CHAPTER 1: Introduction of Hyundai

Chung Ju-Yung founded the Hyundai Engineering and Construction Company in 1947. Hyundai Motor Company was later established in 1967. The company's first model, the Cortina, was released in cooperation with Ford Motor Company in 1968. When Hyundai wanted to develop their own car, they hired George Turnbull, the former Managing Director of Austin Morris at British Leyland. He in turn hired five other top British car engineers. They were Kenneth Barnett body design, engineers John Simpson and Edward Chapman, John Crosthwaite ex-BRM as chassis engineer and Peter Slater as chief development engineer.

In 1975, the Pony, the first Korean car, was released, with styling by Giorgio Giugiaro of Italy Design and powertrain technology provided by Japan's Mitsubishi Motors. Exports began in the following year to Ecuador and soon thereafter to the Benelux countries.

In 1984, Hyundai exported the Pony to Canada, but not to the United States, because the Pony didn't pass emissions standards there. Canadian sales greatly exceeded expectations, and it was at one point the top-selling car on the Canadian market. In 1985, the one millionth Hyundai car was built.

In 1986, Hyundai began to sell cars in the United States, and the Excel was nominated as "Best Product #10" by fortune magazine, largely because of its affordability. The company began to produce models with its own technology in 1988, beginning with the midsize Sonata. In the spring of 1990, aggregate production of Hyundai automobiles reached the four million mark. In 1991, the company succeeded in developing its first proprietary gasoline engine, the four-cylinder Alpha, and also its own transmission, thus paving the way for technological independence.

In 1996, Hyundai Motor India Limited was established with a production plant in Irungattukottai near Chennai, India.

In 1998, Hyundai began to overhaul its image in an attempt to establish itself as a world-class brand. Chung Ju Yung transferred leadership of Hyundai Motor to his son, Chung Mong Koo, in 1999. Hyundai's parent company, Hyundai Motor Group, invested heavily in the quality, design, manufacturing, and long-term research of its vehicles. It added a 10-year or 100,000-mile (160,000 km) warranty to cars sold in the United States and launched an aggressive marketing campaign.

In 2004, Hyundai was ranked second in "initial quality" in a survey/study by J.D. Power and Associates. Hyundai is now one of the top 100 most valuable brands
Worldwide. Since 2002, Hyundai has also been one of the worldwide official sponsors of the FIFA World Cup.

In 2006, the South Korean government initiated an investigation of Chung Mong Koo's practices as head of Hyundai, suspecting him of corruption. On 28 April 2006, Chung was arrested, and charged for embezzlement of 100 billion South Korean won (US$106 million).

As a result, Hyundai Vice Chairman and CEO, Kim Dong-jin, replaced him as head of the company. On 30 September 2011, Yang Seung Suk announced his retirement as CEO of Hyundai Motor Co. In the interim replacement period, Chung Mong-koo and Kim Eok-jo will divide the duties of the CEO position.

1.1 Hyundai in India

Hyundai Motor India Limited is currently the second largest auto exporter from India. It is making India the global manufacturing base for small cars.

Hyundai sells several models in India, the most popular being the Santro Xing, i10, Hyundai EON and the i20. On 3 September 2013, Hyundai launched its much-awaited car, Grand i10 in petrol and diesel variants. Other models include the Getz, Accent, Elantra second generation Verna, Santa Fe and the Sonata Transform.

Hyundai has two manufacturing plants in India located at Sriperumbudur in the Indian state of Tamil Nadu. Both plants have a combined annual capacity of 600,000 units.

In the year 2007, Hyundai opened its R&D facility in Hyderabad, employing now nearly 450 engineers from different parts of the country. Hyundai Motor India Engineering (HMIE) gives technical & engineering support in vehicle development and CAD & CAE support to Hyundai’s main R&D centre in Namyang, Korea.

In mid-2014, Hyundai launched Xcent, a sedan based on successful Grand i10. Recently, on 11 August 2014, Hyundai India Motor limited launched the Elite in petrol and diesel variants.

In 2007, Hyundai started its support engineering centre with CAD/CAE teams in Hyderabad, India. Hyundai expanded its engineering activities in India with Vehicle Engineering team in 2010.

In 2011, Hyundai started its design activities at Hyderabad R&D Centre with Styling, Digital Design & Skin CAD Teams and Packaging team. Indian engineers are heavily involved in making of Indian vehicles like Grand i10, Elite i20 along with other Global cars.
1.2 Introduction of Orange Hyundai (Amreli)

Orange hyundai was founded in October 30 2013. Orange Hyundai is an authorised dealer of Hyundai in Amreli district area. Orange Hyundai is located in Amreli near bypass. Orange hyundai has service department for maintenance of car and sales department for new cars and pre owned cars.

Mrunal Gandhi is Managing Director of Orange Hyundai. Swati Gandhi is CEO of Orange Hyundai. No. of employ are 32. Mostly we service the grand i10, Verna fluidic, Santro, &i10.

(Fig 1.1 Orange Hyundai)

1.2.1 Introduction of Service Department

Our service department especially repair shops are shops specializing in certain parts such as brakes, muffler & exhaust system, transmission, body parts, tire, automobile electrification, auto motive glass repair, air conditioner, wheel alignment, wheel balancer or those who only work on certain brands of vehicle or vehicle form certain continents of the world.

In one day we service approx. 15-17 cars. In one month we service approx. 400-450 car. There are two service adviser and four mechanic in our service department & also one floor supervisor in service department.
Our workshop also offer paintwork repairs to scratches, scuffs and dent to vehicle damage as well as damage caused by collision & major accident. Many body shops now offer paint less dent repair, which is done by pushing the dent out from inside.

