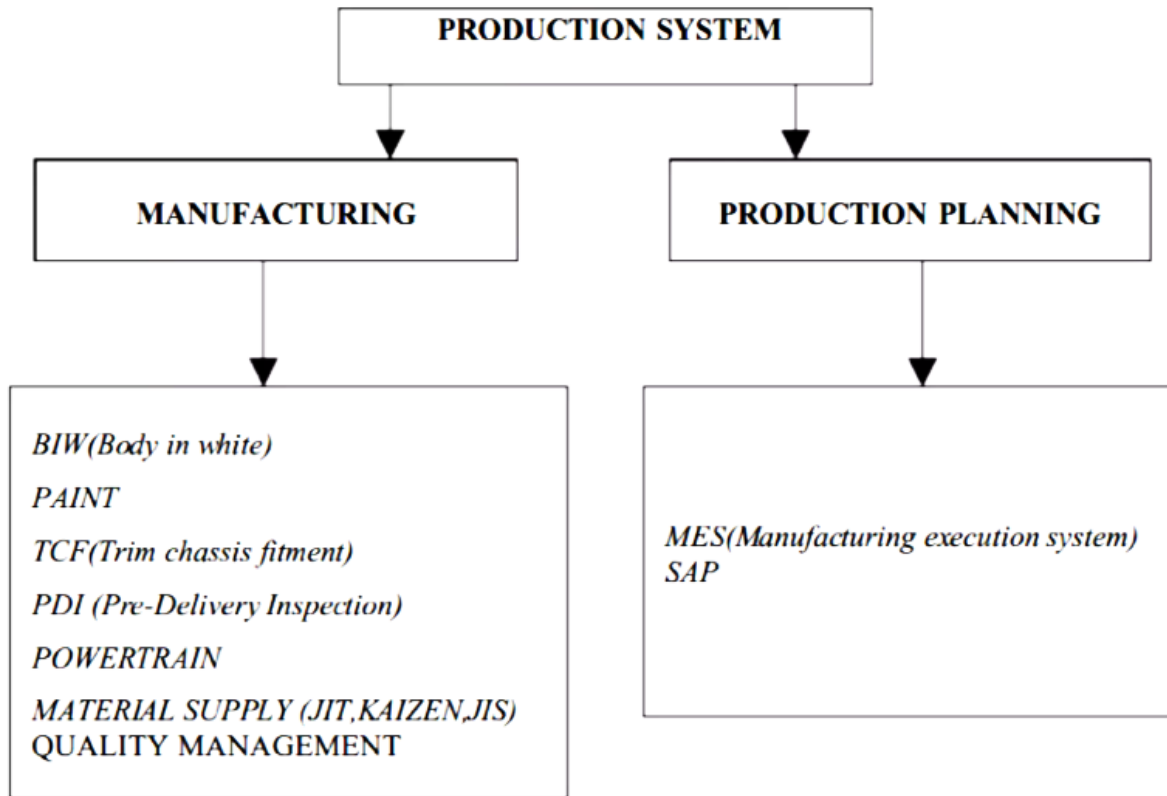
- Tata Motors' 5th and youngest plant. Time from acquisition of land to start of production was in 11 months; a benchmark in the auto industry.
- Tata Motors Pantnagar received IMS (Integrated Management System) certification in 1st ,18 months of operations. (Including ISO TS:16949, OHSAS 18001, ISO 14001).
- Tata Motors' 1st plant with an integrated vendor park, to keep inventories low and to ensure supplies JIT.

