Chapter 1

1. History of MARUTI SUZUKI
2. Introduction of organization
3. Garage layout and modern garage layout
4. Hierarchy
5. Tools, equipments and machines
1.1 History of MARUTI SUZUKI

Fig 1.1

Symbol of MARUTI

Logo of MARUTI UDYOG

MARUTI UDYOG Limited was established in February 1981, though the actual production commenced only in 1983.

In 1970, a private limited company named Surya Ram MARUITEchnical services private limited (MTSPL) was launched on November 16, 1970.

Affiliation with Suzuki

In 1982, a license & Joint Venture Agreement (JVA) was signed between MARUTI UDYOG Ltd. and Suzuki of Japan. At first, MARUTISuzuki was mainly an importer of cars. In India's closed market, MARUTI received the right to import 40,000 fully built-up Suzuki in the first two years, and even after that the early goal was to use only 33% indigenous parts. This upset the local manufacturers considerably. There were also some concerns that the Indian market was too small to absorb the comparatively large production planned by MARUTI Suzuki, with the government even considering adjusting the petrol tax and lowering the excise duty in order to boost sales.

In 1985, the Suzuki SJ410-based Gypsy, a 970 cc 4WD off-road vehicle, was launched. In 1986, the original 800 was replaced by an all-new model of the 796 cc hatchback Suzuki Alto and the 100,000th vehicle was produced by the company. In 1987, the company started exporting to the West, when a lot of 500 cars were sent to Hungary. By 1988, the capacity of the Gurgaon plant was increased to 100,000 units per annum.

Market liberalization

In 1989, the MARUTI 1000 was introduced and the 970 cc, three-box was India’s first contemporary sedan. By 1991, 65 percent of the components, for all vehicles produced, were indigenized. After liberalization of the Indian economy in 1991,
Suzuki increased its stake in MARUTI to 50 percent, making the company a 50-50 JV with the Government of India the other stake holder.

In 2000, MARUTI became the first car company in India to launch a Call Center for internal and customer services. The new Alto model was released. In 2001, MARUTI True Value, selling and buying used cars was launched. In October of the same year the MARUTI Versa was launched. In 2002, Esteem Diesel was introduced. Two new subsidiaries were also started: MARUTI Insurance Distributor Services and MARUTI Insurance Brokers Limited. Suzuki Motor Corporation increased its stake in MARUTI to 54.2 percent.

In 2003, the new Suzuki Grand VITARA XL-7 was introduced while the Zen and the Wagon R were upgraded and redesigned. The four millionth MARUTI vehicle was built and they entered into a partnership with the State Bank of India. MARUTI UDYOG Ltd was listed on BSE and NSE after a public issue, which was oversubscribed tenfold. In 2004, the Alto became India's bestselling car overtaking the MARUTI 800 after nearly two decades. The five-seater Versa 5-seater, a new variant, was created while the Esteem was re-launched. MARUTI UDYOG closed the financial year 2003-04 with an annual sale of 472,122 units, the highest ever since the company began operations and the fiftieth lakh (5millionth) car rolled out in April 2005. The 1.3 L Suzuki Swift five-door hatchback was introduced in 2005.

Manufacturing facilities

MARUTI Suzuki has two manufacturing facilities in India. Both manufacturing facilities have a combined production capacity of 14,50,000 vehicles annually. The Gurgaon manufacturing facility has three fully integrated manufacturing plants and is spread over 300 acres (1.2 km²). The Gurgaon facilities also manufacture 240,000 K-Series engines annually. The Gurgaon Facilities manufactures the 800, Alto, WAGNOR, ESTILO, Omni, Gypsy, ERTIGA, Ritz and EECO.

