



**TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
THAPATHALI CAMPUS**

An
Industrial Attachment On
G.O. Autocare Pvt. Ltd.

SUBMITTED BY

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SUBMITTED TO
THE DEPARTMENT OF AUTOMOBILE AND MECHANICAL
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BACHELOR IN AUTOMOBILE ENGINEERING

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DEPARTMENT OF AUTOMOBILE AND MECHANICAL ENGINEERING

The undersigned certify that they have read, and recommended to the Institute of Engineering, Thapathali Campus for acceptance, an industrial attachment report on G.O. Autocare Pvt. Ltd. submitted by Prakash Koirala in partial fulfillment of the requirements for the degree of Bachelor in Automobile Engineering.

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Abstract

This report summarizes all the experiences and knowledge that we have gained during our industrial attachment done at GO Autocare Pvt. Ltd., Swoyambhu, Kathmandu. The main purpose of the internship was to develop a basic understanding of the technology utilized in the automobile company and the services provided by the company in this field.

This report briefs about the company profile, company activity, layout and our activity during the period of training at GO Autocare Pvt. Ltd. It contains several managerial and technical activities that are assigned at GO Autocare Pvt. Ltd. It contains details on different technology we learned about and the different systems of a car. The special problems related to vehicles that we deal with their possible solutions have been illustrated. Our training methodology and the outcomes of our industrial training along with the recommendation are explained in the report.

Acknowledgements

This internship report is the accumulation of many people's endeavor. Firstly, we would like to express our sincere appreciation to Er. Subodh Kumar Ghimire Head of Department and Er. Prajwal Raj Shakya, Deputy Head of Department for their suggestions to carry out our industrial attachment at GO Autocare Pvt. Ltd. We would also like to express our profound gratitude to GO Autocare Pvt. Ltd for providing the opportunity to the industrial attachment. We would take this opportunity to thank all the individuals for their valuable help and cooperation.

We are grateful to Mr. Roman Vaidhya, HR Manager of GO Autocare Pvt. Ltd for providing a chance for the professional development in the field of an automobile at this company. Our special thanks to Mr. Sandeep Chhetri, Service Head who has given the valuable time and has mentored us throughout the internship. We would also like to remember all the technicians and staff members at GO Autocare Pvt. Ltd who have shared their technical knowledge on automobile and has given their valuable time during the internship. The friendly environment of the company has helped to communicate easily with all the members and has also helped to increase our technical knowledge on the automobile.

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List of Abbreviations

AC	Air Conditioner
CCE	Customer Care Executive
FM	Floor Manager
HR	Human Resource
IDS	Integrated Diagnostic System
IR	Interactive Reception
PCM	Power Control Module
QC	Quality Check
SA	Service Advisor
SCP	Service Core Process
TCM	Transmission Control Module
VCM	Vehicle Control Module

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CHAPTER ONE

INTRODUCTION

The Ford Motor company is an American multinational car manufacturer with its main office in Dearborn, Michigan. This company was founded by Henry Ford and incorporated on June 16, 1903. Ford sells automobiles and commercial vehicles under the brand name “Ford” and the luxury cars under the brand name “Lincoln”. Ford presented methods for large-scale manufacturing of cars and large-scale management of an industrial workforce using intricately engineered manufacturing sequences exemplified by moving assembly lines.



Figure 1.1 Logo of Ford Motor Company

GO Automobiles Pvt. Ltd. (GO Ford) is the automotive division of Golchha Organization that has the legacy of 8 decades of dedicated services to the country. GO Ford is the exclusive dealer of Ford products in Nepal. GO Ford is committed to bringing world-class service to its customers and both its showroom and workshop are well equipped with the highly trained staff and latest machinery and tools to ensure better service experience. In addition to its 4,600 square foot showroom at Thapathali, Kathmandu, it also boasts an 18,000 square foot workshop area with the facilities that are among best in Nepal.

1.1. History

The Ford Motor Company was firstly named as a Henry Ford Company by Henry Ford in 1901 and was launched in a converted factory in 1903 with twelve investors. With the 1980s, Ford introduced several highly successful vehicles around the world. Ford's former UK subsidiaries Jaguar and Land Rover, acquired in 1989 and 2000 respectively, were sold to In 2012, Ford's corporate bonds were upgraded from junk to investment grade, citing sustainable, lasting improvements. In 2017, Jim Hackett was announced to replace Mark Fields as CEO of Ford Motor.

1.2. Objectives of GO Ford

The objectives of the GO Ford are as follows:

- To standardize interior layouts for sales, service, and spares (3S).
- To deliver the vehicles at the promised date to the customer and to enhance the customer's satisfaction.
- To ensure that the bill is within estimate and explain the bill in detail responds to any query or concern.