STRATEGY>>WORKING PRINCIPLES OF TATA MOTORS ,PANTNAGAR



..... towards green plant





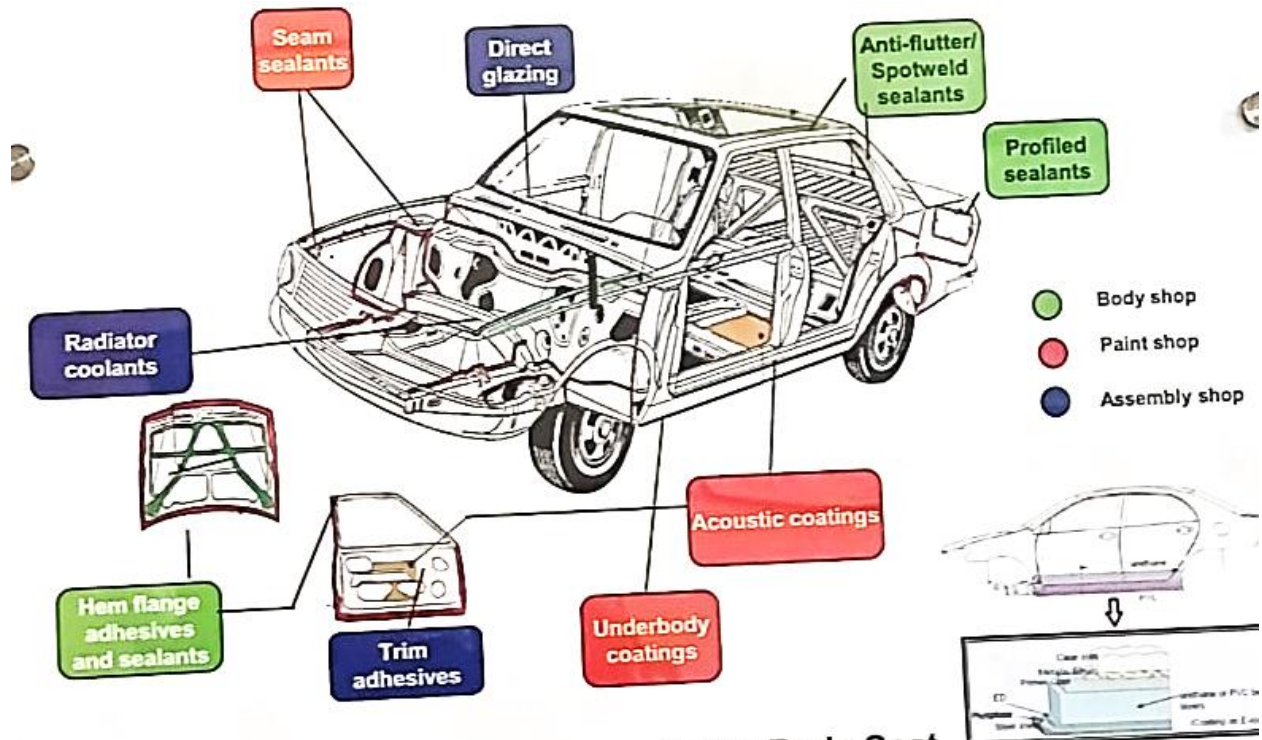
SHOPS OF TATA MOTORS LTD. PANTNAGAR

1) BIW (BODY IN WHITE) SHOP:-

Section	Description
Shop Name	BIW (Body-In-White) Shop
Location	Pantnagar plant, Tata Motors
Focus Area	Cabin manufacturing
Assembly	Load body and chassis are assembled and joined with the cabin
Main Line	Features extensive spot welding operations - Robots perform precise hamming
Slide Lines	Focus on nut and bolt work for fitment - Ensures secure and accurate assembly

2) PAINT SHOP

Weld Body → Pretreatment → Electrodeposition → ED Oven → SOL Sealing (UB)
Sealant → Undercoat Oven → Cooling → Dry Sanding → Intermediate Coat → I/C
Oven → Cooling → Der Sanding → Top Coat (T/C) → Touch Up and Inspection →
TCF



Sealer

Purpose : Rust Proofing and Preventing the
Entering of water and dust

Area : Fitting Panel area & Hemming area

Resin : PVC Resin

Under Body Coat

Purpose : Rust Proofing, Chipping resistance
Noise proof.

Area : Under Body

Resin : Acrylic and Urethane resin

3) POWER TRAIN (ENGINE & GEAR SHOP)

- This shop is divided into Power Train and Engine shop. Here various operations related to Engine, Gear Trains etc. are performed.
- It consists of :-
 1. Engine Assembly Shop
 2. Transaxle Assembly Shop
 3. Engine Dressing Line

Gears: Individual gears are assembled into gear sets.

Shafts: Shafts are fitted with gears and other components.

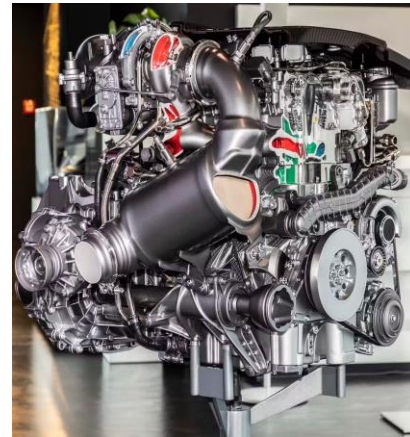
Casings: Assembled gear sets and shafts are housed within the gearbox casing.