The Manesar manufacturing plant was inaugurated in February 2007 and is spread over 600 acres (2.4 km²). Initially it had a production capacity of 100,000 vehicles annually but this was increased to 300,000 vehicles annually in October 2008. The production capacity was further increased by 250,000 vehicles taking total production capacity to 800,000 vehicles annually. The Manesar Plant produces the A-star, Swift, SWIFT DZIRE, SX4, Vitara Brezza ,Ritz , Baleno and Celerio. On 25 June 2012, Haryana State Industries and Infrastructure Development Corporation demanded Maruti Suzuki to pay an additional Rs 235 crore for enhanced land acquisition for its Haryana plant expansion. The agency reminded Maruti that failure to pay the amount would lead to further proceedings and vacating the enhanced land acquisition. It plans to set up a plant in Gujarat and has acquired 600 acres of land.

In 2012, the company decided to merge Suzuki Powertrain India Limited (SPIL) with itself. SPIL was started as a JV by Suzuki Motor Corp. along with MARUTI Suzuki. It has the facilities available for manufacturing diesel engines and transmissions. The
demand for transmissions for all Maruti Suzuki cars is met by the production from SPIL.

1.2 Introduction

- The KATARIA group was founded by MR.SHOBHAGMAL KATARIA in the year 1956 and has grown to become one of the biggest transport operators in INDIA having 60 branches.

- The KATARIA group has since expanded its wings, by way of expansion and the first being in 1984 with dealership of 2 – wheelers.

- It further expanded its wings to become one of the most trusted brand of MARUTI car dealership in INDIA 1996.

- Today KATARIA automobiles is one of the “most trusted brand “ in the automobile dealership of MARUTI SUZUKI with showroom in AHMEDABAD , SURAT , NAVSARI and VAPI.

- Today the KATARIA group is proud to have a family of 2000 dedicated , satisfied and committed work force.

- The group further has a “satisfied” customer base a more than 200000 happy families.
1.3 Garage layout

Fig. 1.2 garage layout
1.3.1 Modern garage layout

Fig. 1.3 modern garage layout

- In the modern garage layout I have changed the way of vehicles in and out.
- Because on the same way of in and out it was a traffic problem.
- Changed the engine repair room. Because it was near the staircase so, to move the engine the problem has been created many times.
- Change the washing ramp. Because in the above layout the washing ramp is near the new car parking. So, the problem is new car cannot come in during the service time.
- Change the painting section and air supply room. Because the painting room was on the underground and the other company have also have the parking in the underground and it is effected to the other vehicle.
- The air supply room was on the top of the workshop and for the service of the air compressor the problem has been created for the technicians to take a heavy tools on the top floor.
- Changed the spare shop. Because in the above layout the spare shop is near workshop and it is very far from the showroom.
1.4 Hierarchy

![Hierarchy Diagram]

**Fig. 1.4 Hierarchy**
1.5 Tools, equipments and machines

Hand tools
Many kind types and sizes of tools are used in automobile work.

1. **Spanner set:** These are the most commonly used type of spanner in garage. The opening should be the right size to fit the nut or bolt. If the spanner opening is too large, it could round off the corners of the hex. These make the use of the proper spanner more difficult. These spanners are available in different sizes ranging from 6 to 32mm.

![Fig. 1.5 spanner and ring spanner](image)

2. **Ring spanner:** In ring spanners the end openings completely enclose the nut or the bolt head, so that they do not slip and cause damage. Further, the end holes in the ring spanners are twelve sided, because of which they can be used in restricted spaces, since the nut or the bolt head can be worked up even when the swing of the spanner is restricted to 15.

3. **Socket spanners:** These types of spanner are useful in restricted spaces where common types of spanners cannot be used. They consist of sockets of different sizes which can be used with various types of handles. The handles have projection at one end around which the sockets fit. One type of handle has a universal joint at the projection end which makes it possible to work with the handle at an inclination with the socket. A ratchet handle is also available which obviates necessity of lifting of the socket from the nut or the bolt head.

4. **Adjustable wrenches:** This wrench has jaws that can be adjusted to fit nuts and bolt heads of various sizes. These types of wrenches have advantage that these can be suitable for a large number of nut and bolt head sizes.