1.3. Products of the Company

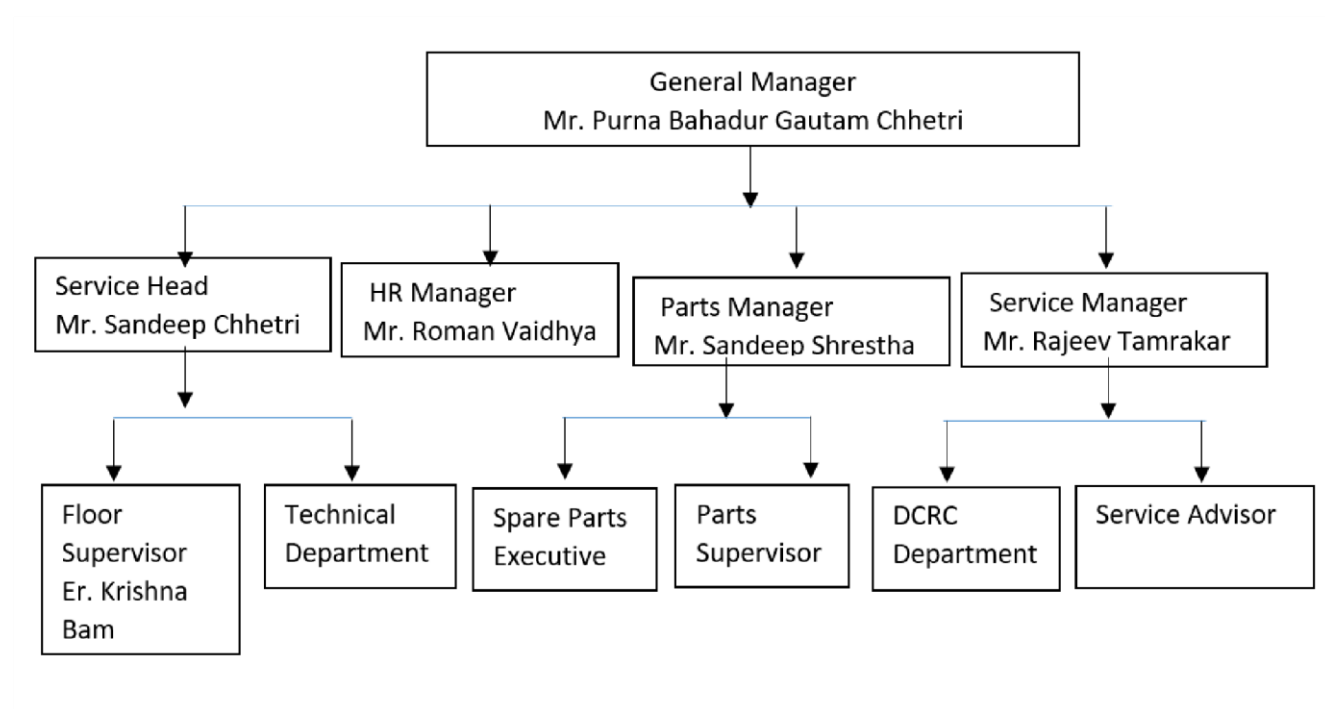
Ford Motor Company manufactures several types of vehicles that include cars, SUVs and crossovers, trucks and vans, hybrids and EVs, pickups.

The current Models that are available in Nepal are All-New Figo, Figo Aspire, All New Fiesta, Ranger, Ecosport, Kuga and Endeavour. They are imported from India and Thailand.

The available models and their specifications are listed below:

Table 1.1. Specification of Models

S.N.	Models	Vehicle Type	Maximum Power	Maximum Torque	GearboxMileage (City)	Fuel Type	Fuel Tank Capacity	Price	Displacement Cc
1.	Ford Figo	Hatchback	99 Bhp @3750rpm	215Nm @3000rpm	5 speed 25.83 kmpl	Diesel & Petrol	40 liters	Rs.21,99,000	1498
2.	Ford Figo Aspire	Sedan	99bhp @3750rpm	215Nm @3000rpm	5 speed 25.83 kmpl	Diesel & Petrol	40 liters	Rs.26,90,000	1498
3.	Ford Ecosport	SUV	98.59 bhp @3750rpm	205Nm @3250rpm	5 speed 22.77 kmpl	Diesel & Petrol	52 liters	Rs.31,90,000	1498
4.	Ford Ranger	Pick-Up Truck	150 bhp @4000rpm	375Nm @3000rpm	6 speed 13.6 kmpl	Diesel	80 liters	Rs.58,90,000	2198-3198
5.	Ford Endeavour	SUV	158 bhp @3200rpm	385Nm @2500rpm	6 speed 12.62 kmpl	Diesel	80 liters	Rs.1,12,00,000	2498-2950
6.	Ford Kuga	SUV	147bhp@4000rpm	240Nm@2500 Rpm	speed	Petrol		Rs.90,00,000	1497



1.4. Organization Structure

Organizational structure is of functional type. Here specialists in related fields are employed and each specialist is supposed to give his/her functional advice to all other workers.

Figure 1.2 Organization Structure

1.5. Objectives of internship

The main objective of this 30 days training program are:-

- To know about automobile repair and servicing skill
- To know about management system of company
- To be familiar with automobile spare parts and plant layout
- To analyze different problems occurring in automobile and their solutions.
- To know about different customers satisfaction.

1.6. Personnel Management

Personnel management is the part of total management of an organization which specially deals with human resources of

- Their procurement
- Their development in terms of skill, knowledge, and attitude
- Their motivation towards the attainment of organizational objectives by creating and maintaining an organizational climate conducive to such development.

GO Ford has many policies regarding the personnel. This service centre provides many facilities to its employees on basis of its policies.

1.6.1. Recruitment and selection of manpower

Recruitment and selection of manpower is done both internally and externally. External recruitment are done for all employees in the organization. Vacancy announcement for external recruitment is done through newspaper advertisement. Interested candidate submits their CV to its office or through email. Selected candidates are called for interview and final name list of the selected candidate is published.

Some employees are also recruited on the basis of recommendation from the employees working within the organization. Equal employment opportunities are provided to each staffs in the company.

1.6.2. Manpower planning

Manpower planning is defined as the scientific process of allocating the right quantity of right men to be required at right time for the right job. The main objective of manpower planning at GO Ford is to utilize the present employees fully. The working hour in this service centre starts from 10 am to 6 pm. According to the policy of an organization the employee can also do over time (OT) as per their interest.

1.6.3. Training and Development of Manpower

The competence of employees and their growth through training and teaching are major genes in determining long-term profitability of a modest business. Hiring and keeping good employees is the key to the first factor. New technicians and engineers are trained and guided by the senior and professionals through work. It also sends its technicians for different level of training to India.

The level of employment is categorized as below:-

- Level 1 generally refers to a state only name based check and an employment history check. It is ideal for those with no previous experience of motor vehicle engineering.
- Level 2 generally refers to a state and national fingerprint based check and consideration of disqualifying offenses, and applies to those employees designated by law as holding positions of responsibility or trust. It will suit you if you have very little knowledge of motor vehicle engineering and want to learn how to service vehicles and take on supervisory responsibilities.
- Level 3 those with considerable experience who want to take their career further by learning more advanced engineering skills, as well as starting to take on management roles.

Weekly workshops are organized within the organization to familiarize new equipment handling techniques.

1.6.4. Job Evaluation and Merit Rating

Job evaluation is done to formulate an appropriate and uniform wages structure and determine relative value of a different job in an organization. Head of the section or senior person evaluate the performance of the workers throughout a certain time and rates his/her performance. On the basis of which promotion of the particular employee is done. On the basis of which merit rating of the employee is done are

- i. Quality of work
- ii. The quantity of work
- iii. Job knowledge
- iv. Job performance
- v. Quality of leadership
- vi. Attitude and Behaviour
- vii. Intelligence

1.6.5. Wages and Incentives

Wages are provided according to the level of the employee. Wages are provided in time to all the employees. The extra salary is given to the employee if she/he has done the OT by calculating their working hour. Incentives are given through bonus.