1.3.2 Introduction of Sales Department

Mitesh Patel is our sales manager there are two team leader one for rural & one for city our approx. selling of car is 30 per month in normal season. Last month we sell approx. 92 cars in October. Three sales man works under each team leader. We have also pre-owned car showroom its works under the sales department & Mitesh Patel is sales manager of advantage.

Cars available at show room:

- Hyundai Xcent
- Hyundai i10
- Hyundai i20
- Hyundai Santro
- Hyundai Verna
- Hyundai Elantra
- Hyundai Grand i10

Mostly we sell following cars

- Hyundai Santro
- Hyundai I10
- Hyundai Verna
- Hyundai Grand i10
- Hyundai I20
- Hyundai Xcent
- Hyundai Elantra
CHAPTER: 2 Industry Garage Layout

(Fig 2.1 Workshop layout)
CHAPTER: 3 HIERARCHY

3.1 Hierarchy of Orang Hyundai

3.2 Name and Post of Member of Orange Hyundai

<table>
<thead>
<tr>
<th>Post</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managing Director</td>
<td>Mrunal Gandhi</td>
</tr>
<tr>
<td>CEO</td>
<td>Swati Gandhi</td>
</tr>
<tr>
<td>General Manager</td>
<td>Rahul Thakkar</td>
</tr>
<tr>
<td>Sales Manager</td>
<td>Mitesh Thakkar</td>
</tr>
<tr>
<td>Role</td>
<td>Name</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Service Manager</td>
<td>Jignesh Adreja</td>
</tr>
<tr>
<td>Floor supervisor</td>
<td>Mayur Malani</td>
</tr>
<tr>
<td>Customer Relation Manager</td>
<td>Twinkle Jodhani</td>
</tr>
<tr>
<td>Body Shop Manager</td>
<td>Pavithran</td>
</tr>
<tr>
<td>Mechanic</td>
<td>Mayur Patel</td>
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<tr>
<td></td>
<td>Mehul Parmar</td>
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<td></td>
<td>Prashant Pathak</td>
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<tr>
<td></td>
<td>Akash Chavda</td>
</tr>
<tr>
<td>Sales Manager</td>
<td>Mitesh Patel</td>
</tr>
<tr>
<td>Team leader (City)</td>
<td>Jitesh Makwana</td>
</tr>
<tr>
<td>Team leader (Ruler)</td>
<td>Bharat Katakiya</td>
</tr>
<tr>
<td>Sales Executive</td>
<td>Amit Barot</td>
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<tr>
<td>Sales Executive</td>
<td>Ketan Harsora</td>
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</table>
Chapter 4: Tools & Major Equipment’s

4.1 INTRODUCTION

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.

There are two types of tools used in the workshop.

1. Hand tools
2. Power tools

4.1.1 Hand tools

This tool is known as hand tools because our hands supply the energy to operate them. Hand tools include hammer, chisel, jack, spanner, screwdriver, puller, pliers, wrench, ring expander, torque wrench, bench wise, hack saw, punch, box spanner, ring spanner, tomy, file, adjustable wrench, taps and dies, etc.

4.1.2 Power tools

Power tools are increasingly used in modern automobile workshop. Their use in comparison with hand tools gives quick effortless and efficient service. This save time and increased productivity and that would result in increased income.

There are three types of power tools

1. Electric tools like portable electric drill, drill press, electric grinder which is operated by electric motor.
2. Pneumatic tools means related to air and pneumatic or air tools like air impact wrench, air ratchet, air jack, air hammer are operated by compressed air.
3. Hydraulic tools means related to fluid or liquid and hydraulic tools like hydraulic jack, hydraulic cranes, and automotive lifts hydraulic presser are operated by presser of fluid use in these elements.

4.2 DIFFERENT TYPES OF TOOLS

4.2.1 Hammer

The hammer is man’s primitive toll. In the earliest time, stone was used to tight a wooden piece and for striking. Even there is no change in its construction.

Instead of a head, a metal head is used for striking.
Types of hammer

1. Ball peen hammer
   This hammer is commonly used by mechanics. The peen is ball shaped there for it is used for forming a rivet head by spreading the shank of a rivet. This is a very common type of hammer used for striking while doing general work in the shop or at home.

2. Cross peen hammer
   The peen of this hammer is flat and forms a cross with the hammer handle. This type of hammer is used widely in sheet metal shops for bending, providing channel in sheets, collar, swaging, etc.

3. Straight peen hammer
   The peen of this hammer is flat but straight to the handle. This hammer is widely used in sheet metal shop for ending, providing channel, working on corners, etc.
4. Sledge hammer

This hammer is used by blacksmiths, wood cutters, stone breakers, fabrication, etc. for heavy jobs. There are three types of sledge hammer: (a) double-faced (b) cross peen and (c) straight peen.

5. Soft hammer

A soft hammer is made from soft metal such as copper and lead. This is used for hammering finished job and for aligning job on a machine.

6. Mallet hammer

A wooden hammer is called a mallet. This is used by car painters to drive their tools and by sheet metal workers for bending thin sheets.

7. Claw hammer

The hammer has a cut in the centre and is bent in a sharp curve. This is used for pulling nails out of wood with the help of the head, while the face is the same as that of ball peen hammer. This is mostly used by cobblers and car painters. Sometimes, the pen has a small curve on the claw and is called a ripping hammer. This is used for ripping wood.

4.2.2. Chisel

Fig 4.2. Chisel

Chisel is one of the most important tools of the fitting shop. It is used for cutting and chipping the work piece when it is cold. Chisel is made of high carbon steel or tool steel. A chisel is in the form of a rod having cutting edge at one end, hexagonal or octagonal body and striking head at the other end.