![Fig.1.6 adjustable wrenches](image)
5. **Torque wrenches:** Important nuts and bolts in automobile work have to be tightened with a specified amount of torque, because excessive torque may result in their breakage while less torque they will remain loose. This is made possible by a torque wrench. It is a specialized form of socket spanners.

![Fig. 1.7 torque wrenches](image)

6. **Screwdriver:** The screwdriver is used to drive, or turn screws. The most common type has a single flat blade for driving screws with slotted heads. There are also the Phillips head and reed, and prince screw drivers.

![Fig. 1.8 screw drivers](image)
7. **Hammers**: A medium weight ball pen hammer is the one commonly used in automobile work. It should be gripped on the end of the handle. When you swing the hammer, the face should strike the object squarely, and not an angle.

![Fig. 1.9 Hammers](image)

8. **Pliers**: Pliers are a special type of adjustable wrench. The two legs move on a pivot so that items of various sizes can be gripped. There are two types of gripping pliers and cutting pliers.

![Fig. 1.10 Pliers](image)
9. **Pullers:** Pullers come in a variety of types and sizes and are used to remove wheels, gears and bearing from shafts from housings. Each pulling operation differs from the other, and care must be exercised to prevent damage to the parts during pulling.

10. **Oil filter wrench:** A type of wrench for removing cylindrical oil filters. It may be either a strap-type wrench or a socket.

![Fig. 1.11 oil filter wrench](image)

11. **Extension or distance:** Extensions are used between a socket and its handle. They allow the handle to be placed farther from the work piece, giving you room to swing the handle and turn the fastener.

![Fig. 1.12 Extension or distance](image)
12. **Universal joint:** A universal joint is a swivel that lets the socket wrench reach around obstructions. It is used between the socket and drive handle, with or without an extension. Avoid putting too much bend into a universal joint, or it may bind and break.

![Universal joint](image)

Fig. 1.13 Universal joint

13. **Torque wrench:** An internal socket-head screw design. The cross-section resembles a star. Commonly used in automobiles, automated equipment, and computer components as it is resistant to wrench cam-out and so suitable for use in the types of powered tools used in production-line assembly.

![Torque wrench](image)

Fig. 1.14 torque wrenches
1.5.1 Power tools

**Pneumatic Nut and Bolt Tightener:**
- It tightens and loosens the nuts and bolts in no time. This is a portable machine whose working end can be changed to suit different sizes of bolts and nuts.

![Fig. 1.15 Pneumatic Nut and Bolt Tightener](image)

**Polisher and Sander:**
- This is an electrically powered machine used to rub the burrs from the surfaces of components, and then polish it to super finishing accuracy. The standing is accomplished by means of emery paper or emery cloth of coarse grade while the fine grade is used for polishing.

![Fig. 1.16 Polisher and Sander](image)

**Drill Stand:**
- It is used to mount the drill machine. The job to be drilled can be placed and clamped on its base. The height of the drill machine can be adjusted suitably to accommodate jobs of different heights. For this purpose the grooves are cut on its vertical stand. The height adjustment is done by means of a lever and mechanical linkage.

![Fig. 1.17 Drill Stand](image)
Jack stands:
- Jack stands support a vehicle during repairs. After raising the vehicle with a jack, place stands under the vehicle. Be sure the stands are placed in secure positions. For example, place jack stands under the frame, axle housing, or suspension arm.

Cost: 1500

Fig. 1.18 jack stands

Two post hydraulic lift

Price: 1.2 lakh/unit

Uses:
- Maximizes service capabilities and revenue potential. Provides open door clearance for trucks, vans, SUV's and passenger cars for access to controls, while rubber door guards protect vehicle doors. Space saving base plate provides obstruction free work environment. Dual safety locks disengage simultaneously w/ a Single Point Mechanical Lock Release. Overhead shut off system protects vehicles from being raised too high.