The incentives are provided on the basis of number of jobs allocated, completed, working hours to the respective employees. The percent of incentives increases with increase in the performance rate of employees.

1.6.6. Motivation

To enhance the worker's ability to do work, the company provides different facilities to the workers. Bonus and incentives are given to the workers for their motivation. Also Health

Services and Employees' Provident Fund has been obliged to motivate the workers in the organization.

1.7. Management Information System (MIS)

Information System is a concept for competitive advantage which defined in the early 80s, there are lots of companies invested in information technology. It is because information technology can help a company more easy to gain competitive by achieving operational excellence, developing new products and services, enhanced customer and supplier intimacy and exploiting digital markets. So nowadays, information system is very important for every company.

GO Ford uses Auto Deal software for job card invoice. It collects data on customer details like name, address, VIN, phone number and their complaints. The number and frequency of job orders and spare parts required provide information for customer care, forecasting and inventory control. Job card forms the basis for work order dispatch, allocation of technicians, recording of services performed, parts replaced and finally the payment. This provides the guide to the technicians, customers and management to keep track of running services and decide on allocation of facilities to the different jobs at required time.

1.8 Production System Design

Go Ford provides economic site and facilities like electricity, transport, communication, water and security. The company uses a multi-storeyed building for office, repair and maintenance bays. The parameters like material handling, body workshop, spare parts, tool room, engine room are located on the ground floor whereas booking, office, store are located on the first floor. This eliminates the need for air conditioning, ventilation and provides ease of supervision and vehicle movement. The company uses Process layout which consists of different sections like repair and maintenance bays, washing bays, engine room, electrical room and warranty room. This provides flexibility in operation. The vehicle is serviced through any of these sections as per required. The job flow pattern is horizontal usually O-flow while passing through different sections. The material handling equipment used is vertical movement type like hydraulic lifts, power screw lifts and combined horizontal and vertical hydraulic hoists for engine movement.