Synchronizers: Synchronizer units are installed to ensure smooth gear shifting.

Bearings and Seals: Bearings and seals are placed to ensure the gearbox operates smoothly and without leaks.

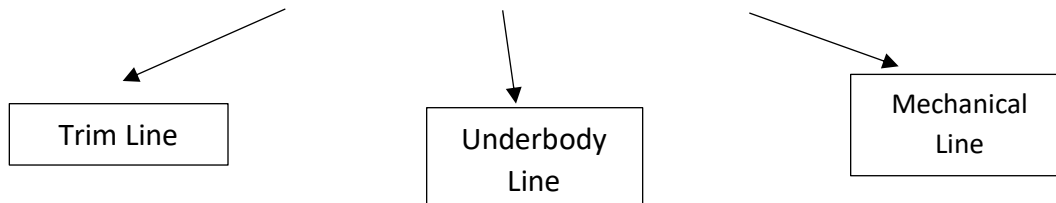


For engine shop basically here ,first head and block are machined properly in the machining line and then sent for assembly . So, next the gears, head , block and all the others parts of the engine are assembled and then sent to the TCF for the assembly with the produced vehicle .



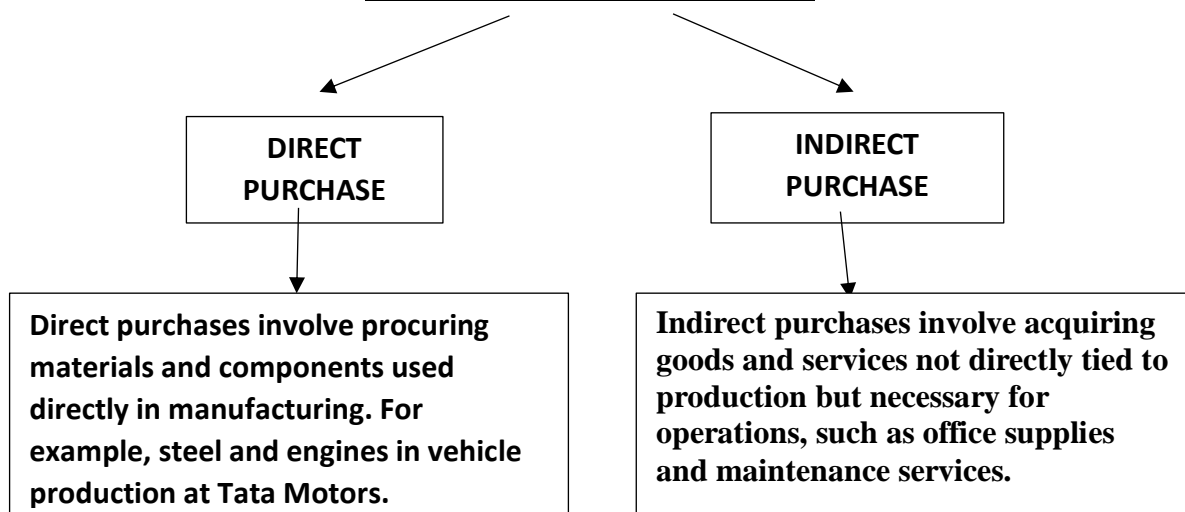
4) TCF SHOP

The TCF shop at Tata Motors Pantnagar plant is where the final assembly of the complete vehicle takes place. After the vehicle body is painted in the paint shop, it enters the TCF shop, which is divided into three main sections:-



The car delivered by the TCF shop is completely checked with reference to product's utility quality and manufacturing quality. After several inspections made by line operators for operational conformance and ethical looks the Car is permitted to be dispatch from TCF shop by the assurance of Line supervisors and operators.

PURCHASE DEPARTMENT



So, yeah I have learnt here how to **Understand Specifications**.

Mechanical engineers have a deep understanding of the technical specifications and requirements for various components and materials used in manufacturing. This expertise is essential in:

- **Preparing Bills of Material (BOM):** Ensuring that the materials listed meet the design and performance criteria.
- **Assessing Indents:** Evaluating requests from other branches to ensure they align with the technical needs of the production process.

Supplier Evaluation

Mechanical engineers are equipped to assess potential suppliers based on:

- **Quality:** Ensuring that suppliers can provide materials and components that meet the required engineering standards.
- **Capability:** Evaluating whether suppliers have the technical capability to produce parts that meet precise engineering specifications.