Function & features:
- The cable and oil pipe are fully concealed, with decent and elegant appearance.
- Designed based on the international standard, meeting the demand of the garage and workshop.
- Manual lowering, safe and simple in operation. Top limit switch, effectively protecting the vehicle from overhead collision.
- Lowest height of lifting pad is 110mm, good for repairing low chassis or low profile car.

Fig. 1.19 Two post hydraulic lift

**Suzuki diagnoses tester**:

- SDT is a device only for MARUTI Suzuki cars to find diagnoses.

Fig. 1.20 Suzuki diagnoses tester
Wheel alignment four post lift

Lead/Pull: defined as "at a constant highway speed on a typical straight road, the amount of effort required at the steering wheel to maintain the vehicle’s straight heading."

Important: Please evaluate for the condition with hands-on the steering wheel. Follow the “Vehicle Leads/Pulls” diagnostic tree located in SI to determine the cause of a lead/pull concern. Lead/Pull concerns can be due to road crown or road slope, tires, wheel alignment or even in rare circumstances a steering gear issue. Lead/pull concerns due to road crown are considered “Normal Operation” and are NOT a warrantable condition -- the customer should be advised that this is “Normal Operation.”

Some customers may comment on a “Lead/Pull” when they hold the steering wheel in a level condition. If so, this is more likely a “steering wheel angle” concern because the customer is “steering” the vehicle to obtain a “level” steering wheel.

Fig. 5.17 Wheel alignment four post lift

Car washing machine

Regular chassis washing of both cars and commercial vehicles to remove grease, oil, mud and other corrosive deposits is most essential. This type of cleaning is a time representative of preventive maintenance. This is easily done by a spray of water with a solvent, at high pressure (above 25 kg/cm²).
Car washer consists of a pump which is driven by an electric motor. The pump sucks water from a well or from a water tank filled beneath it and delivers to the nozzle through a pipe of hoses with high pressure. There are two types of car washers as follows.

Fig. 1.21 Car washing machine

That provided with single hose which can be used to wash only one vehicle at a time.

1. That provided with twin hoses which can be used to wash two vehicles at a time. The nozzles are adjustable, so that the delivery of water can be regulated at variable force from fine spray to solid jet.

Automatic Washing-
The automatic car wash machine has a three horse power pumping station which pumps up to 100ltrs of water per minute through 15 numbers of nozzles, 12 of which spray as a pre-wash arch which washes tires, wheels and rocker panels and rest three nozzles sprays on back top brush. The machine dispenses a specially formulated foaming, high pressure chemical during a prewash pass which is applied along with high pressure wash.

The high pressure spray automatically adjusts to the vehicle’s dimensions by the use of P L C based control panel and lastly, high pressure air blowers maintain the best air-steam helps to dry the complete vehicle surfaces.

Air compressor

Air compressors are used to compress the air which can be used for a number of purpose like washing of vehicle, cleaning of engine, spraying of lubricating oil, spraying of paint, tire inflation, greasing a vehicle, for lifting hoist, for pneumatic grinder, for spark plug cleaning etc.
An air compressor is shown in fig 2.3. It can be compared with the working of petrol engine or any other engine. The air compressor is coupled to electric motor. An automatic pressure controller is provided between motor and main current line, to break the circuit when the pressure inside the air tank reduces a maximum valve.

Compressor piston draws air into the cylinder during suction stroke through the inlet valve. As piston moves upward during its next stroke, the inlet valve closes and the air gets compressed and delivered to the air tank through outlet valve. One pressure gauge is fitted on air tank for observing the filling position.

Wheel balancer

Technical Features:-

- Adopts quality computer with the feature of high intelligence and high stable
  Mechanical main shaft adopts high precision bearing driven, wear-resistant, low noise
- Press stop key to realize the emergency stop.
- Full automatic dynamic/ Static balance check.
- Balance 3 ALU rim and 1 motorcycle tire. Full automatic trouble diagnosis.