1.8.1. Plant layout

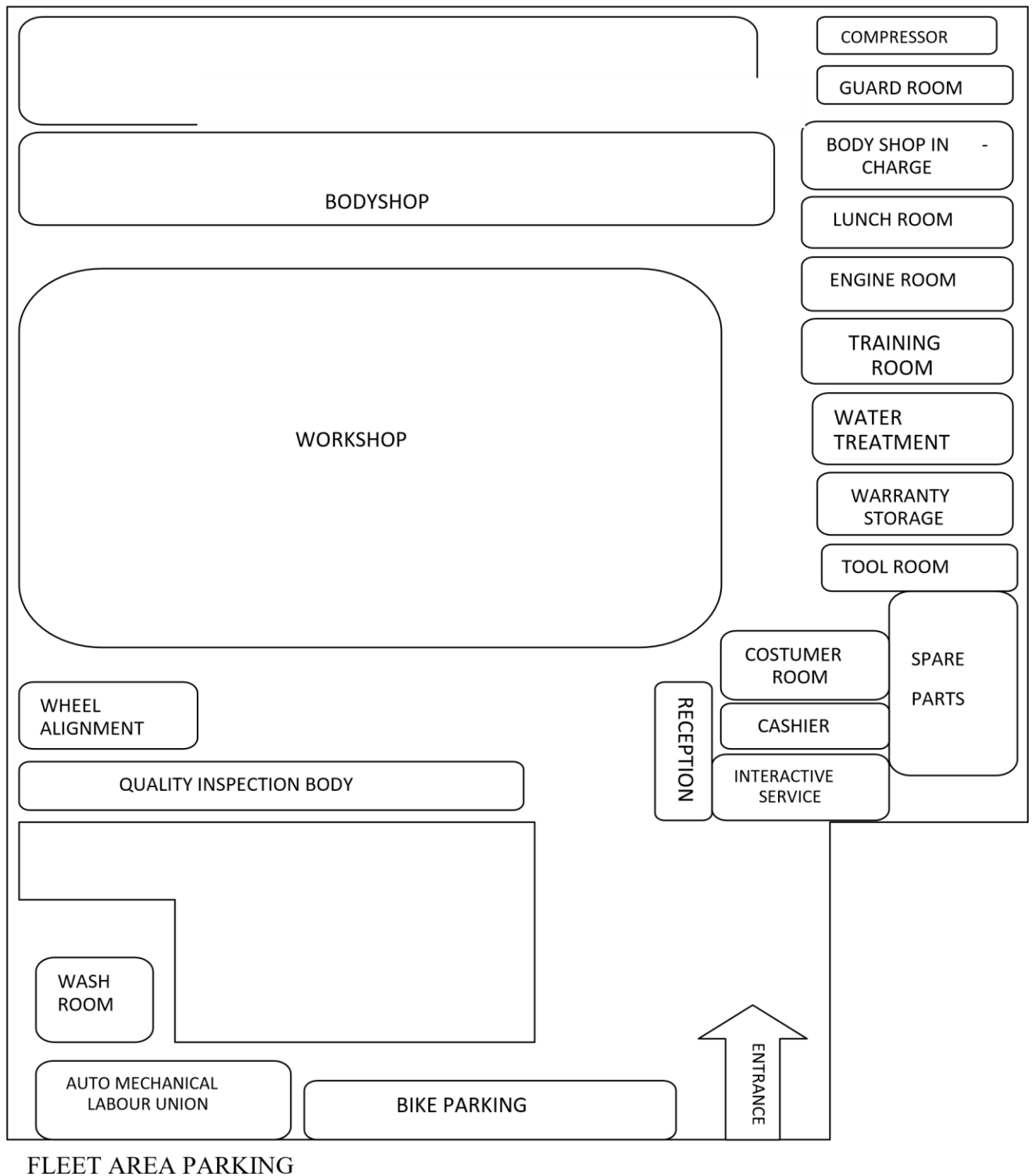


Figure 1.3 Plant layout

1.9. Process Planning

Operation of GO Ford service

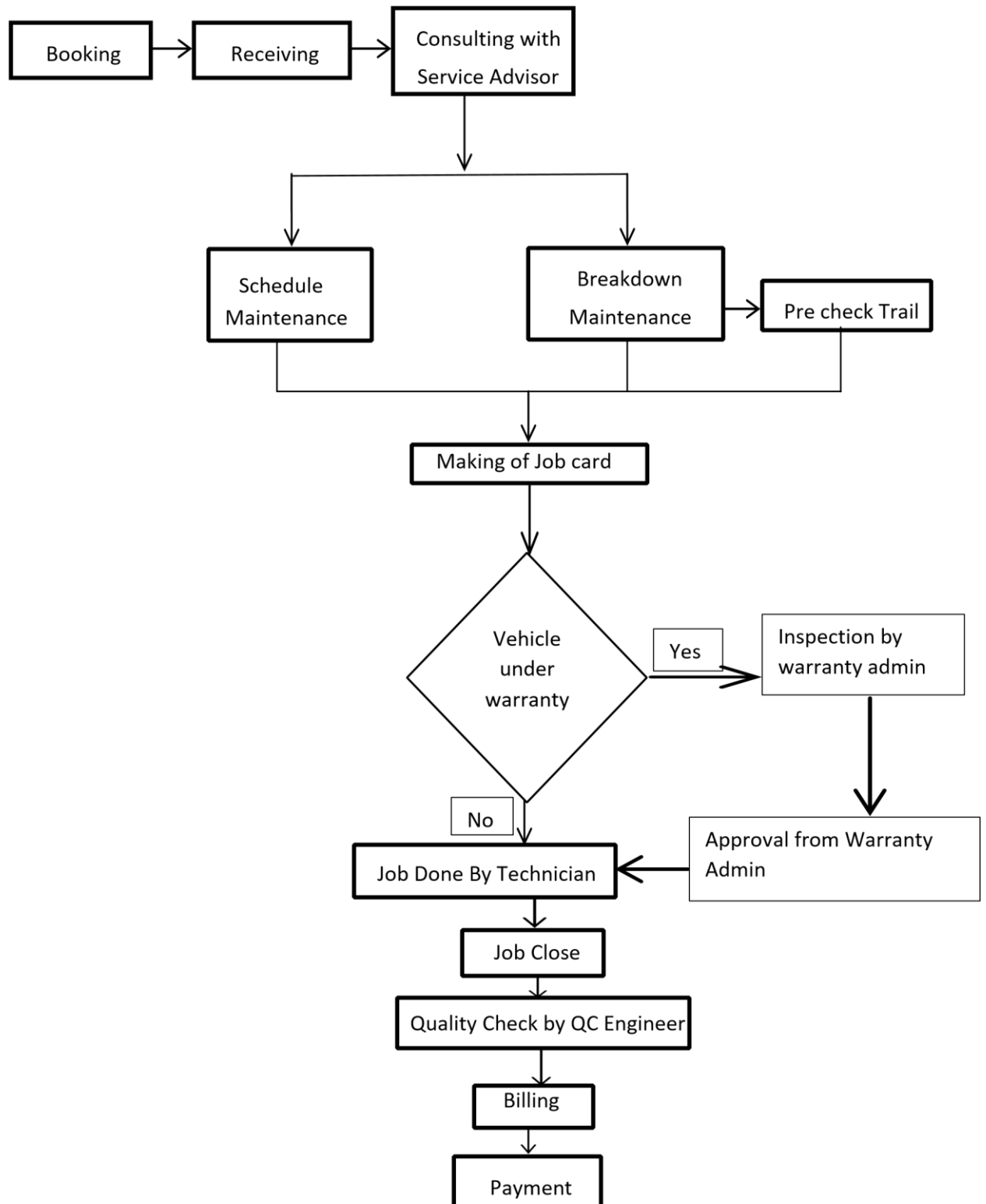


Figure 1.4 Operational Flow Chart

1.9.1. Operation process

The operating process of GO Ford is explained as:

- a) **Booking:** The Customers first has to do book date and time schedule for any kind of services and repairs for their vehicles.
- b) **Receiving:** After the process of booking, the customer takes their vehicle to the service station where it is delivered in the hand of service station personnel on the fixed date. The vehicles enter the gate verifying the confirmation of maintenance.
- c) **Enquiry with The service advisors: Customer describes the problem to the advisors.** Then the job card is made accordingly to the customer problems. Customer Visit may be because of breakdown maintenance or scheduled maintenance. Breakdown maintenance includes inspection by supervisor and head technician and pre check trial. They detect the problem and describe the problem to customer and service advisors. Computer diagnostics is also done in special case. Scheduled maintenance includes no any trial inspection. For it simply the job card will be made for general maintenance and inspection
- d) **Making of Job Card:** Either it is scheduled maintenance or breakdown maintenance each customer should make job card, in which detail of complaint is written. In job card, the vehicle model, number, chassis number, customer name, and contact are included. Also the name of technician, estimated date of delivery and time are included for effective maintenance of work.
- e) **Warranty process:** If the vehicle is under warranty it is then inspected by warranty technician also approval is necessary from admin and if not the job is allocated to technician and process is followed as shown above.
- f) **Allocation of Job to Technician:** After trial inspection supervisor asks the technician to do the job. Each job is done by a specific number of technicians. No any technician can go and just start to maintain the vehicle without any prior authentication. The job should be totally done by technician under the supervision of technical supervisor.
- g) **Quality Check:** After the job is done, the vehicle is taken to trial by the QC engineer or expert technician who can detect the problem by hearing noise on moving vehicle. Thus quality is checked by the QC engineer.
- h) **Job Finish:** After the quality check. The job is closed by technician and sent information to the adviser for billing where account section makes the billing according to direction of advisor. After payment customer can take his/her vehicle to home.

CHAPTER TWO

ATTACHMENT DETAIL

2.1. Material handling equipment

Various materials handling equipment is used throughout the workshop that simplifies the work to a level where far lesser effort is required. GO FORD workshop makes use of Material handling equipment like trolley, Lift (Hydraulic and Electric), hydraulic jacks etc.

2.2. Equipment types

Various types of equipment are used for the maintenance and all required work. All used equipment is illustrated below.

2.2.1. Lift

There are many kinds of lifts which are used for different purposes such as maintenance, washing. On the basis of their function and mechanism, we differentiate types of lifts and these are as follows.

Four post lift

This type of lift contains four posts for mechanical support and base for vehicle. This lift is driven by hydraulic pressure which drives rope and pulley. It is generally used for gearbox and clutch maintenance and sometimes for the computerized wheel alignment. Computerized wheel alignment is the process where we check caster and camber angle for the correct alignment of vehicle.