Cost Efficiency

Engineers can analyze the cost implications of different materials and components, balancing cost with performance and durability. This is crucial in:

- **Bidding Process:** Selecting the best suppliers based on a combination of cost and quality.
- **Budget Management:** Ensuring that procurement stays within budget without compromising on the quality or performance of the components.

Process Improvement

Mechanical engineers can apply their knowledge to improve procurement processes, such as:

- **Streamlining Operations:** Identifying inefficiencies in the procurement process and suggesting improvements.
- **Technological Integration:** Implementing advanced tools and software to enhance the accuracy and efficiency of procurement activities.

CONCLUSION ABOUT THIS LEARNING IS :-

This project aims to optimize procurement processes in the automotive industry, focusing on the practical experience gained during an internship at Tata Motors Pantnagar. The project involves activities such as receiving indents from other branches and conducting bidding to secure the best prices within a decided budget.

I have worked upon my communication skills and entered to a technical world of communication.

ASSEMBLY OF THE ACE 700 cc MODEL IN DETAIL



The standard Ace HT is powered by a two-cylinder 702 cc engine, delivering 16 hp (12 kW) at 3200 rpm and a torque of 3.8 kgf.m (37 N.m) at 2000 rpm. It has a permissible loading capacity of 750 kg (1650 lb). It is equipped with a four-speed manual gearbox and has a top speed of 60 km/h (37 mph).

The Ace EX adds a five-speed gearbox, stop-start and larger wheels (13" over 12") and wider tires (155 rather than 145), and a top speed of 70 km/h.

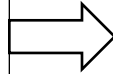


The **Tata Super Ace** is a 1 Ton diesel mini truck aimed for Intra City Applications and Last Mile Distribution. It has a loading deck length of 2630 mm (the longest in its class) and a top speed of 125 km/h (78 mph). The Super Ace has a turning radius of 5.1 m and a mileage of 14 km/L (8.75 mpl), which gives it a maximum range of 440 km per its 38 L fuel tank. It has a three-way drop load body which provides a 60 cm height for loading and unloading.

TRIM LINE

Interior Assembly:

- **Dashboard Installation:** Mounting the dashboard, which includes components such as the instrument cluster, air vents, and infotainment system.
- **Seats:** Installing seats with proper alignment and securing them to the vehicle floor.
- **Interior Panels:** Fitting door panels, headliners, carpeting, and other interior trim pieces.
- **Electrical Wiring:** Routing and connecting wiring harnesses for various electrical systems, including lights, controls, and sensors.



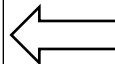
Exterior Fittings:

- **Windows and Windshield:** Installing glass components, ensuring proper sealing and functionality.
- **Mirrors:** Mounting side mirrors and rearview mirrors.
- **Exterior Trim:** Attaching exterior moldings, badges, and other decorative or functional trim pieces.



Functional Checks:

- Conducting functional tests on interior and exterior components to ensure they operate correctly and meet quality standards.
- Verifying proper alignment, fit, and finish of all installed components.

