Chapter: - 1

INTRODUCTION

1.1 Introduction of Ford
1.2 Introduction of Organization
1.3 Current Workshop Layout
1.4 Modified Workshop Layout
1.5 Current Hierarchy

Ford Models in India:-

Ford Figo
Ford Aspire
Ford Ecosport
Ford Endeavour
Ford Mustang

Fig. 1.1 Ford Tag Line
1.1 Introduction of Ford

Ford India Private Limited is a wholly owned subsidiary of the Ford Motor Company in India. Ford India Private Limited’s headquarters are in Maraimalai Nagar, Chennai, Tamil Nadu.

It currently is the sixth largest car maker in India after Maruti Suzuki, Hyundai, Tata, Mahindra, etc.

- Ford Motors Company is founded on June 16, 1903.
- This company is 113 years old.
- But this company in India was founded on October 1995.

![Ford Main Headquarter](image_url)

**Fig. 1.1.1 Ford Main Headquarter**

<table>
<thead>
<tr>
<th>Founder</th>
<th>Henry Ford</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headquarters</td>
<td>Dearborn, Michigan</td>
</tr>
<tr>
<td>Key People</td>
<td>William C. Ford, Jr.</td>
</tr>
<tr>
<td></td>
<td>(Executive Chairman)</td>
</tr>
<tr>
<td></td>
<td>Mark Fields</td>
</tr>
<tr>
<td></td>
<td>(President and CEO)</td>
</tr>
<tr>
<td>Products</td>
<td>Automobiles</td>
</tr>
<tr>
<td></td>
<td>Luxury Vehicles</td>
</tr>
<tr>
<td></td>
<td>Commercial Vehicle</td>
</tr>
<tr>
<td></td>
<td>Automotive parts</td>
</tr>
</tbody>
</table>
This person name is Henry Ford. He’s Founded Ford Motors Company.

Henry Ford Born on July 30, 1863. And Died on April 7, 1947.

Henry Ford Was an American industrialist, the founder of the Ford Motor Company, and the sponsor of the development of the assembly line technique of mass production.

Although Ford invented neither the automobile nor the assembly line, he developed and manufactured the first automobile that many middle class American could afford. In doing so, Ford converted the automobile from an expensive curiosity into a practical conveyance that would profoundly impact the landscape of the 20th century.  

Henry Ford created the Ford Model T car in 1908 and went on the develop the assembly line mad of production, which revolutionized the industry.

As result, Ford sold million of cars and became a world-famous company head.
1.2 Introduction of organization

- Jai Ganesh group was established by shri Devjibhai K. Patel in the year 1947 by setting up a Dealership for Indian Oil Corporation Limited for their petrol pump at Mitana (Morbi), at an age of 23.
- The Mentor of Jai Ganesh, Shri Devjibhai K. Patel comes from a modest background and belongs to the farming community; who are known for their hard work, sincere commitment and for their endeavors.
- Jai Ganesh ford started 25 Feb. 2015

Fig. 1.2.1 Ford symbols
1.3 Current Workshop Layout

- In layout front Right side offices. Right first table is Auto-car Reception table, and left side customer waiting Room. CWR inside service manager office. Reception table behind Advisers tables and after payment office.

Fig. 1.3.1 Current Workshop Layout
1.4 Modified Workshop Layout

- In workshop layout I will change Repairing Area, Accident vehicle Area and Paint Area. So, no Traffic and easily park cars.

Fig. 1.4.1 Modified layout
1.5 Current Hierarchy

- In Organization Rajnikant sir is Dealer.
- Kiran Sir is general manager and Amar sir is service manager. Dhaval sir is ASM (Assistant Service Manager) and after all advisers.
- In workshop, floor supervisor is Chetan sir.
- Hiten sir, Chetan sir, and Raju sir are vehicle test drivers.
- Raju sir is also diagnostic.
- After all technicians and workers.

Fig. 1.5.1 Current Hierarchy
Chapter: - 2
TOOLS AND EQUIPMENT

2.1 Major Equipment, Instruments, Machines.
2.2 List of hand tool
   2.2.1 Hand tool in detail:-
2.3 List of Power Tools
   2.3.1 Power Tools in Detail:-
2.4 Machine
2.5 SST (Special Service Tool)
2.1 Major Equipment, Instruments, Machines.

- Breakdown of the vehicles can occur due to many reasons such as accident, broken part, loss of strength of component material etc. Such vehicles are brought to the auto garage for repairing. For repairing work, some tool, machines and equipment are required, is called garage tools.

2.2 List of hand tool: -

1. Fixed spanner
2. Ring Spanner
3. Torque Wrench
4. Box Spanner
5. Wrench
6. Floor Jack
7. Bench wise
8. Tool trolley
9. Pliers

1. Fixed spanner:-

- A Fix spanner is used for turning a nut, bolt or similar fixing that is turned to tighten. The spanner is used to grip the given fixing (whether it is a nut, bolt, concrete screw etc.....) and turn it, allowing you to apply torque and tighten the nut onto the bolt.
- Cost : - 1000

Fig. 2.2.1 Fixed spanner
2. Ring spanner:-

- Ring spanners grip a fastener at the corners just like a socket spanner, just the sort of grip that is needed if a nut or bolt is very tight. Ring spanners have different sized heads at each end. They aren't as convenient as sockets but can fit into places that a socket can't.
- One disadvantage of the ring spanner is that it can be awkward to use once the nut or bolt’s been loosened. A ring spanner in which the jaws form a ring with internal serrations which fit completely around a nut, usable in confined spaces.