Scissor Hydraulic Lift

This lift is also used to lift the car to operate the car for the maintenance action. It is especially applied in the factory, workshop, warehouse, grain depots, stations, hotels, airports, docks, gas stations, stadiums, electric power, elevated pipelines, etc. It is also used for maintaining of lifting equipment and outdoors electric facilities as well as steel structure workshop. The mobile lifting platform can help you handle high altitude works better.



Figure 2.1 Scissors hydraulic lift

2.2.2. Hydraulic Jack

This is simple hydraulic lift used for lifting the vehicle. This is moveable to anywhere and has capacity up to 5 ton. Hydraulic jacks are typically used for shop work, rather than as an emergency jack to be carried with the vehicle. Use of jacks not designed for a specific vehicle requires more than the usual care in selecting ground conditions, the jacking point on a vehicle, and to ensure stability when the jack is extended. Hydraulic jacks are often used to lift elevators in low and medium rise buildings.



Figure 2.2 Hydraulic jack

2.2.3. Engine holder

It is equipment which is used to hold and carry the engine in order to transport it from one place to another. An engine stand is a tool commonly used to repair large heavy gasoline or diesel engines. It uses a heavy cantilevered support structure to hold the engine in midair so that the mechanic has access to any exposed surface of the engine.



Figure 2.3 Engine holder

2.2.4. Tool box

It contains all tools lock or unlocks nuts and bolts such as wrench, ratchet Wrench, screw driver, pliers, hammer, mallet hammer, socket, extension and so on. It could mean a small portable box that can carry a few tools to a project location or a large storage system set on casters. Modern toolboxes are predominantly metal or plastic.



Figure 2.4 Tool box

2.2.5. Impact gun

It is used to lock and unlock nuts and bolts. It is driven by high speed and high torque motor which rotates the socket. Impact gun are widely used in many industries, such as automotive repair, heavy equipment maintenance, product assembly, major construction projects, and any other instance where a high torque output is needed. For product assembly, a pulse tool is commonly used, as it features a reactionless tightening while reducing the noise levels

the regular impacts suffer from. Pulse tools use oil as a medium to transfer the kinetic energy from the hammer into the anvil.



Figure 2.5 Impact gun

2.2.6. Air Nozzle and Air compressor

It is a pneumatically operated nozzle, used to blow air while cleaning the air filter or any surfaces with dust. It is also used to clean hoses, tubes etc. It can also be used while cleaning engines by attaching a supply pipe of kerosene to it. Used to compress the air use for operating pneumatic gun, grinder, dry cleaning processes like cleaning of air filter and other parts. Its pressure range is 0.5 to 10 bar. Air compressors have many uses, including: supplying high-pressure clean air to fill gas cylinders, supplying moderate-pressure clean air to a submerged surface supplied diver, supplying moderate-pressure clean air for driving some office and school building pneumatic HVAC control system valves, supplying a large amount of moderate-pressure air to power pneumatic tools, such as jackhammers, filling high pressure air tanks (HPA), for filling tires, and to produce large volumes of moderatepressure.



Figure 2.6 Air nozzle and Air compressor

2.2.7. Wheel alignment machine

It is computerized system used to find out alignment the position of the all four wheels such as toe, camber, caster angles. It has turn table clamps which are clamped on wheels and they contain camera that detects rotation of wheels at stationary position and gives information to computer for adjustment.



Figure 2.7 Wheel alignment machine

2.2.8. Oil Disposer and AC Refrigerant Charger

It is used to accumulate the used engine oil, drained out from the sump of the car under maintenance. The drained oil is stored in a drum and sold later. This equipment meets the requirements relating to the maintenance, testing and commissioning of vehicle air conditioners in refrigeration terms. It consists of a filling cylinder, pressure gauges, vacuum pump, shut-off valve and filling hoses. It is used to empty, evacuate and fill the refrigerant

in the vehicle. The extracted refrigerant can be recycled (dried and cleaned by removing suspended matter) in the station and refilled after being repaired.



Figure 2.8 Oil disposer and ac charger

2.2.9. Tire Rim Separator

It is semi-automated equipment that holds the rim of the tire firmly so as to restrict the movement of the tire while the technician takes the tire off the rim. It also assists the technician to rip the tire off the rim by hydraulically pushing the tire out of the rim. This machine also assists the technician while fitting a new tire to a rim or a new rim to an old tire.



Figure 2.9 Tire rim separator

2.2.10. Hydraulic Single Transmission Jack

A hydraulic transmission jack is used to hold the transmission while removing or assembling a new one to the vehicle. It is operated manually. The transmission forms an integral aspect of a vehicle's engineering and is extremely heavy. Whether you are working on any kind of transmission of an auto, truck or a motorcycle, using a transmission jack is advisable. These are usually made of heavy-duty steel with easy roll casters on ball bearing.

The saddle tilts for easy positioning of the transmission during repair.



Figure 2.10 Hydraulic single transmission jack

2.2.11. Suspension Holder

This equipment is used to compress the spring of the suspension in order to loosen the nut of the spring and the damper, and the condition of the damper is examined.



Figure 2.11 suspension holder

2.3. Training Methodology

We collected data through data collection procedures which includes primary and secondary sources. Primary data is data originated for the first time by the researcher through direct

efforts and experience, specifically for the purpose of addressing his research problem. Also known as the first hand or raw data. We, ourselves obtain the information regarding the training till date. These were collected through observations, physical testing, mailed questionnaires, personal interviews, telephonic interviews, case studies, etc. Secondary data implies second-hand information which is already collected and recorded by any person other than the user for a purpose, not relating to the current research problem. We collected the secondary sources of data through internal records of the organization, reports, books, journal articles, websites and so on. Go Auto care Pvt. Ltd has provided us the platform to enhance our practical knowledge of automobile components, working principles, problem analysis and solution making. Training was carried out in the bay where actual repair and maintenance task of the vehicle was being done. We observe the activities carried out, problems occurred and various techniques of repair and maintenance. On the first week, we were told to observe the activities going on the body workshop. We observed the processes involved in general servicing and the general components of a car.