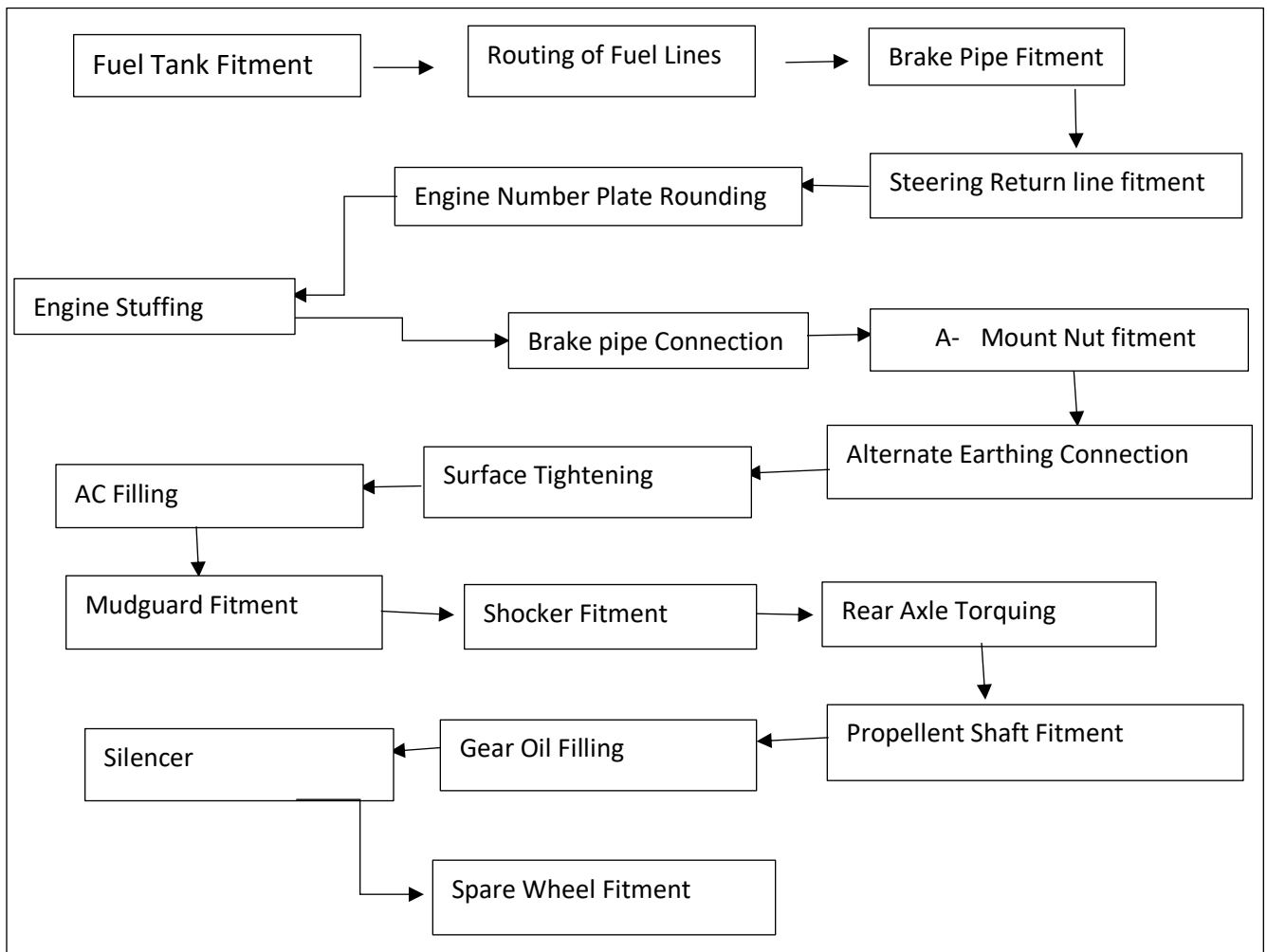


Final Inspection:

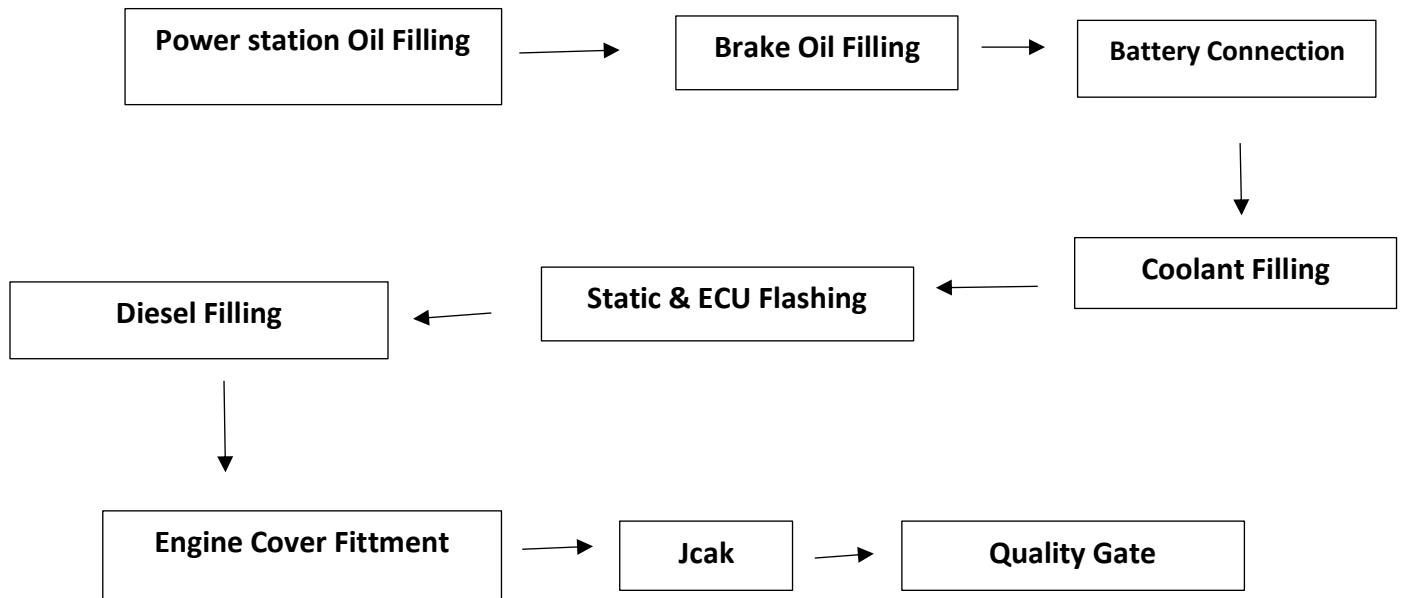
- Thoroughly inspecting the entire trim assembly to ensure compliance with design specifications and customer expectations.
- Addressing any issues or discrepancies identified during inspection before the vehicle proceeds to the next stage of production.