- 6x7, 8x9, 8x10, 10x11, 12x13, 12x14, 14x15, 14x17, 16x17, 18x19, 20x22, 21x23, 24x27, 30x31
- Cost :- 1000

3. Box Spanner :-

- Box spanner is use to open bolt instantly because box spanner is force 90 degree deferent than ring spanner.
  - 8 short
  - 10 short
  - 12 short
  - 14 short
  - 17 short
  - 19 short
  - 22 short
  - 24 short
  - 27 short
  - 30 short
  - 32 short
  - 08 long
  - 12 long
4. Wrench:-

With the greater application of machinery, the variety and size of wrench in daily use have also increased. The traditional open end wrenches, pipe wrench and monkey wrench have been replaced by those which are generally made of chrome-molybdenum or chrome-vanadium steel.

5. Floor Jack :-

There are various safety features which prevent the jack from coming down in case of power failure or leakage of seal in case of air operated jack. The jacks are classified on the basis of no. of jack posts, e.g. two post, four post or six post jacks.

To work under the car or to change wheel, it is necessary to lift the car. For doing this, a lifting jack is used which may be mechanically or hydraulically operated. Such a jack is a standard accessory with many cars.

Approximately Cost:-5000
6. Bench wise :-

- Any job being performed manually requires proper holding. They are normally held by certain devices and one of these is called vice. Most of the manual operations such as filing, sawing, cutting threads by hand, debarring and many machine operation such as shaping, milling, etc. are done by clamping the work in the vice since rigidity of the job is necessary while conducting any operation.

- Holding of work, either small our large, round our square, becomes very easy when held by the vice. Same times, the shearing of thin sheets is also carried out with the help of the vice.

- Bench vice is fixed on bench. The bench fitter and machinist uses this vice for holding a variety of manual jobs and assembly and dismantling of machine part and equipment, etc. there are two types of bench vices which are used in a machine shop.

Fig. 2.2.5 Bench Wise
8. Tool trolley:-

- Tool trolley is give all workshop technician in trolley technician carry all type spanner and then time they spanner necessary they spanner take out from trolley.
- In trolley spanner are well organist and well arranged.
- The Tool Trolleys are used to store general, special tools and for various other purposes. The Tool Storage Trolleys are generally designed in vertical order so as to save the floor area and easy approach to tools.
- Catering to the specific requirements of the clients, the company has acquired noteworthy position amidst the major Mechanics Tool Trolleys Manufacturers and Suppliers in India.
- The Tool Trolleys are sturdy and handy tool storage units designed to operate right in the workplace with time saving and added productivity.
- The right storage units to complement the work of automobile mechanics, body repair specialist, maintenance engineers and other users also.

9. Pliers:-

- Pliers are used to grip, cut, crimp, hold, and bend various parts.
- Different pliers are helpful for different situations.
- Several types of pliers are pictured in never use pliers when another type tool will work. Pliers can nick and scar a part.
- Combination pliers, or slip-joint pliers, are the most common pliers used by an automotive technician.
- Slip joint allows the jaws to be adjusted to grasp different size parts. Rib joint pliers, also called channel lock pliers or water pump pliers, open extra wide for holding very large objects. Needle nose pliers are excellent for handling extremely small parts or reaching into highly restricted areas. Do not twist too hard on needle nose pliers, or the long thin jaws can be bent.

Fig. 2.2.6 Tool Trolley
10. Combination Spanner

- Combination Spanner is a tool used to provide grip and mechanical advantage in applying torque to turn objects—usually rotary fasteners, such as nuts and bolts—or keep them from turning.
10. **Hammer**

- A hammer is a tool or device that delivers a blow (a sudden impact) to an object. Most hammers are hand tools used to drive nails, fit parts, forge metal, and break parts objects.
- Hammers vary in shape, size, and structure, depending on their purpose.

![Fig. 2.2.9 Hammer](image)

12. **T-Spanner**

- Excellent quality socket spanners with extended shaft for easy access to nuts and bolts. Precision engineered tools for precise working in a T-handle design for good leverage. Sold individually, sockets are available in sizes from 8mm to 19mm.

![Fig. 2.2.10 T-Spanner](image)
2.3 List of Power Tools

2.1 Two post lift
2.2 Grinder
2.3 Compressor Gun
1. Two Post Lift:-

- Hydraulic hoist for 4 wheelers raises vehicles to any comfortable working height up to 6 feet, living hade room for complete under chassis access.

**Specification:-**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifting Time</td>
<td>4 tone</td>
</tr>
<tr>
<td>Lifting Capacity</td>
<td>55 second</td>
</tr>
<tr>
<td>Power Supply</td>
<td>400v/500Hz</td>
</tr>
<tr>
<td>Motor Power</td>
<td>2.2kw</td>
</tr>
</tbody>
</table>

Table 2.3.1 Two Post Lift

Fig. 2.3.1 Two Post Lift
2. Grinder:-

- We have use grinder to before picking dent. Because appeared clean dent.
- Grinders are used for fast removal of material joints after welding and to remove paint and primer. They come in various size and shapes.
- The most commonly used portable air grinder in collision Repair and refinishing shops is the disc type grinder. It is operated like the single action disc sander. An air grinder shod is used carefully. It can quickly thin down and cut through body panels, causing major problem.
- Approximate cost : 5,000