The size of a chisel is described by its length and width of edge. When the cutting edge becomes blunt, it is again sharpened by grinding. For cutting the work piece with the chisel, it is placed vertically on the work piece and hammering is down upon its head. But for chipping, the chisel is inclined at 40 – 70 degree with the work piece. The angle of the cutting edge of the chisel is 35 – 70 degree according to the metals to be cut.
4.2.3. Jack

![Fig 4.3. Trolley jack and lift](image)

In a bit workshop, a jack becomes necessary to facilitate the servicing work. It may be pneumatically operated, but more common these days are the electrically operated ones. The jack raises the vehicle high enough to carry out the work under it. 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.

4.2.4. Screwdriver

![Fig. 4.4. Screw driver](image)

The screwdriver is used to drive or turn screw. The most common type has a single flat blade for driving screw with slotted head. This is the Phillips head and read and prince screw driver. Always use a correct screwdriver when using a single blade screwdriver. The one with a tip that properly fits the slots in the screw. The screwdriver is one of the commonly used tools in the work shop and at home. It is used to loosen and tighten screws which have slots in their heads. A screwdriver is available in several size, shapes or types.

4.2.5 Types of screwdriver

1. Standard screwdriver
2. Cabinet screwdriver
3. Standard with square shank screwdriver  
4. Flat blade screwdriver  
5. Electronics screwdriver  
6. Offset screwdriver  
7. Phillips screwdriver  
8. Ratchet type screwdriver

4.2.6. Pliers

![Fig. 4.5 Pliers](image)

A plier is a handy tool used for holding and gripping small objects at places where the use of hands is unsafe or inconvenient. It is also often used as a wrench to hold and turn, but this is not a safe practice and should be avoided. Generally, there are two types of pliers in common use: the combination or slip joint pliers used for holding and gripping small objects; and the nose pliers which have a long tapering nose used for positioning circlips and placing small objects in narrow spaces.

4.2.7. 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.

![Fig. 4.6 Wrenches](image)
Types of wrenches

1. Open-end wrench
2. Socket wrench
3. Pipe wrench
4. Monkey wrench
5. Adjustable wrench
6. Close–end wrench
7. Twelve-point box wrench
8. Tee-socket wrench
9. Off-set socket wrench
10. Allen wrench
11. Torque wrench

4.2.8. Ring expander

Fig. 4.7 Ring expander

They are used for removing and installing the piston rings on the piston. They have flat gripping edges to avoid any damage to the rings and to the piston. The expander is very light in weight and weighs only 5 ounces.

4.2.9. Torque wrench

Fig. 4.8. 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.

4.2.10. Bench wise

![Fig. 4.9. Bench wise](image)

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 or large, round or 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.

4.2.11. Electrical portable drill.

![Fig 4.10. Electric portable drill](image)

Electric portable drill, tools is an electrically powered machine used to make holes wrench required. It can be taken conveniently to any area of repair since it is handy compact and portable.

It has electric motor that drives a chuck with adjustable jaws that holds a tool. The chuck jaws are opened and a drill bit inserted turning and chuck key close the jaws. They tightly grip the shank of drill bet.

Observe the following caution when using an electric drill.
1. Drill must be properly grounded through the ground terminal in the plug.
2. Do not drag the drill by its cord.
3. Do not like the cord, step unit or run a vehicle or machine over it. This could damage insulation and cause dangerous electric shock.
4. Keep your hand and cloths away from the rotating chuck and drill bit.
5. Keep a frame grip on the drill. Be ready to shut it off if the drill bit jams.
6. It is the bit jams do not try to break it free by turning the drill on and off. This can damage the drill pull the drill back to free it.

4.2.12. Hack saw

Fig 4.11 Hack saw

Hack saw is used for cutting metal pieces, like rods, pipes, sheets, etc. in the fitting shop. It consists of two main parts of toothed blade and fixed or adjustable frame. The hack saw has a replaceable steel blade, with has a series of sharp teeth. The teeth at like tiny chisel as the blade is pushed over a piece of metal, the teeth cut fine shavings, or fillings, of the metal. The forward strokes which do the cutting should be smooth and steady not jerky on the back stroke, life the blade slightly so that it does not drag. This would dull the teeth.

4.2.13. Drill bits

Fig 4.12 Drill bit

Drill bits are cutting tools used to create cylindrical holes, almost always of circular cross-section. Drill bits come in many sizes and have many uses. Bits are held in a tool called a drill, which rotates them and provides torque and axial force to create the hole. Specialized bits are also available for non-cylindrical shaped holes.

The shank is the part of the drill bit grasped by the chuck of a drill. The cutting edges of the drill bit are at one end, and the shank is at the other. Drill bits come in
standard sizes, described in the drill bit sizes article. A comprehensive drill bit and tap size chart lists metric and imperial sized drill bits alongside the required screw tap sizes.

4.2.14. Pullers

![Fig. 4.13 puller](image)

Pullers are used to remove gears, bearings, pulleys, wheel, etc. from their attaching components. They provide a safer, quicker, and easier removal. They may operate manually or hydraulically. The pullers may be of several kinds. These are: 1. Pull type puller and 2. Push type puller. 3. Mechanically puller 4. Hydraulically pullers

4.2.15. Punches

![Fig. 4.14 Punch](image)

A punch is a circular rod having one pointed end and the other end flat. Its body is knurled. It is used to mark points on the work piece for further operations like drilling, filling, cutting, chipping. To mark a point, the punch is kept vertical on the surface touching its pointed end with it. Its upper end is then slightly strike by a hammer. The points in a line easily visible when cutting or chipping the work piece.

4.2.16. Box spanner
Box spanner is really a skilled tool to fasten or uninstall the screws. It truly is composed of six-rowed sleeve, one or some sleeve handle structure. The inside six-rowed sleeves are placed in order according to the item No. of screws for specific utility. The box spanner is composed of boxing sleeve with 6 or twelve sleeves, take care of, and connective pole and the like. It is fairly suitable to wrench the screw, bolt and nuts in narrow or deep places.