- We learned about the air filter, mobile filter, coolant, coolant tank, wiper detergent, AC filter, steering oil tank.
- We also got familiarized with the other parts of the automobile like brake pads, brake discs, brake drum, hand brake, RTB, speedometer, odometer, suspension, steering rack, engine radiator, brake booster, Turbocharger, inlet manifolds etc.
- We were given to do general servicing. On general servicing, we were allowed to change engine oil, mobile filter and clean/ change air filter, change fuel filters if necessary. Then we changed brake pads, tires.
- We learned about engine components like spark plugs, injectors, Gear box, Synchronizer, Bearings, Clutch plate, Pressure plate, flywheel, pistons, piston rings etc.
- We observed engine parts closely in the engine room.
- We learned to check gap of piston rings, to fit piston to the cylinder.
- We learned assembly and disassembly of engine parts.
- We studied the assembly of the manual transmission, their components, and their functions.

- We learned to use the Auto Deal software to prepare the job card and view the vehicle's repair history.
- We started from Vehicle inspection, Job card opening, dealing with customers, diagnosis of problems, Quality check, and job card closing.

2.4. Automotives

2.4.1. Automotive Engines

An engine is a machine designed to convert heat energy into mechanical energy. The heat from burning fuel produces power which moves the vehicles. Automobile engines are mostly IC engine because the fuel that runs them is burned internally. Mostly Ford automobiles are single cylinder as well as multi cylinder engines. To continue running the engine must have four support system. These are fuel, ignition, lubricating and cooling system.



Figure 2.12 Automotive engine

Lubricating System:

The lubricating system keeps all moving parts inside the engine coated with the layer of oil. It reduces wear on parts. It also allows the parts to move freely with little power loss in making them work.

Exhaust System:

An exhaust system is usually piping used to guide reaction exhaust gases away from a controlled combustion inside an engine. The entire system conveys burnt gases from the

engine and includes one or more exhaust pipes. Diesel exhaust is the gaseous exhaust produced by a diesel type of IC engine plus any contained particulates.

Fuel Injection System:

Fuel injection is the introduction of fuel in an IC engine, most commonly automotive engine, by the means of injector. All diesel engine uses fuel injection by design. Petrol engine can use gasoline direct injection in which fuel is directly delivered into combustion chamber or use indirect injection where the fuel is injected along with the air.

Ignition System:

After the air fuel mixture enters the engine cylinder, the piston moves up the cylinder. This compresses the trapped mixture. The resulting combustion produces power to move the car.

The ignition system provides the spark.

Cooling System:

IC engine cooling uses either air or a liquid to remove the waste heat from the engine. The cooling system removes just enough heat so the engine runs at proper temperature. For gasoline engine fins are provided for cooling the engine (Air cooling) and for diesel, water is used as a coolant along with antifreeze.

2.4.2. Clutches and Gear Box

A clutch is a mechanical device that engages and disengages the power transmission, especially from driving shaft to drive shaft. A transmission is a machine in a power transmission system, which provides controlled application of the power. Often the term transmission refers simply to the gear box that uses gear and gear train to provide speed and torque conversions from a rotating power source to another device. Gear Box contains gears of different sizes. When the transmission is passed through the larger gear, greater torque is obtained.



Figure 2.13 Clutch and gear box

2.4.3. Drive Train System and Differential Box

The drive train of a motor vehicle is the group of components that deliver power to the driving wheels. This excludes the engine or motor that generates the power. In contrast, the power train is considered as including both the engine or motor, and the drive train. Differential gear provides power to wheels coming from propeller shafts. It has bevel gears for right angle power transfer. It helps for turning a vehicle or for brake application without stopping engine rotation. Four Wheel drives (4WD) refer to vehicles with two or more axles providing power to four Wheel ends. Four-wheel drive vehicles have a transfer case, not differential, between the front and rear axles, and meaning that the front and rear drive shafts will be locked together when engaged. This provides maximum torque transfer to the axle with the most traction but can cause binding in high traction turning situations. These include full-time and selectable part-time 4WD. 4WD is not intended for high speeds without a limited slip mechanism.

2.4.4. Automotive Electronics Automotive Battery

An automotive battery is a rechargeable battery that supplies electrical energy to a motor vehicle. It is also known as an SLI battery (starting lighting-ignition) and its main purpose is to start the engine. Once the engine is running, power for the car's electrical systems is supplied by the alternator. Typically, starting discharges less than three per cent of the battery capacity.

Automotive Lighting

The lighting system of a motor vehicle consists of lighting and signaling devices mounted or integrated to the front, rear, sides, and in some cases the top of a motor vehicle. This lights the roadway for the driver and increases the conspicuity of the vehicle, allowing other drivers and pedestrians to see a vehicle's presence, position, size, direction of travel, and the driver's intentions regarding direction and speed of travel. Emergency vehicles usually carry distinctive lighting equipment to warn drivers and indicate priority of movement in traffic.

Speedometer and Odometer

A speedometer or a speed meter is a gauge that measures and displays the instantaneous speed of a vehicle. It shows how fast the vehicle is moving in the instrument cluster. Many speedometers are driven from the total distance the vehicle has traveled. An odometer is an instrument for measuring the distance traveled by a vehicle. The device may be electronic, mechanical, or a combination of the two. The odometer operates by pair of gear from speedometer shaft. Its motion is carried through the gear to the mileage or kilometer number rings. This turn shows the distance traveled by the vehicles.

2.4.5. Power-Brake system

Power brakes are a system of hydraulics used to slow down or stop most motor vehicles. It uses a combination of mechanical component to multiply the force applied to the brake pedal by the driver into enough force to actuate the brakes and stop a vehicle that can weigh several tons. The brake pedal is connected to the Vacuum booster which is the first step of the force multiplication. The booster passes the force to the Master Cylinder which compresses a liquid and forces it through the brake lines to the brakes themselves. The liquid that is pushed into the brakes activates the Brake Calipers which in the case of Disc Brakes, push against the brake rotor causing friction that slows and eventually stops the rotation of the vehicle wheels. In Drum Brakes, pistons push two "shoes" against the brake drum accomplishing the same effect.

Anti-Lock Braking System

An automobile safety system that allows the wheels on a motor vehicle to maintain tractive contact with the road surface according to driver inputs while braking, preventing the wheels from locking up (ceasing rotation) and avoiding uncontrolled skidding. It is an automated system that uses the principles of threshold braking and cadence braking which were practiced by skillful drivers with previous generation braking systems. It does this at a much

faster rate and with better control than a driver could manage. ABS generally offers improved vehicle control and decreases stopping distances on dry and slippery surfaces for many drivers; however, on loose surfaces like gravel or snow-covered pavement, ABS can significantly increase braking distance, although still improving vehicle control.