3. Compressor Gun

- It is use for open every nut and bolt.
- Cost = 3000
2.4 Machines

1. Bearing Fitting Machine
2. Wheel Balancing Machine
3. Wheel Alignment Machine
4. A.C. Gas Charger Machine
5. Battery Report Machine
6. Battery Charger Machine
1. Bearing Fitting Machine

- Used in a wheel bearings, axle bearing replacement. By the hydraulic jack type machine we can easily fit and remove the bearing from the wheel bearing.
- **Cost:** 15000

![Fig. 2.4.1 Bearing Fitting Machine](image)

2. Wheel Balancing Machine

- A machine used to check the wheel and tire assembly for static and dynamic balance. Wheel balancer machine, also referred to as tire unbalanced or imbalanced, and describes the distribution of mass within an automobile tire or entire wheel attached Goodyear recommends you have your wheels balanced every 3,000 - 6,000 miles (5,000 km - 10,000 km).

- However, if you're experiencing these symptoms, your tires may need balancing:
  - □ Steering-wheel vibration at highway speeds
  - □ Seat or floorboard vibration at highway speeds
  - □ Scalloped/cupped wear patterns on your tires
Approximately Cost:-1.5 Lac

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balancing accuracy</td>
<td>1 kg</td>
</tr>
<tr>
<td>Cycle time</td>
<td>5 to 8 second</td>
</tr>
<tr>
<td>Rim width</td>
<td>1.5”-20”</td>
</tr>
<tr>
<td>Rim Diameter</td>
<td>10”-30”</td>
</tr>
<tr>
<td>Wheel max.diameter</td>
<td>860mm</td>
</tr>
<tr>
<td>Power supply</td>
<td>230v, 1ph, 50Hz</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 54</td>
</tr>
<tr>
<td>Balancing speed</td>
<td>100rpm</td>
</tr>
</tbody>
</table>

Table 2.4.2 Wheel Balancing

Fig. 2.4.2 Wheel Balancing
3. Wheel Alignment Machine

- Wheel alignment consists of adjusting angle of the wheel so that they are set to the car maker’s specification. The purpose of this machine to reduce wear and to ensure that vehicle is travelling straight and true without pulling to one side on road. This may lead to vehicle pulling and tire wear.

- Wheel alignment consists of adjusting angle of the wheel so that they are set to the car maker’s specification. The purpose of this machine to reduce wear and to ensure that vehicle is travelling straight and true without pulling to one side on road. This may lead to vehicle pulling and tire wear.

- A major improvement in fuel saving would result if everyone correctly inflated their tires. The typical alignment on an economy sedan takes an hour under ideal circumstance A utility or performance vehicle may require additional labor. When fasteners and hardware are sized extra times require and part may need to replace. A good start is to consult your local licensed automotive technician.

- **Approximately Cost:- 4.5 Lac**

![Fig. 2.4.3 Wheel Alignment](image)
**Specification:-**

<table>
<thead>
<tr>
<th>Accuracy</th>
<th>Measurement Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display accuracy</td>
<td>1 Inch/0.1 mm</td>
</tr>
<tr>
<td>Camber</td>
<td>+/-2 Inch</td>
</tr>
<tr>
<td>Caster</td>
<td>+/-6 Inch</td>
</tr>
<tr>
<td>Kingpin inclination</td>
<td>+/-6 Inch</td>
</tr>
<tr>
<td>Toe-in &amp; toe-out</td>
<td>+/-2 Inch</td>
</tr>
<tr>
<td>Set Back</td>
<td>+/-2 Inch</td>
</tr>
</tbody>
</table>

**Table 2.4.3 Wheel Alignment**

**4. A.C. Gas Refill Machine**

- AC gas machine is used for the refilling AC and storage of AC gas. AC refilling process is used when cooling slower; at that time it is necessary to refill the AC gas. If some maintenance is require for the AC parts, at that time gas have to remove from the line and store at the AC machine.

**Specification:-**

<table>
<thead>
<tr>
<th>Refrigerant type</th>
<th>R134a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Procedure</td>
<td>Semi-automatic/manual</td>
</tr>
<tr>
<td>Display</td>
<td>Graphic</td>
</tr>
<tr>
<td>Scale Resolution</td>
<td>10g</td>
</tr>
<tr>
<td>Vacuum pump</td>
<td>841min</td>
</tr>
<tr>
<td>Recovery sped</td>
<td>300 g/min</td>
</tr>
<tr>
<td>Refrigerant bottle capacity</td>
<td>12Ltr.Refillable</td>
</tr>
<tr>
<td>Hoses</td>
<td>3m</td>
</tr>
<tr>
<td>Working temperature</td>
<td>10/50c</td>
</tr>
<tr>
<td>Power supply</td>
<td>230v AC-50Hz</td>
</tr>
<tr>
<td>Approximate cost</td>
<td>1, 48,000</td>
</tr>
</tbody>
</table>

**Table 2.4.4 A.C Gas Refill Machine**
5. Battery Report Machine

- Battery Report Machine is used to check Battery Health.
- As battery fails, this machine warns you “Replace Battery:
- This Machine also shows a cranking position.
6. Battery Charger Machine

- Up to 6 no. of 12v batteries can charge at a time.
- Cam operated rotary switch for voltage & current adjustment
- DC ammeter indicates charging current.
- Miniature circuit breaker on DC output.
- Approximate cost 10,000

Approximately Cost: - 5000

Fig. 2.4.6 Battery Charger Machine
2.5 SST (Special Service Tool)

1. Torque Wrench

- The wrench is used when it is necessary to know the amount of force to be applied to the nut or bolt. The amount of force is generally indicated on the dial or scale which is mounted on the handle. Some wrench of this type has an indicator which gives a single when the pre-set force is reached.