Main applications of box spanner

It can be used for the nut or bolt in fully lower position than the connective face, and also the diameter of concave hole rejects the application of open-end or adjustable wrench. That could be exclusively suitable for box spanner. Aside from, due to the space limitation of bolt pieces, people may only use box spanner.

4.2.17 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.

4.2.18. Tomy

![Fig.4.17. Tomy](image)

A Tommy bar, also called a T-bar or wrench lever, is a short bar or rod that is inserted through the shaft of another tool, most commonly a socket spanner or box spanner, to provide extra leverage when turning the tool. Spanners are used to tighten or loosen nuts and bolts. A spanner used with a Tommy bar has a hole through the shaft where a bar is inserted to help turn the nuts and bolts, for example when changing car tires, removing hubcaps, or doing adjustments to a motorcycle tire. Tommy bar tools come in many different sizes with varying diameters and of varying lengths, and are usually made of aluminum, steel or stainless steel that can be chrome-plated, zinc-plated or powder-coated. A Tommy bar tool is commonly included in tool kits provided with a car or motorcycle.

The type of spanner most commonly used with a Tommy bar is the box spanner, also called a box wrench. This tool is a hollow tube with a socket at each end, and the T-bar is inserted through the two holes in the hollow tube to help turn the spanner. T-bars can also be used with jackscrews.

4.2.19. Files

![Fig.4.18. File](image)

File is the one of the most important tool used in fitting shop. It is used for filling the metal surface. Files are made of high carbon steel by forging. They are hardened and tempered. If the file is made of mild steel, it is case hardened. The advantage of
such a file is that it is not brittle. For filling the work piece in different shapes, the files are made of different cross sections.

4.2.20. Thickness gauge

Fig 4.19. Thickness gauge

Thickness gauge or feeler gauge are strips or blades of metal of various thickness. Many thickness are dual dimension for example 3 and 0.08 mm on the first blade means it is 0.003 inch (or 0.08 mm) thick. Some thickness gauges are stepped. The tip is thinner that the rest of the blade for example the top blade is 0.004 inch (0.10mm) thick at the tip and 0.006 inch (0.15) along the rest of the table. Thickness gauge are used to measure small distance such as the clearance between two parts. For example thicknesses gauge being used check the clearance between the rocker arm and valve in an engine. The clearance is adjusted by running the adjusting screw.

Stepped thickness gauge are often used where close adjustment are required. For example suppose the specifications call for 9 valve clearance of 0.005 which (0.13 mm). You would use a 0.004 to 0.006 inch (0.10 to 0.15 mm) stepped thickness gauge you would adjust the clearance so that the (0.004 inch to 0.10 inch) end should fit but the thickness part would not stepped thickness gauge are often called go-no-go gauge.

4.2.21. Vernier calipers

Fig. 4.20 Vernier calipers
It is normally used to measure length, thickness or outside or inside diameters of small jobs where accuracy of measurement is in multiple of ten microns or 1 thousandths of an inch called thou.

1 thou = 1/1000 inch = 25 microns and 1 microns = 1/1000 mm.

Some Vernier calipers are fitted with dial or digital indicator to give direct reading of the scale measurement taken. Free length of valve springs is measured using Vernier calipers. For same mechanics the Vernier caliper is more convenient than the mike the Vernier caliper take both inside and outside measurement to within thousandths of an inch to read that are seen between the last inch marking and the zero on the Vernier scale. Then add the numbers of 0.025 inch marking seen between the last tenth reading and the zero on the Vernier scale finally read the numbers of line from zero on the reverse scale to the point where the line on the Vernier scale exactly meets a line on the fixed scale. Each of their lines represents 0.001 inch. There is also a metric Vernier caliper.

4.2.22 Micrometer

![Micrometer](image)

**Fig 4.21 Micro meter screw gauge**

The micrometer is a precision tool that can measure thickness in thousandths or ten-thousandths of an inch or in hundredths of a millimeter metric system. There two types, outside and inside micrometer in the shop micrometers are called ‘’mikes’’

A micrometer is accurately calibrated at the time of manufacture to ensure accurate measuring, check the calibration of the micrometer are checked by leaning the contact faces then close then against inch other or against a standard test gauge, these gauge is usually included in a micrometer set. Inside micrometers should be assembled then the overall length should be checked using an outside micrometer of known accuracy.

4.2.23 Bore Gauge
It is basically a dial indicator in a special holder to check an engine cylinder with a cylinder bore gauge. The gauge is moved up and around the cylinder bore. The amount of movement of needle from zero mark shows surface variation indicating the amount of wear, tapers and ovality of cylinder.

4.2.24 Depth gauge

It is a precession instrument type of micrometer used to measure the depth of a groove or hole or liner distance between two surface increasable measures by inside or outside micrometer. Some Vernier and dial calipers also serve as depth gauge. They have a thin blade attached to the moving jaw. As the jaw moves the out the blade expands from the other end of the frame. This measure of expand length of blade is indicated on the Vernier or dial scale.

4.2.25. Feeler gauge

(Fig. 4.22 Bore gauge)
(Fig. 4.23 Depth gauge)
(Fig. 4.24 Feeler gauge)
The feeler gauge compresses a no. of levels in which each leaf has different thickness. The length and width of levels are equal. The name feeler gauge comes from the fact that, they are used to check such a small gaps which can just be felt. They are used to check and adjust the gaps of spark plug electrodes, contact breaker points in distribute rotor assembly and valve tapped clearance, etc. depending upon the type of services performed by them, the feeler gauge may be classified as follows.