Figure 2.14 anti-lock braking system

2.4.6. Power-Steering system

Hydraulic or electric system that helps drivers steer by augmenting steering effort of the steering wheel. Hydraulic or electric actuators add controlled energy to the steering mechanism, so the driver needs to provide only modest effort regardless of conditions. Power steering helps considerably when a vehicle is stopped or moving slowly. Also, power steering provides some feedback of forces acting on the front wheels to give an ongoing sense of how the wheels are interacting with the road; this is typically called "road feel".

2.4.7. Automotive Chassis

A chassis consists of an internal framework that supports a manmade object in its construction and use. It is analogous to an animal's skeleton. An example of a chassis is the under part of a motor, consisting of the frame (on which the body is mounted). If the running gear such as wheels and transmission, and sometimes even the driver's seat, are included, then the assembly is described as a rolling chassis.

2.4.8. Exhaust gas recirculation

An Internal combustion engine, exhaust gas recirculation (EGR) is a nitrogen oxide (NO_x) emissions reduction technique used in petrol/gasoline and diesel engines. EGR works by recirculation a portion of an engine's exhaust gas back to the engine cylinders. Exhaust gas is routed back into the combustion chamber because the exhausted air is much hotter than

the intake air. EGR works by diluting the N_2 and providing inert gases to combustion (CO_2 primarily) to act as an absorbent of combustion heat to reduce peak in cylinder temperatures. NO_x is produced in a narrow band of high cylinder temperatures and pressures.

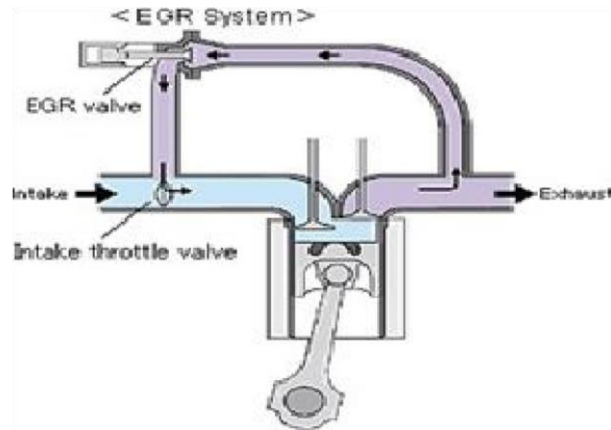


Figure 2.15 exhaust gas regulation

2.5. Inventory Control

In one sentence inventory control is nothing but to give uninterrupted service towards the Production / Sales / Maintenance etc. with minimum stock. Inventory control is an important aspect of the growth of company. Store inventory is the heart of an industry. Inventory control or stock control can be broadly defined as "the activity of checking a shop's stock these updates includes general repairs and maintenance." Ford factory recalls and also warranty service on all Ford models. Whether we need an oil change, transmission service, brake pads, or even engine repair. Every part has its own part number and is needed to register before using. So, advisor has to have brief information about parts so that he can inform customer. If new part that is unavailable is needed, then order for that part takes place immediately and arrives within a week. Computers of inventories department and advisor's computers are linked so that all used part during the maintenance work are subtracted from the inventory department computer.

2.6. Plant Maintenance

Maintenance management describes the efficient and productive output of the organization. For washing purpose, different compartment is separated and for the maintenance different compartments with lifts are separated. Maintenance is all basis on the experience of

technician. Maintenance work is started with the customer complain about their vehicle to service advisor. He finds out problem and prepares job card accordingly. Then customer handed job card to supervisor who ordered specific technician with respect to difficulty of the work. So, maintenance works are divided according to technician level. Each technician has their own tool box so that it is easier to handle and save time because of their habitual action with their own tool box. For very difficult and heavy maintenance work a group of technician is separated.

2.7. Quality Management

Quality of the product and the maintenance work is one of main objective of the GO ford. To maintain the quality product, they use genuine part of GO ford. Customer satisfaction depends upon following elements,

- Behave
- Time of delivery
- Cost
- Service provided

Company has directed its full efforts towards providing superior quality service for its customers at reasonable cost. To improve the quality through customer complaints the company had managed customer care department and customer relations desk. They ensure the level of quality provided to the customer and provide future steps to improve the quality after receiving suggestions from the customer on current quality condition. To improve the service quality technician are trained time to time and they are trained by experts about current technology and modern vehicles. These all factors help to improve the factors affecting quality.

CHAPTER THREE

RESULT AND DISCUSSIONS

3.1. Case Studies

Problems and solutions of different systems of a car are described below.

3.1.1. Disc brake

After having test ride we noticed a noise while braking which may be caused by two factor one is vibration of the components and another dusts in the brake pad so chamfer pads were added and brake pads were cleaned. Another problem encountered was insufficient braking. So brake pads were checked, if worn out replaced it and brake fluid level was checked and add if necessary. In some cases disc itself was worn out so we had change it.

3.1.2. Drum brake

Maximum problem occurred on drum brake was noise while applying brake and insufficient brake for noise, brake shoes were cleaned using sand paper and the housing was blown using premiered air so as to remove dust. Insufficient braking was due to either worn out braking lining or insufficient brake fluid so brake shoes were changed and brake fluid was added if necessary.

3.1.3. Steering system

Most problem faced on the steering system was hard steering while turning. It was due to various reasons like steering leakage, pump malfunction, PAS hose leakage so the pump was changed in one car where pump malfunction had occurred hose pipe was also changed in condition of leakage of oil. Rack was cleaned and was greased properly.

3.1.4. Suspension system

Some vehicle were reported jerking too much and noise on suspension system. So the possible causes noted was hard damper. So we checked the retracting time if necessary. In some cases damper were also changed.

3.1.5. Transmission system

In the maximum vehicle we detected various problem regarding transmission system. The problem detected and solution done for these are discussed below:

1. Car not shifting into gears:

It was caused by either servicing done outside or clutch plate assembled in reverse. So clutch assembly was fixed accordingly.

2. Gear shifting hard:

This was reported more often during our internship period. So the shift cable bush was changed if broken. In some cases gear fluid was filled and synchronized was changed if it was worn out.