- Other wrench has ratchets or handles which slip off when the force designed is achieved. These types of wrenches are a boon to the industry where the parts assembled require a definite force.

![Fig. 2.5.1 Torque Wrench](image-url)
2. Piston ring compressor

**Fitting the piston into the cylinder bore**

- Thoroughly clean the sealing surface of the engine block from sealing residues, if this has not been done during the reconditioning process.
- Thoroughly clean all tap holes from any adhering dirt, oil and coolant.
- Carry out all cleaning work prior to fitting the pistons into the cylinder bores.
- Apply a thin layer of fresh engine oil to all piston surfaces. Do not forget the piston pin and conrod bearings.
- Pay attention to the assembly direction of the piston (marking on the piston crown, valve pockets).
- Clean the cylinder bore again using a cloth moistened with engine oil.
- Check your piston ring scuff band for damage and dents and remedy these or replace the tool if necessary.
- Take care during piston fitting that the scuff band or the conical assembly sleeve are positioned flat on the cylinder head sealing surface.

![Fig. 2.5.2 Piston Ring Compressor](image)
Chapter:-3
Maintenance & Preventive Maintenance of Vehicle

3.1 Types of Services in Ford Workshop

3.2 Preventive maintenance

3.3 Periodic maintenance

3.4 Faults and reminds

3.4.1 Engine Faults and Remedies
3.4.2 Gear Box & Clutch Faults and Remedies
3.4.3 A/C System Faults and Remedies
3.4.4 Braking System Faults and Remedies
3.4.5 Other Faults and Remedies
3.1 Types of Services in Ford Workshop

1. Free service
2. Paid service
3. Running repair

(1) Free service:-

It’s a service given by the dealer, after purchasing new car from company. There are total 2 free services given in Ford.

- 1st Free Service (1200-1500km or 2 months)
  - All light check, Tire pressure check
  - Greasing all door and battery terminal.
  - Water and oil check
  - Other complain (if there)
  - Washing

- 2nd Free Service: (9000-10000km or 6 months)
  - All light check
  - Water check, Tire pressure check (33 psig)
  - Greasing all door and battery terminal.
  - Oil and oil filter change
  - Air filter
  - Other complain (if there)
  - car trial test(wheel alignment)
  - Washing
(2) Paid service:-

- Engine oil check
- Coolant check
- Battery water check
- All door & Glass check
- Caliper pin service
- Viper spray check
- Washing & Cleaning

(3) Running repair :-

- The running repair service is a service in which service center solve the problems of customers & try to fulfill the demand of the customers.
3.2 Preventive maintenance

Schedule check and repair following things for preventing maintenance:

1. Engine oil and filter
   - The engine oil and filter should be changed at the intervals specified in the manual.
   - If the car is being driven in severe conclusions, more frequent oil and filter changes are required.

2. Drive Belts:
   - Inspect all drive belts for evidence of cuts, cracks, excessive wear or oil and replace if necessary.
   - Drive belts should be checked periodically for proper tension and adjusted as necessary.

3. Fuel Filter
   - A clogged filter can limit the speed at which the vehicle may be driven, damage the emission system and cause hard starting. If an excessive amount of foreign matter accumulates in the fuel tank, the filter may require replacement more frequently.
   - After installing a new filter, run the engine for several minutes, and check for leaks at the connections.

4. Fuel lines, fuel hoses and connections
   - Check the fuel lines, Fuel hoses and connections for leakage and damage.
   - Replace any damaged or leaking parts immediately.

5. Timing belt
   - Inspect all parts related to the timing belt for damage and deformation.
   - Replace any damaged parts immediately.

6. Air cleaner filter
   - A Genuine Ford air cleaner filter is recommended when filter is replaced.
7. Spark plugs
- Make sure to install new spark plugs of the correct heat range.

8. Cooling system
- Check the cooling system part, such as radiator, coolant reservoir, hoses and connections for leakage and damage.
- Replace any damaged parts.
- The coolant should be changed at the interval specified in the maintenance schedule.

9. Transmission oil
- Inspect the transaxle oil according to the maintenance schedule.

10. Brake hoses and lines
- Visually check for proper installation, chafing, cracks, deterioration and any leakage.
- Replace any deteriorated or damaged parts immediately.

11. Brake fluid
- Check brake fluid level in the brake fluid reservoir.
- The level should be between “MIN” and "MAX" marks on the side of the reservoir.