4.2.26. Wire gauge

Wire gauges are precisely sized pieces of round wire having its diameter marked usually on the wire holder. They are used similar to feeler gauge to measure small gapes or opening kill’s spark plug electrode gap.
4.3 DIFFERENT TYPES OF MAJOR EQIPMENTS AND INTSTRUMENT

4.3.1 WHEEL BALANCER

(Fig 4.26 wheel balancer)

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, describes the distribution of mass within an automobile tire or entire wheel attached.

When wheel rotates, asymmetries of mass may cause it to hop or wobble, which can cause ride disturbance, usually vertical & lateral vibration. It can also result wobbling of the steering wheel or of the entire vehicle. Vehicle suspension can become excited by unbalanced forces when the speed of the wheel reaches a point that its rotating frequency equals the suspensions resonant frequency. Balancer machine measured the weight on balancing machine and correction weight are applied to counteract the combined effect of the tire and wheel unbalanced. After sale, tyre may be rebalanced if driver perceives excessive vibration.

(Fig 4.27 Tire weight)
4.3.2 wheel alignment machine

Wheel alignment consist of adjusting angle of the wheel so that they are set to the car maker’s specification. The purpose of these machine to reduce wear and to ensure that vehicle is traveling straight and true without pulling to one side on road. This may lead to vehicle pulling and tire wear. Under normal driving condition many vehicle can go 50,000km+ before they need a new set of tire, which is a good interval to have the alignment checked as well as.

If your vehicle squeals while turning corner on dry pavement, it is probably time to have alignment checked. Affecting and potential shortening the life of all other component. Braking distance, ride quality, fuel economy are all affected by the correct inflation and rotation of tire. 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 a labour. When fasteners and hardware are sized extra time require and part may need to replace. A good start is to consult your local licensed automotive technician.
Tire Wear and Wheel Alignment

- Wear Indicator
- Overinflation
- Underinflation
- Feathered Wear
- Camber Wear
- Spotty/Chopped Wear
- Diagonal Wear/Heel and Toe Wear
- Local Wear
- Negative Camber
- Positive Camber
- Toe In
- Toe Out
- Negative Caster
- Positive Caster

(FIG 4.29 tire wear wheel alignment)
4.3.3 Spot welding machine

Resistive spot welding is a process in which contacting metal surfaces are joined by the heat obtained from resistance to electric current. Work pieces are held together under pressure exerted by electrodes. Typically, the sheet are in the 0.5 to 3 MM thickness range. The process uses two copper alloy electrodes to concentrate welding current into a small spot and to simultaneously clamp the sheets together. Forcing a large current through the spot will melt the metal and form the weld. The attractive feature of spot welding is a lot of energy produced and delivered to the spot for a short time. That permits the welding to occur without excessive heating of the remainder of the sheet.

The amount of heat delivered to the spot is determined by the resistance between the electrode and the magnitude and duration of current. The amount of energy is chosen to match the sheets material properties, its thickness. Applying little energy not melt the metal and or make a poor weld. Applying too much energy will melt the metal too much and make a hole rather than a weld another feature of weld is that the energy delivered to the spot can be controlled to produce reliable weld.
4.3.4 Hydraulic lift

(Fig 4.32 hydraulic lift)

Main purpose of hydraulic lift is to lift vehicle in work shop. Hydraulic lift can serve as work platform for mechanics. So the mechanic can work easily under the vehicle. When car lifts the work will been easy to done under the car like a, oil change, gear oil replace & some under body work would been easy to do. A workshop can’t complete without a hydraulic lift. Hydraulic lift is the main part of a workshop.

A hydraulic lift is a type of machine that uses a hydraulic apparatus to lift or move objects using the force created when pressure is exerted on liquid in a piston. Force then produces "lift" and "work.

Hydraulic jacks are mechanical devices that are used to lift heavy objects. Many people might be familiar with hydraulic jacks since they are used for lifting automobiles to change a tire. Various industries use hydraulic jacks to lift airplanes, race cars and semi-truck

Hydraulic Hoist for 4 Wheelers raises vehicles to any comfortable working height up to 6 feet, leaving head room for complete under-chassis access. Ideal for muffler repair, rust proofing operation, transmission repair and any other repair calling for a wheel-free condition.
4.3.5 MIG Welding

**MIG - MAG / BRAZING** welding machine. Designed for continuous and spot welding with electronic regulation of spot welding time. Thanks to Optional kits this model allows also sheet tempering and riveting. Flexibility of use with a wide range of materials such as steel, stainless steel, high strength steels and aluminium. Complete with MIG-MAG welding accessories.

(Fig 4.33 Mig welding)
4.3.6 Engine crane

An engine crane is a common repair tool used in vehicle repair shops to remove or install gasoline or diesel engines in small and crowded vehicle engine compartments. It uses a heavy cantilevered support structure to hold the engine in mid-air so that the mechanic can carefully connect or disconnect fragile hoses and wires on the engine to the frame of the vehicle.

Engine cranes are typically mounted on large casters so than an engine can be lifted straight up out of an engine compartment and then rolled away from the immobile vehicle frame. The engine crane is commonly used in combination with the engine stand so that the removed engine can be rotated in midair to provide access to underside surfaces of the engine.

(FIG 4.34 Engine Crane)
4.3.7 Transmission jack

Transmission jack is used to hold heavy transmission of vehicle when it is being removed. Hydraulic transmission jack is used with any light of heavy vehicle transmission. Transmission jack is manual and the foot-operated pump can effectively improve your work. It is easy to transfer in workshop because it is so compact and lighter in weight. There is a spring-loaded release valve automatically halts the lowering action when let go and spring loaded foot pedal helps in operation.

(Fig 4.35 Transmission jack)
4.3.8 Semi-Automatic Tire Changer

Semi-automatic side swing arm; Pneumatic bead breaker; Optional motorcycle.