Work Principal:-

The micro CPU will provide the normal information if it checks each unit in the normal situation. And the operators can execute the balance operation. When
balancing, MCPU can control the rotation of the balancer tester main shaft through the drive interface. The unbalance signal sensed by balance sensor is sent to the micro-processor port through A/D converter. CPU will integrated analyze the unbalance signal and angle signal to calculate the unbalance value and display the value through the LED unit.

SAFETY AND PREVENTION:-

Before operation, please confirm that you have read the entire warning label and the instruction manual. Not according with the safety instruction can cause the injuries to the operators & bystanders.

Keep your hands and the other parts of your body from the location with the potential danger. Before starting the machine, you must check it there existing the damaged part. If any break or damage, the machine will not be used.

In emergency situation, if the tire not fixed, you should press “STOP” to stop the rotation of the wheels. Adopts high strength protective cover to prevent the tire from flying in any direction and can only fall on the ground to protect the safety of the operators.

Before balancing, operators should check all the tires and wheels to find the possible faults. Do not balance the tires and wheels with fault.

Do not exceed the load capability of the wheel balancer and do not attempt to balance the wheel bigger than the designed dimension.

Wear suitable clothing such as suitable safety suit such as glove, glasses and working suit. Not wear necktie, long hair, loose clothing. The operators should stand beside the machine when operation the machine. Keep from the unauthorized personnel.

Fig.1.23 Wheel balancer
Fluid management

Fig. 1.24 Fluid management

For fluids such as air, oil or water
Removable drip tray
Inspection flap in rear wall.
Chapter 2.

2.1 Testing of automobiles  
2.2 Gear box overhauls  
2.3 Major vehicles repairs
2.1 Testing of injector

Fuel injector diagnosis and cleaning equipment

- On hand operated machine the pump is calibrated at limited speeds, thus also do not perform the governor test. Therefore the motor driven machines very common to test the injection pumps now-a-days.

- The motor driven bench consists of an electric motor of 2 to 3 hp. Therefore the operating range of the pump can be obtained up to 4000rpm. This covers the full range of engine speed. The machine is mounted on a table, which has provisions to connect the pump at right alignments.

- A trip plate is provided which trips-off at every 14 seconds.

- The delivery pipes from the pump are connected to the injection nozzles, the valves of which are spring loaded. The fuel delivered from the nozzle is measured by the glass vessels.

- When the test to performed, the shaft is rotated at the testing speed, then the pump elements also deliver their fuel into a tray provided above elements also deliver their fuel into a tray provided above the measuring vessels.

- When complete air of the system is removed then the tray is quickly swung and the fuel is allowed to be delivered into the measuring vessels.

- This delivery of the fuel is allowed for 200 revolutions of the camshaft by the means of a counting device.

- After completing the above revolutions, the tray is automatically and quickly moved over to cover the tops of the measuring vessels.

Fig 2.1 Testing of injector
2.1.1 Testing of battery with hydrometer

- Wear suitable eye protection;

- Remove vent caps or covers from the battery cells; Squeeze the hydrometer suction bulb and insert the pickup tube into the cell closest to the battery's positive (+) terminal.

- Slowly release the bulb to draw in only enough electrolyte to cause the float to rise. Do not remove the tube from the cell; Read the specific gravity indicated on the float. Be sure the float is drifting free, not in contact with the sides of top of the barrel. Bend down to read the hydrometer at eye level. Disregard the slight curvature of liquid on the float.

- Record your readings and repeat the procedure for the remaining cells.

Fig. 2.1.1 Testing of battery with hydrometer
2.2 Gear box overhauls

Problem:

In the swift there was a problem from few weeks. There has been some strange noise when driving and it sound like a gear box related.

The strange sound increase when it run on $2^{nd}$ gear.

If you press the clutch pedal down and the $2^{nd}$ gear is not shifting.