12. Rear brake drums and linings/Parking brake
- Check the rear brake drums. And linings for scoring, burning, leaking fluid, broken parts, and excessive wear.
- Inspect the parking brake system including the parking brake lever and cable.
### 3.3 Periodic maintenance

<table>
<thead>
<tr>
<th>Parts</th>
<th>Pre. Maintenance Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine &amp; Oil Filter</td>
<td>10000 km or 1 year</td>
</tr>
<tr>
<td>Coolant &amp; Brake Oil</td>
<td>20000 km or 2 year</td>
</tr>
<tr>
<td>Gear Oil</td>
<td>50000 km or 5 year</td>
</tr>
<tr>
<td>E.G.R. cleaning</td>
<td>30000 km</td>
</tr>
<tr>
<td>Air filter &amp; Fuel filter (Diesel)</td>
<td>20000 km</td>
</tr>
<tr>
<td>Air filter &amp; Fuel filter (Petrol)</td>
<td>40000 km</td>
</tr>
<tr>
<td>Timing</td>
<td>100000 km</td>
</tr>
</tbody>
</table>

Table 3.3.1 Periodic Maintenance
### 3.4 Faults and Reminds

#### 3.4.1 Engine Faults and Remedies

<table>
<thead>
<tr>
<th>No.</th>
<th>Fault</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>High fuel consumption</td>
<td>Fuel pipe replace (if damaged)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air filter replace</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tappet setting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cylinder head overhaul</td>
</tr>
<tr>
<td>2</td>
<td>Black smoke outlet</td>
<td>EGR valve service</td>
</tr>
<tr>
<td>3</td>
<td>Unwanted noise of chain</td>
<td>Timing chain and tensioners Replaced</td>
</tr>
<tr>
<td>4</td>
<td>Noise at a time of starting</td>
<td>Engine Starter motor replaced</td>
</tr>
<tr>
<td>5</td>
<td>Engine not starting</td>
<td>Check wiring, ECM and fuel line</td>
</tr>
<tr>
<td>6</td>
<td>Improper combustion</td>
<td>Engine overhaul</td>
</tr>
<tr>
<td></td>
<td>Oil exhaust with smoke</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Engine vibration</td>
<td>Replace spark plug</td>
</tr>
<tr>
<td></td>
<td>Engine tuning</td>
<td>Tappets setting</td>
</tr>
<tr>
<td></td>
<td>Lack of pickup</td>
<td>Injector service</td>
</tr>
<tr>
<td></td>
<td>Engine jerking.</td>
<td>Throttle body</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fuel filter replaced</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace air filter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clean Inlet Manifold &amp; Intercooler</td>
</tr>
<tr>
<td>8</td>
<td>Poor starting</td>
<td>Recharge battery (Run-down)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clean battery terminal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Starter motor replace</td>
</tr>
<tr>
<td>9</td>
<td>Connecting rod noise (got band)</td>
<td>Connecting rod replace</td>
</tr>
<tr>
<td>10</td>
<td>Engine not starting</td>
<td>Check wiring, ECM and fuel line</td>
</tr>
</tbody>
</table>

Department of Automobile Engineering - AITSDS
### 3.4.2 Gear Box & Clutch Faults and Remedies

<table>
<thead>
<tr>
<th>No.</th>
<th>Fault</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gear Shifting Hard</td>
<td>Replace Synchronizer Rings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace gear wire</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace gear changing assembly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gearbox overhaul</td>
</tr>
<tr>
<td>2</td>
<td>Unwanted noise from gearbox</td>
<td>Replaced bearing</td>
</tr>
<tr>
<td>3</td>
<td>Clutch Operate hard</td>
<td>Replace Clutch &amp; Pressure Plate</td>
</tr>
<tr>
<td></td>
<td>Grabbing clutch</td>
<td>Clutch cylinder</td>
</tr>
<tr>
<td></td>
<td>Slipping clutch</td>
<td>Clutch wire</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clutch Overhaul</td>
</tr>
<tr>
<td>4</td>
<td>Dragging clutch</td>
<td>Clutch pedal play adjust</td>
</tr>
</tbody>
</table>

### 3.4.3 A/C System Faults and Remedies

<table>
<thead>
<tr>
<th>No.</th>
<th>Fault</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flow not coming</td>
<td>AC filter &amp; cooling coil clean</td>
</tr>
<tr>
<td>2</td>
<td>Gas leakage</td>
<td>Leakage Check of ac system</td>
</tr>
</tbody>
</table>

### 3.4.4 Braking System Faults and Remedies

<table>
<thead>
<tr>
<th>No.</th>
<th>Fault</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gear Shifting Hard</td>
<td>Change Synchronizer Rings</td>
</tr>
<tr>
<td>2</td>
<td>Clutch Operate hard</td>
<td>Clutch &amp; Pressure Plate Change</td>
</tr>
<tr>
<td>3</td>
<td>Steering Hard &amp; Not Coming Back After Turning</td>
<td>Service or Change</td>
</tr>
<tr>
<td>4</td>
<td>One side Pulling Car</td>
<td>proper alignment</td>
</tr>
</tbody>
</table>
## 3.4.5 Other Faults and Remedies