3. Automatic transmission ,no pickup

Only one or two vehicle having automatic transmission had arrived reporting no pickup. There TCM was failed to communicate with the actuator so TCM was reprogrammed. Replacement of clutch was also done if clutch failure occurred.

4. Gear slipping

One of the vehicle was diagnosed with worn out synchronizer so we changed it.

3.1.6. Lubrication system

Various problem reported regarding lubrication system were leakage, mixing of impurities and clogging of oil filter. To fix the leakage problem we changed the piston ring and gasket.

And impure oil was changed with clean oil and oil filter was also changed.

3.1.7. Cooling system

Vehicle overheating was reported on some of vehicle. It was caused by various reasons such as low coolant level, leakages, damaged thermostat valve, damaged fan resistor and damaged fan belt. So we filled the coolant up to the level and in some cases pipe was changed. Fan resistor and fan belt were changed in some vehicle. Hoses were cleaned and replaced if necessary in some cases.

3.1.8. Fuel supply system

Insufficient and discontinuous supply of fuel were occurred in some vehicle so we checked the fuel injector, sensors malfunction. Injector were cleaned. One causes was timing out due to problem in PCM so we reprogrammed it.

3.1.9. Problems in engine

Engine's problem was very much often. Some of the problems encountered and their solutions are discussed as follow:

➤ Car starting fine but start jerking:

In some of vehicle during diagnosis O2 sensor was broken so too high or too low mixture was being sent to the engine. So O2 sensor was replaced and also vacuum leakage was checked.

➤ Car runs smoothly at low speed but jerks when pressing the accelerator: While diagnosis of this problem we found out the spark plugs were damaged so we changed the spark plugs. But sometimes sparks plugs only need be cleaned at tip using sand paper.

➤ Fluctuating engine power :

Engine power was fluctuating as a result vehicle speed and pickup was affected. So we cleaned the spark plug and the condition of air filter was checked and was changed. Some other causes noted were clogged or damaged fuel filter and clogging of the exhaust system. Fuel filter was changed and on one vehicle whole exhaust system was also changed.

➤ Engine misfire:

There were many caused of engine misfire. one is engine overheating which we have already discussed. Other reasons were ignition timing out and low fuel pressure. This was diagnosed by adjusting the part of the engine using special tools to correct the timing. To increase fuel pressure, pressure regulator was changed.

➤ Other general problem:

Other general problem faced were poor lubrication and oil pump failure. For such case lubrication system was monitored and done necessary filling or replacing. In some cases oil pump was changed.

CHAPTER FOUR

CONCLUSIONS AND RECOMMENDATIONS

4.1. Conclusions

The main objective of the industrial attachment was to learn the professionalism, get the practical knowledge of the automobile components and understanding the works and ethics of the organisation. In the time period of one month, we got the opportunity to learn basic process of job handling as well. We also developed the skill of identifying most of the components and opening and closing of job card with the help of auto deal. The supervisors engaged us to work in the initial phase which helped to uplift our enthusiasm towards work. The technicians were very helpful and cooperated us well and made easy to learn and distinguish different parts and mechanism of cars and taught us the process of repair and maintenance. Hence, it can be concluded that the training session has been successful as it has hiked our knowledge and understanding of various aspects of company culture, ethics and enhanced our academic knowledge on the automotive sector and engineering.

Lastly, GO Autocare Pvt. Ltd. was very beneficial as all the objectives were fulfilled. We were familiarized with the works done by an engineer in an automobile company. This experience will surely help a lot in future. During our internship at GO Ford Service Centre, we were able to enhance our technical and managerial skills. We got familiarized with the vehicle system and its latest models. Various new and advanced technologies have been developed in modern cars. Latest modern cars have been equipped with the features like automatic transmission system, use of various sensors, antilock braking systems, air bags, four Wheel drive system etc.

4.2. Recommendations

Following things are recommended to GO Ford Company so that it could increase its performance:

- The need to repair the components as the damage on the small parts seemed to change to the whole components itself to which the expenses of the repairment was high.
- It would be better establishing an internal cafeteria for the employees within the premises.
- Structured and scheduled recruitment of interns would be beneficial.
- It would be better if mechanics are provided the face mask since they are highly prone to inhaling high degree of carbon particles emitted by vehicles.

Terms and Conditions of GO Ford

- GO Autocare Pvt. Ltd assumes no responsibility for loss or damage due to the theft, fire, flood, accidents, riots or other act of god, which shall be covered against the vehicle owner's policy. We assume no responsibility for any valuable or accessories in the car.
- Vehicle shall be driven, tested, repaired and stored at the sole risk, responsibility and ability of the customers. In case of damage due to an accident, repairs will be carried out under the insurance of the vehicle.
- The customers will not hold GO Autocare Pvt. Ltd responsible/liable for delay in delivery or carrying out repairs or procurement of spare parts for reason beyond GO Auto care Pvt. Ltd.
- Vehicles are repaired at owner's risk and eventually liability. On account of workmanship reported within 15 days of delivery shall be limited to rework without cost to owner.
- Vehicles are received and delivered within office hours only.
- Salvage of accident vehicle must be lifted by the customers within seven days from the date of delivery of the vehicle. Salvage not claimed within seven days will be disposed of by GO Ford as scrap.
- The customers undertake, to pay all repair prior to taking delivery of the vehicle; subsequent reimbursements from insurance company may be made by them directly to the customers.

- No vehicle will be delivered without the receipt.
- Delivery to customer will not be given on credit.

Appendix B: Log Book

Table B.1 Daily Work Log book

S.N.	Job Description	Remarks
1	General Servicing Mobil filter, AC filter and Mobil of the vehicle was changed.	
2	Over-heating In most of the cases, the reason was due to the malfunction of the thermostat valve and moreover due to coolant level, leakage, fan belt That was sort out by replacing the parts	
3	Gear Hard Due to the worn out synchronizer and low level of gear oil the ring was changed and the fluid was filled	
4	Full engine service The whole engine was dismantled, each part was cleaned with kerosene, worn parts were replaced and the engine was assembled. The engine was fixed to the vehicle and was started for whole day	
5	Dealing with customer The entry of the vehicle was followed. The problems of the vehicle were discussed with the customer and checked on test drive.	
6	Service Advisor The IR of the vehicle was learnt followed by making of the Job card. The job was allocated to the respective mechanic.	
7	Closing of Job card After completion of the job, the closing of Job card was done and updated on the system.	

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