![Gear Box](image)

Fig. 2.2 Gear box

Solution:

- First open the air filter head and remove the air filter.
- Disconnect the battery connection and remove the battery from it.
- Remove the spring bolt of the silencer. It is placed under the car.
- With the help of the timing bolt take a piston in parallel and remove the timing chain.
- With the help of the tools and air gun remove the under clutch bolts and remove the bolts of a pressure plate.
- Remove the pressure plate.
- Disconnect the cable clutch because the flow of fuel have been stopped.
- With the help of the jack stand remove the gear box from the car.
- Remove the ring on the clutch with the help of pliers.
- After the removing the rings on the clutch, remove the screws of a gear box with the help of the screw drivers.
- Remove the cam shaft.
- Remove the reverse gear tooth.
- Then remove the $1^{st}$ gear tooth and $2^{nd}$ gear tooth and change the $2^{nd}$ gear tooth.
- Because the problem was on the shifting of a second gear. So it has to change the second gear tooth.
2.3 Major vehicles repairs

Major repair

In the event of major accident, where significant loss has been caused to the vehicle, it is mandatory to register a case of local cops. The customer is expected to co-operate with the authorities to help them verify the cause and nature of the accident. Most of the companies in INDIA limit the customer’s financial liability in the range of Rs.3000-Rs.5000. The cost of repairing the vehicle is borne by the insurance company.

The service might decide to revoke services to the customer, if he/she has been found in violation traffic rules [drunk driving over speeding etc].

Changing of the timing chain

In the event of major damages like dents or scratches, the company charges a predetermined penalty. The cost of repairing the vehicles is settled from the collection and insurances is not invoked. If a third party has suffered in the accident, the liabilities need to be cleared by the customer.

Changing of a valve timing chain.

The cost of timing chain is approx 1200/-

Fig. 2.3 timing chain

2.3.1 Change of a distributor cap
To change the distributor cap, open the head and remove the shaft from it.
The distributor is a main component of the ignition system. It takes very high voltage and delivers it to fire the spark plugs.

When the distributor rotor and cap are replaced, the entire ignition system should be inspected.
After replacing the distributor cap the ignition wires will need to be reinstalled.
Check the ignition system.
Replace the cap if found faulty.
Re-check the ignition system.
- Check the ignition timing if needed.
- Engine misfires. Car does not start. Noises from the engine. Check engine light is on.

### 2.3.4 change of a clutch cable

![Clutch Cable Image](image)

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 cable and clutch bearing.

Car: swift

Reason: clutch pedal became hard

Cost: 1500/-
Chapter 3.

3.1 Accidental vehicle
3.2 Preventive maintenance
3.3 Faults and remedies
3.1 Accidental vehicle

**Accident form rear side of alto 800**

- There was a alto 800 with accident from rear side and after it repair it has approximate cost RS.25000. There is insurance company to inspect the accident vehicle.
- Generally, it has been used in the accident vehicle is dent puller, welding machine, sander, spray gun and the head lights which has been broken has to replace it and replace the mirror. After the repair is done the final inspection is done of repair, from the insurance company.

![Fig. 3.1 accident vehicles](image)

3.2 Preventive maintenance

- There are 3 free services.
- 1000 km / 1 month – regular check.
- 5000 km / 6 months – regular check up and tuning.
- 10000 km / 12 months – engine oil, oil filter, air filter.
- Then periodic service is recommended once every 10000 km / 12 months.
- Engine oil at 10000 km.
- Oil filter at 10000 km.

![Fig. 3.2.1 Oil filter](image)
- Coolant at 20000 km.
- Spark plugs in petrol car at 40000 km.
- Brake fluid and clutch fluid at 20000 km.
- EGR valve cleaning in diesel car at 30000 km.

![EGR Valve](image)

**Fig. 3.2.2** EGR valve

- Wheel alignment and balancing at 10000 km.
- Minimum cost in petrol cars per month is RS 2500/-
- Minimum cost in diesel car per month is RS 4000/-
- Paid services costs RS 1200 + applicable vat on parts and service tax on labor additional.
- The fuel filter should be changed at intervals of 20000kms for carburetor vehicles. In case of MPFI vehicles, the interval is 40000 kms. However, if quality of fuel has been poor, it is recommended that you change the filter at earlier intervals as prescribed by the service manager of the MARUTI Suzuki service station. You will find plenty of Maruti Suzuki service centers across India.