<table>
<thead>
<tr>
<th>No.</th>
<th>Fault</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A/C cooling less A/C not working</td>
<td>Refill gas Clean A/c filter Gas leakage test Gas pipe replace (if damaged) Clean cooling coil Replace A/c fan Replace condenser Replace A/c compressor Check wiring</td>
</tr>
<tr>
<td>2</td>
<td>In steering turning time Unwanted noise Steering wheel hard</td>
<td>Steering column service EPS motor replaced UJ and propeller shaft replaced Steering rank replaced Inner Outer tie rod replace</td>
</tr>
<tr>
<td>3</td>
<td>Unwanted noise from Front side Noise from brake Noise from suspension</td>
<td>Brake caliper service Wheel brake dies turning Stabilizer bush and rod replace Lubricant suspension Insulator replace Shock absorber replace Replace wheel baring Replace front axle Tight bolt (if any bolt got looser)</td>
</tr>
<tr>
<td>4</td>
<td>Unwanted noise from Rear Noise from wheel drum</td>
<td>Lubricant rear suspension Replace stabilizer rod Replace rear axle Replace wheel hub</td>
</tr>
<tr>
<td>5</td>
<td>Decreases In Braking Performance Brake not working</td>
<td>Replace brake pad or show Wheel dies drum turning Replace wheel cylinder Replace master cylinder Replace booster Replace ABS module Replace brake pipe Replace brake oil</td>
</tr>
<tr>
<td>6</td>
<td>Vehicle mishandling Pull at one side Vibration</td>
<td>Wheel Alignment Wheel Balancing Wheel replace</td>
</tr>
<tr>
<td>7</td>
<td>Steering remains cross</td>
<td>Wheel rim replace</td>
</tr>
<tr>
<td>8</td>
<td>Power window not working</td>
<td>Replace motor Replace sliding penal Replace switch</td>
</tr>
</tbody>
</table>
Chapter 4
MAJOR VEHICLE REPAIR

4.1 Major vehicle repairs

4.1.1 Engine overhaul
4.1.2 Gearbox overhaul
4.1.3 Clutch Overhaul
4.1.4 AC System overhaul
4.1 Major vehicle repairs

4.1.1 Engine overhaul

Car : - Ford (Ecosport)
Problem : - overheating.
Action Taken: - engine block change.

- The engine we are talking here is the diesel engine which got damaged due to overheating.
- The overheating was caused due to low engine oil level and also there was no engine coolant.
- The engine was removed from the car and was observed very carefully by a well-trained technician. The damages were severe.
- One engine timing belt was somehow missing. And rest all was very loose, except one.
- The 3rd piston along with the cylinder was badly damaged.
- The timing chain was then fitted properly and it was made sure that all the screws were also properly fitted. Also the 3rd piston was changed. All the complete measures were taken and the engine was repaired.

The engine we are talking here is the diesel engine which got damaged due to overheating.

- First of drain the engine oil
- And drain other fluids, Coolant, gear oil
- Now disconnect all the electrical wiring with the engine.
- Now with a crane hoist the engine.
- Open up all the mountings of the engine so the engine is separated from the vehicle.
- Now slowly remove the engine out of the car.
- Now detach the gearbox from the engine.
Next remove the common rail and injectors and four them numbers according to the cylinders.
- Remove tappet cover an belt.
- Water pump and alternator remove
- Now timing cover remove and Belt Remove oil pump.
- Unbolt camshaft from cylinder head and remove camshaft and head
- Remove inlet manifold and remove exhaust manifold with turbo charger
- Removing cylinder head and oil pump.

4.1.2 Gearbox overhaul

**Car** :- Ford (Ecosport)

**Problem** :- Gear shifting hard and sometime some gear not working

**Action Taken** :- Gear overhaul

- The steps of Gear overhaul are given below:-
- First of all disconnect all wiring to the gear box.
- Now remove clutch cable to the gear box.
- After gear mounting disable to gear and disable gear from engine.
- Now drain pressure plate and clutch plate.
- Check clutch kit and action it.
- Now check sleave cylinder
- And clutch bearing.
- After disable frank, output shaft and input shaft.
- Also disable to all gears and cyncronizer or dog clutch and check it.
- Check all gear teeth and gear shaft.
- Now check input shaft; If it damage, so replace.
- Now check all cycronizer and dogs or bearing.
- After all damage parts are replace and assemble gear box.
- Replace oil seal and properly assemble all parts to the gear box.
- After remain fitting clutch kit and fitting to the gear box.
- Connect and fitting all wiring to gear box.

Fig. 4.1.2.1 Pressure Plate

Fig. 4.1.2.3 Gear Main Shaft

Fig. 4.1.2.4 Cycronizer Rig

Fig. 4.1.2.5 Gear dog
4.1.3 Clutch Overhaul

- The clutch is one of the most important parts in a manual transmission car as it connects the engine with the gearbox, and is what provides motive force for the car. It is also one of the parts of the car that sees high wear and tear depending on a person’s driving style and the environment it is driven in.
- In clutch overhaul we replaced clutch plate, pressure plate and clutch bearing.

Car: Ford (Figo)
Reason: Clutch pedal became hard
Cost: 30000 to 35000 Rs

The steps of Clutch overhaul are given below:

- Remove both tyre and Axle.
- Battery and battery stand dismental.
- Disconnect to all wiring to the gear box.
- Now unbolt gear box bolts.
- Unbolt Gear mounting.
- Now replace clutch bearing, present at gear box.
- Drain pressur plat bolts and replace clutch kit.

Fig. 4.1.3.1 Clutch Plate
4.1.4 AC System overhaul

Car : Ford (Ecosport)

Reason : cooling less or in case of pipe repair.

Work done : Clean cooling coil
            Clean A/C fan
            Refill gas
            Repair pipe (if damaged)

Cost : 8000 Rs

Process:

- Recover A/C gas in gas refilling machine
- Remove battery terminals
- Unbolt steering wheel, and dashboard,
- unbolt audio accessory
- Remove electric socket and unbolt steering Colum and lift it down
- Remove dashboard from car.
- Remove cooling pipe and heating hosepipe from front.
- Remove every electric socket under dashboard.
- Unbolt rod from car body and lift it.