(FIG 4.36 Tire changer)
4.3.9 AC Gas Filling machine

(Fig no 4.37 AC gas filler)

Do-it-to-yourself auto air conditioning recharging requires eye protection, a charging kit, refrigerant, and some practical knowledge. Keep in mind, if you do not have the manufacturer's specifications and a charging manifold with gauges, you will not be able to do a professional job, but many people successfully recharge their AC with kits available at department stores and
Auto parts retailers. Try to get a kit that includes a pressure gauge, this will make troubleshooting and charging easier. Here is a guide to how it is done.

Steps:

Discharged, it may be contaminated with moisture, and charging will not give satisfactory results unless the source of the leak is found, repaired and the receiver dryer replaced. The open system must be repaired and purged using a vacuum pump to remove air and moisture. You will also want to add compressor oil if the system has been leaking. Evidence of oil leakage and measurement of oil left in a replaced compressor will be a guide as to how much oil to replace.
Check for any obvious leaks. If your system has lost sufficient refrigerant to quit working, you have a leak. Small leaks may take months to deplete the refrigerant so that the AC fails to cool, but charging a system with a significant leak is simply a waste of time. Look for refrigerant oil residue on hose, tubing, and fittings that are part of the refrigerant system. Spray a soapy water solution on fittings and watch for bubbles to appear, indicating a leak.
Make sure the condensing coils are not obstructed with debris, and that the compressor is operating. To test a compressor with a low charge you may need to jump the pressure switch, often located on the accumulator.
Make sure the condensing coils are not obstructed with debris, and that the compressor is operating. To test a compressor with a low charge you may need to jump the pressure switch, often located on the accumulator.
Tap your refrigerant can. This is done by opening the valve on the tapping fitting completely open, which retracts the tapping pin into the valve body. Failing to do so will result in the tap puncturing the can when it is installed, releasing the refrigerant before the fitting is sealed.
Securely thread the tapping valve on the refrigerant can, close the valve completely shut. This drives the pin into the top of the can, making it possible to release the refrigerant when the valve is opened.
Purge the charging hose by opening the valve until you hear it fill with refrigerant, then slowly loosening the brass fitting that connects the hose to the valve. Be careful not to allow refrigerant to spray on bare skin, as this will freeze skin tissue on contact. Re-tighten the hose once you have heard refrigerant escaping, this should have forced any air (and moisture) from the hose.

(Fig no 4.45)

Locate the low pressure charging port on the refrigerant line on your car. This will be on the larger tube, usually near or on the accumulator. Connect the quick coupling and make sure it is not leaking.
Crank your engine and turn the AC on high cool, high fan. If your recharging hose is equipped with a pressure gauge, check it to determine if the system needs refrigerant. If the pressure holds steady in the recommended range, the system is full and should not be charged. If the pressure is below the recommended range, follow the instructions to recharge the system. Another indicator that the system needs refrigerant is that the compressor cycles rapidly. If the compressor switches on and off every 5 to 20 seconds, it is most likely due to low pressure. You will see the pressure drop when the compressor kicks on, the compressor will shut off when the pressure gets too low, and the pressure rises back up to the operating range as the system equalizes. Compressor cycling (switching on and off) in a completely...
Open the valve until you hear refrigerant passing through the hose.
Allow the can to dispense its contents. This often takes anywhere from two to five minutes. The hotter the outside temperature, the more quickly the contents will discharge. Keep the can with the tap up at all times, to allow non-liquid refrigerant

Into the suction side of the system to prevent compressor damage. Do not overcharge! A manifold gauge should be used to measure both high and low side pressure. Consult a Pressure temperature chart.

Close the valve and disconnect the hose when the can is empty or no longer discharging enough to keep the can cold. Check the charging port for leaks, and replace the plastic cap.

(Fig no 4.49)
Check the air from the AC vents in the car. It should be blowing cold (38-45 degrees), if not, either one can of refrigerant was not sufficient to charge the system, or some other component is the problem. Do not overcharge! A manifold gauge should be used to measure both high and low side pressure. Consult a Pressure temperature chart.

**4.3.10: ATS ELGI Pre-set Type Tire Inflator**

ATS ELGI Electronic Pre-Set Type Tire Inflator Inflates or Deflates the tire as per the pre-set pressure. There is a solenoid valve ensure that there is no wastage of air and air cleaner cleanse the air to be filled.

There is highly visible backlit digital display for tire pressure and set pressure and night visibility. There are plenty of tire pressure pre-sets.
4.3.11: ELAK Multi Battery Charger
Features:

- Double wound mains isolated transformer
- Full wave bridge rectifier.
- A.C. Mains ON-OFF Switch with indicator.
- Operated Rotary Switches for Voltage and Current Control.
- D.C. Ammeter to indicate charging current.
- Fuse on A.C. Input.
- Miniature Circuit Breaker on D.C. output.