### 3.3 faults and remedies

1. There is no or poor spray from the windshield washer. The spray does not come out at all or does not have enough pressure.
   - When you pull the windshield washer switch, listen for a humming sound from the engine bay. If you get that humming sound and there’s no water coming out of the spray nozzle, first check if there is windshield wash fluid or water in the container. If that’s there, check the tubing from the container to the wash nozzle for leaks. If none are evident, it could be that the nozzle itself is blocked. Take a pin and clean the nozzle holes. Spray a lubricant spray on the nozzle to rid it of any debris that has blocked it.
Some brake noise is normal and unavoidable, demanding driving condition such as traffic condition, dusty condition and humidity can also cause brake noise but if the brakes of your cars are making constant noise without any of their reason the most likely yours car brake pad have worn enough to allow their wear indicator or sensor to touch the disc brake rotator, when this occurs sensor sensor emits that pitch noise to warn you that brakes need immediate attention.

![windshield washer](image1)

Fig. 3.3.1 windshield washer

1. Swift brakes are making noise.

- Some brake noise is normal and unavoidable, demanding driving condition such as traffic condition, dusty condition and humidity can also cause brake noise but if the brakes of your cars are making constant noise without any of their reason the most likely yours car brake pad have worn enough to allow their wear indicator or sensor to touch the disc brake rotator, when this occurs sensor sensor emits that pitch noise to warn you that brakes need immediate attention.

![brake pad](image2)

Fig. 3.3.2 brake pad

2. I just drove through the flooded road in MARUTI Zen, but now I can't shift gears easily. The clutch is juddering and the gears are not shifting.

- Most cars run a dry-clutch mechanism, where the clutch sits in an assembly between the engine flywheel and the transmission. This dry clutch has ventilation holes as well as a gap for the clutch cable or linkage mechanism to activate the clutch. Hydraulic clutches will have a slave cylinder that operates the clutch fork. When you drive through flooded roads, water can
enter the clutch housing and wet the clutch. The clutch plates have an asbestos based friction material, that can get soaked in water.

Fig. 3.3.3 clutch
Chapter 4.

4.1 Safety features
4.2 Special challenging experience
4.3 Liking and disliking
4.4 References
4.1 Safety features

- Seatbelt
- Anti-lock Braking System (ABS)
- Air bag
- Reverse camera

4.1.1 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).

4.1.2 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.
- 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 Reduce speed faster (crashing at a lower speed may reduce impact and injury).

4.1.3 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.

4.1.4 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 came 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 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.
4.2 Special challenging experiences

- There were many challenges to be faced during training.

- First, I have to adjust myself according to atmosphere of organization.

- There were many rules and regulations to be followed strictly and discipline was must.

- The technicians used dialects instead technical words while giving answers to my questions which was initially difficult to understand but later it was not a big thing.

- While fitting or removing parts from cars for the first time was like a big challenge as I have to learn identifying the parts correctly.
4.3 Like and dislike

4.3.1 Likes

- I like the environment of the workshop.
- The showroom is always maintained very nicely and kept very clean.
- The staff of the showroom is very polite and kind.
- All the technicians are well trained.
- The technicians are very helpful and they helped me learning everything.
- The store room is maintained very well.

4.3.2 Dislike

- The showroom is located in the outskirts of the city which is a trouble to the customers.
- The store room is not maintained properly.
- The store person is does not perform his job quite well.
- In the workshop technicians don’t have unity.
- Some service advisors are not well trained.
- There are only two jacks available in the workshop which causes problem.

4.4 References

- https://www.cardekho.com/maruti-swift/service-cost.htm
- https://m.wikihow.com/install.acamshaft