Fig. 4.2.4.1 Open Dash board
Then remove A/C assembly.
Then disassemble it, remove Evaporator.
Cover pipes with plastic bag or other things.
Wash it with water, remove dirt from it.
Clean A/C assembly with cloth and compress air.
Remove A/C blower and clean it.
Assemble everything as it was removed.
Refill A/C gas as per required quantity.

Fig. 4.2.4.2 A.C. Gas recovering
Chapter 5

TESTING OF AUTOMOBILES

5.1 Particulars of practical Experiences in industry
5.2 Testing of automobiles
5.3 Additional Data
5.4 Information in- Cost reduction
5.5 Cost estimates of major repairs
5.1 Particulars of practical Experiences in industry

1. Checking of all the lights
   All the lights like head-tail lamps, interior lights are checked and changed if necessary

2. Greasing all the hinges
   All the hinges like door and hood hinges are oiled or greased for smooth operation

3. Wiper blade check
   Working of wiper properly and water spray nozzles is checked.

4. Tire check
   Tire tread is check and replaced it worn out

5. Balancing
   After sometimes due to wear and tear wheels are need to be balanced
   If they are not done then it may cause vibration on high speeds

6. Suspension check
   Lower arm and stabilizer link, jumper leakage, shock absorber and springs are checked

7. Greasing all the hinges
   All the hinges like door and hood hinges are oiled or greased for smooth operation

8. Wiper blade check
   Working of wiper properly and water spray nozzles is checked.

9. Tire check
   Tire tread is check and replaced it worn out

10. Balancing
    After sometimes due to wear and tear wheels are need to be balanced
5.2 Testing of automobiles

1. Battery Testing machine :-
   - Battery testing machine use to battery life check.
   - This machine get information to battery life.
   - If battery fail so this machine inform “Replace battery”

2. IDS – Integrated Diagnostic System :-
   - IDS use to diagnose.
   - This system use to sensor’s information, like sensor not working so this system inform you.
   - Or this system use to check “error” and it information.
   - Cylinder firing order and sensor working check in this system.

Fig. 5.2.1 Battery Testing

Fig. 5.2.2 IDS (Integrated Diagnostic System)
5.3 Additional Data

i. Safety features

1. Seatbelt
2. Anti-lock Braking System (ABS):
3. Air bag
4. Reverse camera

1. Seatbelt

Operation:
- In the event of a crash, seatbelts are designed to keep you inside the car. Lap sash seatbelts are the most effective. Seatbelt warning devices help you and your passengers remember to buckle up.

Benefits:
- Seatbelts are the single most effective way to protect you in a crash. They also reduce the risk that you or your passengers will collide with parts of the car (e.g. the steering wheel, dashboard, windshield, or even other occupants).
- In overall Hyundai car seat belt coming because in India Seatbelts are compulsory.

Fig. 5.3.1.1 Seatbelt
2. Anti-lock Braking System (ABS)

Operation:

- ABS reduces the risk of tires skidding under heavy braking. ABS uses sensors to detect when a wheel is about to lock. ABS selectively releases and applies the brake to prevent the wheel from locking. 46
- When this happens there may be a vibration or shuddering through the car
- And the brake pedal may pulsate. For ABS to work properly keep constant firm pressure on the brake pedal.

Benefits

- ABS helps drivers to:
- Stop the car quickly and safely on most surfaces
- Steer and brake heavily at the same time

Fig. 5.3.2.1 ABS Module

Fig. 5.3.2.2 ABS System
3. Air bag

- An airbag is a vehicle safety device. It is an occupant restraint system consisting of a flexible fabric envelope or cushion designed to inflate rapidly during an automobile collision. Its purpose is to cushion occupants during a crash and provide protection to their bodies when they strike interior objects such as the steering wheel or a window.

- Modern vehicles may contain multiple airbag modules in various side and frontal locations of the passenger seating positions, and sensors may deploy one or more airbags in an impact zone at variable rates based on the type, angle and severity of impact; the airbag is designed to only inflate in moderate to severe frontal crashes.

- Airbags are normally designed with the intention of supplementing the protection of an occupant who is correctly restrained with a seat belt. Most designs are inflated through pyrotechnic means and can only be operated once.

- Newer side-impact airbag modules consist of compressed air cylinders that are triggered in the event of a side impact vehicle impact.

- In our Ford car Airbag Coming in Fiesta, Figo, Ecosport, Endeavour, Figo Aspire, New Figo, New Endeavour.

Fig. 5.3.3.1 Air bag
4. Reverse Camera

- A backup camera is a special type of video camera that is produced specifically for the purpose of being attached to the rear of a vehicle to aid in backing up, and to alleviate the rear blind spot. Backup cameras are alternatively known as 'reversing cameras' or 'rear view cameras'. It is specifically designed to avoid a Backup collision.
- The area directly behind vehicles has been described as a killing zone due to the associated carnage. The design of a backup camera is distinct from other cameras in that the image is horizontally flipped so that the output is a mirror image. This is necessary because the camera and the driver face opposite directions, and without it, the camera's right would be on the driver's left and vice versa. A mirrored image makes the orientation of the display consistent with the physical mirrors installed on the vehicle. A backup camera typically sports a wide-angle or fisheye lens.
- While such a lens spoils the camera's ability to see faraway objects, it allows the camera to see an uninterrupted horizontal path from one rear corner to the other. The camera is typically pointed on a downward angle, to view potential obstacles on the ground as well as the position of approaching walls and docks, rather than straight back.