4.3.12 Approximate cost of Major Parts and Equipment’s

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Name of Parts /Equipment</th>
<th>Approximate Cost of Parts/Equipment’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wheel balancer</td>
<td>85000/-</td>
</tr>
<tr>
<td>2</td>
<td>Wheel Alignment</td>
<td>350000/-</td>
</tr>
<tr>
<td>3</td>
<td>AC gas filler</td>
<td>90000/-</td>
</tr>
<tr>
<td>4</td>
<td>G-scan</td>
<td>150000/-</td>
</tr>
<tr>
<td>5</td>
<td>High scan</td>
<td>150000/-</td>
</tr>
<tr>
<td>6</td>
<td>Spot welding</td>
<td>75000/-</td>
</tr>
<tr>
<td>7</td>
<td>Hydraulic lift</td>
<td>175000/-</td>
</tr>
<tr>
<td>8</td>
<td>Flat liner</td>
<td>65000/-</td>
</tr>
<tr>
<td>9</td>
<td>Air filter</td>
<td>300/-</td>
</tr>
<tr>
<td>10</td>
<td>Diesel filter</td>
<td>2000/-</td>
</tr>
<tr>
<td>11</td>
<td>Brake pad</td>
<td>2000 to 10000</td>
</tr>
<tr>
<td>12</td>
<td>Wiper blade</td>
<td>500 to 1500</td>
</tr>
<tr>
<td>13</td>
<td>Spark plug</td>
<td>2000/-</td>
</tr>
<tr>
<td>14</td>
<td>Headlight (Verna fluidic)</td>
<td>46000/-</td>
</tr>
<tr>
<td>15</td>
<td>Gear cable</td>
<td>2500 per piece</td>
</tr>
<tr>
<td>16</td>
<td>Pressure plate</td>
<td>25000</td>
</tr>
<tr>
<td>17</td>
<td>Front bumper</td>
<td>5000 to 12000</td>
</tr>
<tr>
<td>18</td>
<td>Alloy wheel</td>
<td>3200 to 11000</td>
</tr>
<tr>
<td>19</td>
<td>Power widow motor</td>
<td>2200 to 15500</td>
</tr>
<tr>
<td>20</td>
<td>Spark plug</td>
<td>500 per piece</td>
</tr>
<tr>
<td>21</td>
<td>Gear oil</td>
<td>1100/-</td>
</tr>
<tr>
<td>22</td>
<td>Wiper motor</td>
<td>1800/-</td>
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<tr>
<td>23</td>
<td>Music player</td>
<td>9000 to 78000</td>
</tr>
<tr>
<td>24</td>
<td>Tail bumper</td>
<td>3200 to 12000</td>
</tr>
<tr>
<td>25</td>
<td>Wind shield</td>
<td>5000 to 22000</td>
</tr>
</tbody>
</table>
CHAPTER 5: Work Done At Orange Hyundai

5.1 Testing of automobiles:

When some vehicle comes to our workshop for servicing vehicle and complain about wheel alignment or wheel balancing or any other noise in vehicle then one technician take a test drive of car and check the main problem in car. And solve the problem of customers & one time the service has been done then after technician and customer both take the test drive of car and when customer say that they are satisfied then car’s service was complete.

5.2 Overhauling & Major vehicle repairs:

Definition: Body repair industries where highly skilled worker are able to restore a vehicle. To its original glory after it has been damaged.

A major repair, remake, renovation, or revision it means overhauling.

5.2.1 Major repair of vehicle/Accident repair vehicle

- There are five steps to repair major repair vehicle
  1. Filling claim
  2. Disassembling
  3. Repair
  4. Paint
  5. Cars delivery

(Fig 5.1 Major vehicle repair)
Filling claim:

Before anybody work takes place you must Report the accident and file a claim with your Industry Company. If the insurance provider feel car is flexible you will get claim number and you can contact a body shop. Then after company hand over the car and starts the next step.

Disassembly

The body shop will disassemble the vehicle. During the disassembly process, it’s common for a body shop to find inner damage that was hidden from the initial inspection.

In many cases, the insurance company will in many cases, the insurance company will have to get involved once again and more Part will be ordered.

(Fig 5.2 disassembled vehicle)

Once the part has been arrived work will continue and starts the restoration of vehicle. Technician make the scheduled of restoration.

Repair:
After all of the parts have arrive and the repair Sophisticated equipment to closely analyze your vehicle frame to ensure it is brought back exactly same specification. Once the frame is restored and balanced, any Exterior panel and other metal finishing pieces are installed on vehicle. After this portion Is Completed, the shape of car right back to where it was originally.

**Paint**

The car never look completed without a New paint job, but before that happen, the new panel must be prepared for paint. The new panel must be primed and then Sealed properly so they accept the paint After new part have been prepared, the Final coats of paint are applied. Once paint dried and the car looks restored.

![Painting Process](image)

*(Fig 5.3 painting process)*

**Car’s delivery:-**

Before the vehicle can be given back to its Owner, it must be tested out on the road to ensure it drives like it is supposed to. The whole point of body repair is to restore a vehicle to its pre-accident Condition. Once the body shop feels confident that the vehicle properly restored, they will call the owner to come in and pick it up or Deliver to its owner.
5.3 Work Done by Myself at Orange Hyundai:

5.3.1 Engine oil, oil filter replace

(Fig 5.4 oil filter replace)

5.3.2 Gear oil change

(Fig 5.5 gear oil change)
• **5.3.3 Battery change**

(Fig 5.6 battery change)

• **5.3.4 Wheel rotation**

(Fig no 5.7 wheel rotation)
- Wheel balancing & alignment
- Battery replace
- Head light changing
- Brake pad service

**5.3.5 Service of car**

1st service of car
2nd service of car

3rd service of car

(Fig 5.8 brake pad replace)

**5.3.6 Wiper Blade changing**

(Fig 5.9 wiper blade replacement)
5.4 Overhauling of Engine

A tune-up usually refers to the routine servicing of the engine to meet the manufacturer's specifications. Tune-ups are needed periodically as according to the manufacturer's recommendations to ensure an automobile runs as expected. Modern automobiles now typically require only a small number of tune-ups over the course of an approximate 250,000-kilometre (160,000 mi) or a 10-year lifespan.

Tune-ups may include the following:

- Adjustment of the carburettor idle speed and the air-fuel mixture
- Inspection and possible replacement of ignition system components like spark plugs, contact breaker points, distributor cap and distributor rotor
- Replacement of the air filter and other filters
- Inspection of emission controls
- Valve train adjustment

In early days, mechanics finishing the tune-up of a performance car such as a Ferrari would take it around a track several times to burn out any built-up carbon; this is known as an Italian tune-up.