UNDERBODY LINE

Here are the steps for the assembly of the TATA ACE 700 cc model in the UNDERBODY LINE ARE :-



MECHANICAL LINE



COMPARISON OF TATA ACE 700 cc WITH OTHER ADVANCED MODELS

Tata Ace First Model (700 cc)

1. Engine and Performance:

- **Engine:** 700 cc, naturally aspirated, indirect injection diesel engine.
- **Power Output:** Approximately 16 HP.
- **Torque:** Around 37 Nm.
- **Top Speed:** 60-70 km/h.
- **Fuel Efficiency:** Approximately 20-22 km/l.
- **Transmission:** 4-speed manual transmission.

2. Design and Dimensions:

- **Body Type:** Compact light commercial vehicle (LCV).
- **Load Capacity:** Around 700-750 kg.
- **Dimensions:** Length - 3800 mm, Width - 1500 mm, Height - 1845 mm.
- **Wheelbase:** 2100 mm.

3. Features:

- **Basic Interior:** Functional and utilitarian design, minimal comfort features.
- **Safety Features:** Basic safety features including seat belts.
- **Suspension:** Front - Independent with coil spring, Rear - Semi-elliptical leaf spring.

Advanced Models (e.g., Tata Ace 800 cc, Tata Ace Mega, Tata Ace EV)

1. Engine and Performance:

- **Engine Options:** Range from 800 cc to 1000 cc diesel engines, and an electric motor for the Ace EV.
- **Power Output:** 20-40 HP depending on the model.

- **Torque:** 45-100 Nm depending on the model.
- **Top Speed:** Up to 80-90 km/h for advanced diesel models, and 70-80 km/h for the Ace EV.
- **Fuel Efficiency:** Improved fuel efficiency of 22-25 km/l for diesel models. Electric models offer a range of approximately 100-120 km per charge.
- **Transmission:** 5-speed manual transmission in advanced diesel models, and a single-speed transmission for the Ace EV.

2. Design and Dimensions:

- **Body Type:** Improved design for better aerodynamics and aesthetics.
- **Load Capacity:** Enhanced to 850-1000 kg depending on the model.
- **Dimensions:** Slight variations in dimensions to accommodate increased load capacity and passenger comfort.
- **Wheelbase:** Ranges from 2100 mm to 2250 mm.

3. Features:

- **Improved Interior:** Enhanced comfort features including better seats, air conditioning (in select models), and advanced infotainment systems.
- **Safety Features:** Enhanced safety with features like ABS, improved braking systems, and better crash protection.
- **Suspension:** Improved suspension systems for better ride quality - Front: Independent with coil spring, Rear: Semi-elliptical leaf spring with improved damping.

4. Technology and Connectivity:

- **Telematics:** Some models are equipped with telematics for fleet management.
- **Driver Assistance:** Features like reverse parking sensors and digital instrument clusters in select models.

CONCLUSION FROM THIS COMPARISON ARE :-

This comparison highlights the evolution of the Tata Ace from its basic first model to the more advanced, feature-rich versions available today. The advancements include better engine performance, increased load capacity, improved fuel efficiency, enhanced safety, and modern technological features.



AFTER ADVANCEMENTS LEADS TO PROFIT

So, here I am going to discuss some of the technological advancements in the upcoming model of **TATA ACE 700 cc**.