Fig. 5.3.3.2 Air bag
In our Ford car ABS Coming in Endeavour, New Endeavour.

Fig. 5.3.4.1 Reverse Camera
## 5.5 Cost estimates of major repairs

### Ecosport & Fiesta Engine overhaul

<table>
<thead>
<tr>
<th>No.</th>
<th>Part Name</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Engine block</td>
<td>40,000</td>
</tr>
<tr>
<td>2</td>
<td>Piston</td>
<td>8000</td>
</tr>
<tr>
<td>3</td>
<td>Pistone Ring</td>
<td>4500</td>
</tr>
<tr>
<td>4</td>
<td>Connecting Road</td>
<td>6000</td>
</tr>
<tr>
<td>5</td>
<td>Cranck Shaft</td>
<td>12,000</td>
</tr>
<tr>
<td>6</td>
<td>Cam Shaft</td>
<td>10,000</td>
</tr>
<tr>
<td>7</td>
<td>Engine Head</td>
<td>20,000</td>
</tr>
<tr>
<td>8</td>
<td>Inlet Valve</td>
<td>250</td>
</tr>
<tr>
<td>9</td>
<td>Exhost Valve</td>
<td>250</td>
</tr>
<tr>
<td>10</td>
<td>Tapet Cover</td>
<td>2500</td>
</tr>
<tr>
<td>11</td>
<td>Chamber</td>
<td>5500</td>
</tr>
<tr>
<td>12</td>
<td>Dummeper Pully</td>
<td>4500</td>
</tr>
<tr>
<td>13</td>
<td>Timing Belt</td>
<td>1500</td>
</tr>
<tr>
<td>14</td>
<td>Ideler Pully</td>
<td>1500</td>
</tr>
<tr>
<td>15</td>
<td>Tesioner Pully</td>
<td>1600</td>
</tr>
<tr>
<td>16</td>
<td>Cam Shaft Pully</td>
<td>3500</td>
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<td>17</td>
<td>Voltenator</td>
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</tr>
<tr>
<td>18</td>
<td>Voltenator Pully</td>
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<tr>
<td>19</td>
<td>Gasket</td>
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<tr>
<td>20</td>
<td>Sealent</td>
<td>1500</td>
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<tr>
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<td><strong>Total</strong></td>
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<td><strong>Labor Charge</strong></td>
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</tr>
<tr>
<td></td>
<td><strong>Estimate</strong></td>
<td>143,600</td>
</tr>
</tbody>
</table>

Table 5.5.1 Ecosport & Fiesta Engine Overhauls
## Figo & Fiesta Gear box overhaul

<table>
<thead>
<tr>
<th>No.</th>
<th>Part Name</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cycronizer ring</td>
<td>1500</td>
</tr>
<tr>
<td>2</td>
<td>Dog</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Fork</td>
<td>2500</td>
</tr>
<tr>
<td>4</td>
<td>Main shaft</td>
<td>3000</td>
</tr>
<tr>
<td>5</td>
<td>Reverse gear sensor</td>
<td>800</td>
</tr>
<tr>
<td>6</td>
<td>Reverse gear</td>
<td>2200</td>
</tr>
<tr>
<td>7</td>
<td>Gear cable</td>
<td>4000</td>
</tr>
<tr>
<td>8</td>
<td>Sealant</td>
<td>1500</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>15,600</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Labor charges</strong></td>
<td><strong>5000</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Estimate coast</strong></td>
<td><strong>20,600</strong></td>
</tr>
</tbody>
</table>

Table 5.5.2 Figo & Fiesta Gear Overhauls
Chapter 6

Challenging experiences

6.1 Challenging experiences encountered during training

- First of challenging point is environment.
- Second is, I have train work shop atmosphere.
- There were many rules and regulations to be followed strictly and discipline was must.
- I have accepted all challenging and try to solve it.

**Car**: - Endeavour  
**Reason** : - 3rd & 4th Gear doesn’t Work  
**Cost** : - 4 Lac

- First of all discontent all wiring to the gear box
- Discontent gear cables
- Now, Drain gear mounting
- Dismantle propeller shaft
- Now, Drain gear round bolts and dismantle gear to the engine
- Remove all gear part and check it; if it damage so replace it.
- We have change some gears and solenoid switch
- Also, We have change the gear sifting mechanism
- So, this gear box for me challenging experience

![Fig. 6.1.1 Automatic Gear box](image-url)
Fig. 6.1.2 Dismantled Automatic Gear Box
Chapter 7
My liking & Disliking

Liking:-

- Fully workshop good clean and all things are properly place it.
- All vehicles properly parking
- Fast repair decision
- All part easily available
- All technicians good knowledge and properly work
- All technician provide good training

Disliking:-

- Doesn’t available automatic washing
- Sometime ordering part doesn’t available in part area
Chapter 8

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- Ford Main Headquarter: - Ford Headquarter
- Henry Ford History: - Henry Ford History
- Ford Symbol: - Ford all symbols
- Combination Spanner: - Combination Spanner Uses
- Hammer Description: - Hammer Uses
- T-Spanner Description & Image: - T-Spanner Uses
- Fix Spanner Description: - Fix Spanner Uses
- Seat Belt Image: - Safety Futures Images
- Air Bag Images: - Air Bags In ford

Books:-

- R.B. Gupta
- Workshop Manual