- **TATA ACE** was launched in 2005. Also called **Chota Haathi**, it transformed the small commercial vehicle segment in the country and changed the face of last mile delivery across megacities and developing towns alike.
- But that was only the start of its successful journey, one that has led to constant innovation and years of evolution that has led to the introduction of the new **Tata Ace Gold BS6** variants in 2020, marking a continued legacy of innovation to offer customers the very best.
- The new Tata Ace Gold Petrol, Diesel and CNG variants are powered by advanced BS6 technology, backed by the Promise of 6 — higher mileage,

higher pick-up, higher payload, more comfort and convenience, higher profits and lower maintenance costs.

- Each small truck comes loaded with features that promise, at a low acquisition cost of INR 4.60 lakhs onwards, with potential for earning from Day 1. The potential for earning is upto INR 25,000 per month.

High Mileage

- The Tata Gold Petrol comes with the Tata 694CC Gasoline MPFI" BS-VI, 4 Stroke Water Cooled Engine, Gear Shift Advisor and Eco Switch for better fuel efficiency, that all help towards increasing the mileage it offers.
- The Diesel variant is powered by the proven and trusted 2 cylinder 700CC Naturally Aspirated DI Engine, along with a Gear Shift Advisor to economize fuel usage. The CNG model with its Water cooled multipoint gas injection 694 cc CNG engine also has a Gear Shift Advisor to optimize mileage.

High Pick Up

- All of the Tata Ace Gold models boast high pick up. For the petrol variant, it has a high power of 30 HP for better speed, high torque of 55 Nm for better acceleration, high gradeability of 30% for better pickup and a top speed of 70 kmh.
- While the diesel sits just below at 20 HP, torque of 45 Nm and gradeability of 27.5%, and the CNG is 26 HP, 51 Nm and 29% gradeability.

High Payload

- All three variants of the Tata Ace Gold are designed with a heavy duty truck-like chassis that is even more reinforced with durable axles and rugged front and rear leaf spring suspension.
- They can take payloads of up to 750 kg for the Petrol and Diesel and 640 kg for the CNG. This means higher transportation amounts per ride, thereby increasing potential profit.

High Convenience

- The stylish interiors of the new Tata Ace Gold BS6 models are fitted with elements of comfort and convenience such as a digital cluster, roomy glove box, bottle and document holder as well as USB charger.

Low Maintenance

- Whichever Tata Ace Gold model you choose to purchase, you are investing in a vehicle with an overall higher aggregate life, with the add-on benefits of easy spare part accessibility as well as serviceability across 1400+ Tata Motors Authorized Service Stations. They also come with a warranty of 2 years/72,000 km.

High Profits

- With low maintenance costs, higher fuel savings and high load carrying capacity, Tata Ace Gold completes its promise of 6 with higher profits.
- That's what makes it the top choice for anyone who wishes to generate a reliable, steady income for themselves and their families too.

ROLE OF THE SUPPLY CHAIN IN TATA ACE MODEL 700 cc

The supply chain department plays a crucial role in the seamless production and distribution of the Tata Ace 700 cc model. During my internship, I observed how the supply chain department ensures the efficient flow of materials and components, contributing to the overall success of the vehicle's production.

Procurement and Supplier Coordination: The supply chain department is responsible for sourcing high-quality raw materials and components required for the Tata Ace 700 cc. By maintaining strong relationships with reliable suppliers, the department ensures timely deliveries and adherence to quality standards. This coordination is vital for the Just-In-Time (JIT) manufacturing process, which minimizes inventory costs and reduces lead times.

Inventory Management: Effective inventory management is essential to avoid production delays. The supply chain team uses advanced inventory management systems to track stock levels, forecast demand, and reorder components as needed. This proactive approach ensures that the manufacturing line operates smoothly without interruptions.

Logistics and Distribution: Transportation and logistics are critical aspects of the supply chain. The department manages the transportation of raw materials to the manufacturing plant and oversees the delivery of finished Tata Ace vehicles to

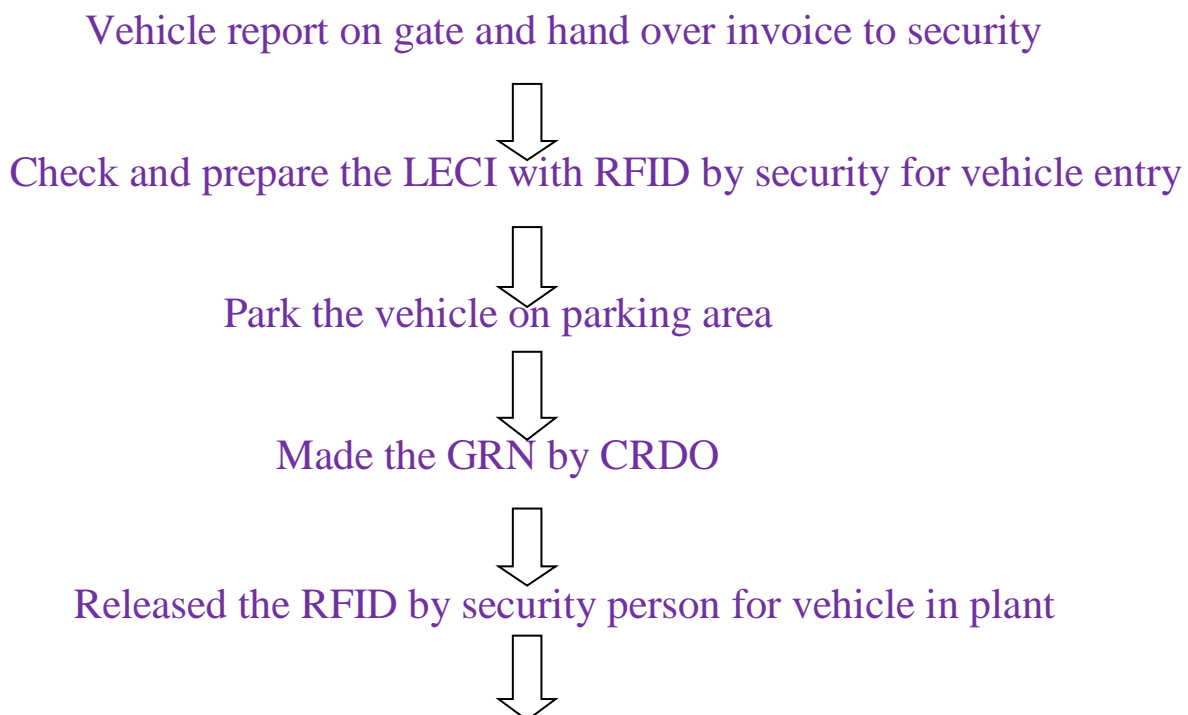
dealerships. Efficient logistics planning helps in minimizing transportation costs and ensuring timely delivery to customers.

Addressing Challenges: The supply chain department is adept at handling challenges such as supplier delays, transportation issues, and demand fluctuations. By implementing contingency plans, diversifying suppliers, and leveraging technology, the department mitigates risks and maintains production continuity.

In conclusion, the integration of the supply chain department with the production of the Tata Ace 700 cc model ensures efficient operations, cost optimization, and high-quality output. The insights gained from my visit to the supply chain department have provided a deeper understanding of its critical role in the automotive manufacturing process.

By including this section, you can effectively connect your project on the Tata Ace 700 cc model with the supply chain department, showcasing the interdependencies and contributions of the supply chain to the overall production and distribution process.

Inventory flow chart :



Unloading the material vehicle & checked the quantity as per invoice quantity by store person



Made the mb02 by store person



Store acknowledgement



Vehicle will go to out gate



Hand over RFID token and LECI to security by driver



Out the RFID in system



Exit the vehicle

CONCLUSION

In conclusion, this project has provided a comprehensive understanding of the Tata Ace 700 cc model and its evolution into advanced versions. The detailed comparison highlights significant advancements in engine performance, design, features, and technology, showcasing Tata Motors' commitment to innovation and quality.

VOTE OF THANKS

I would like to express my gratitude to Tata Motors Limited for providing me with the opportunity to intern at their Pantnagar plant. This project on the Tata Ace 700 cc model & Procurement and Cost Optimization at Tata Motors Pantnagar has been an invaluable learning experience.

Special thanks to the **Assembly Department** for their insights into the production processes and to the **Purchase & Supply Chain Department** for allowing me to observe their operations. Your guidance has significantly contributed to the success of this project.

I am also thankful to my project supervisor and mentors at Tata Motors for their constant support and feedback. Additionally, my professors at IIT Ropar have provided crucial academic guidance throughout this project.

Lastly, I appreciate the support of my colleagues, fellow interns, family, and friends, whose encouragement has been a great source of motivation.

Thank you all for your invaluable contributions.