(Fig 5.10 engine overhauling)

5.5 GEAR BOX OVERHAULS:

- Problem: Gear Shifting Hard Of 1st & 2nd.
- Action Taken: Synchronizer Ring Change Of 1st & 2nd Gear
5.5.1 PROCEDURE OF DISASSEMBLE A GEAR BOX:

- First of all we taken test drive of Car.
- Then we decide to change the 1st & 2nd Gear Synchronizer Ring.
- First of all we adjust the car into lift.
- Then we open the front tyres & Drive Shafts.
- Then we remove the Battery from the car.
- Then start opening the connections or bolts of Gear Box.
- We put the tyre under the Gear Box.
- Then open the bolts of Mounting of Gear Box.
- Result, the Gear box easily Disassemble.
- Then we started opening the shafts of Gear Box.
- Each Gear Box consists of four Synchronizer Ring for 1st, 2nd, 3rd, 4th Gear.
- The upper Shaft is called Counter Shaft, on which the 1st & 2nd Gear are Mounted.
- The lower Shaft is called Lay Shaft, on which 3rd & 4th Gear are mounted.
- 5th Gear is mounted on left side on top of the Gear Box.
- The Reverse Gear was located near to Shaft.
- The above image shows the Synchronizer Rings.

(FIG 5.11 Front Axel)
The above image shows the Final Gear of Swift.

(FIG 5.12 Gears)

(FIG 5.13 synchronizing Gear ring)
- The Drive Shafts are Mesh with this Gear.
- It consists of Sun Gear & Planet Gear.
- We change the Synchronizer Ring with the help of Hydraulic Press.
- After this all done, the problem was solved and the Shifting of Gears are also smooth.

**5.5.2 GEAR BOX OVERHAULS (CASE 2):**

- Car: Verna (Diesel)
- Problem: Noise Occurs Continuously Like A Rickshaw.
- Action Taken: Counter Shaft Replace.

**5.5.3 Procedure of Solving the Problem:**

- First of all we taken the test drive.
- The Gears are shifting properly without noise.
- But when we press the brake pedal the noise not occurs.
- Then we decide to remove the Gear Box.

- Adjust the car into lift.
- Remove the front tyres and put under the Gear Box.
- Disassemble of Drive Shafts.
- Then we started opening the connections or bolts of Gear Box.
- And finally open the bolts of mountings.
- Result Gear Box remove from the car.

(FIG 5.14 Drive shaft)
- The above image shows the Counter Shaft of SX4.
- The 1st & 2nd Gear are mounted on this shaft.
- The top of the left side of this shaft is Gear Bearing.
- The problem was the teeth of this shaft is broken.
- Then we change the Counter Shaft.
- The problem was solved & we taken the test drive again, the noise was not occurring.

5.6 Faults & remedies:

Cost Reduction workshops focus on material, labour, and overhead costs at the business or product line level. Workshop preparation includes assembling relevant material costs (including out-sourcing) and labour costs both direct and indirect. Breakdowns may also be by product line, customer, location, or supplier. Quality costs, rework, value-added data are also collected. A multi-functional team assesses the cost, quality, and productivity data and brainstorms solutions based on cost, Lean Thinking, supply management, productivity.

5.7 Major failures

A major failure to comply with the consumer guarantees is when: a reasonable consumer would not have bought the motor vehicle if they had known about the full extent of the problem. For example, no reasonable consumer would buy a new car with so many recurring faults that the car has spent more time off the road than on it because several mechanics have been unable to solve the problem> the motor vehicle is significantly different from the description, sample or demonstration model shown to the consumer. For example, a consumer orders a car with a diesel engine after test-driving the demonstration model, but the car delivered has a petrol engine the motor vehicle is substantially unfit for its normal purpose and cannot easily be made fit within a reasonable time. For example, the engine of a pick-up vehicle, with a stated towing capacity of 3500 kilograms and normally used for towing, has a design flaw that causes it to overheat when it tows a load of more than 2500 kilograms the motor vehicle is substantially unfit for a purpose that the consumer told the supplier about, and cannot easily be made fit within a reasonable time. For example, a sports utility vehicle does not have enough towing capacity to tow a consumer’s boat, despite the consumer telling the supplier the boat’s specifications the motor vehicle is unsafe. What is ‘unsafe’ will depend on the circumstances of each case. For example, a truck has faulty brakes that cause the vehicle to require a significantly greater braking distance than safe for normal use. When there is a major failure to comply with a consumer guarantee, the consumer can choose to reject the motor vehicle and choose a refund or an identical replacement (or one of similar value if reasonably available), or keep the motor vehicle and ask for compensation for any drop in its value caused by the problem.
5.7.1 Major failure - rejection period

A consumer cannot reject a vehicle if the: rejection period has passed consumer has lost, destroyed or disposed of the vehicle. Vehicle was damaged after being delivered to the consumer vehicle, part or component has been attached to, or incorporated in,

Some other property and cannot be detached without damaging it consumer has caused the problem through their own action or inaction – see Abnormal use’ below.

5.8 Minor failures

Minor failures to comply with the consumer guarantees of acceptable quality or fitness for purpose include those where a vehicle has a fault that significantly affects its operation, but can be fixed within a reasonable time. For example: a vehicle where the windscreen wipers stop working a vehicle with a small fault in its transmission, which the manufacturer can quickly resolve by, for example, replacing the entire transmission rather than repairing only the faulty component. A minor failure does not initially allow the consumer to reject the motor vehicle and demand a refund, replacement or compensation for the difference in value.

5.9 Maintenance:

Describes the act of inspecting or testing the condition of car subsystems (e.g., engine) and servicing or replacing parts and fluids. Regular maintenance is critical to ensure the safety, reliability, drivability, comfort and longevity of a car. During preventive maintenance, a number of parts are replaced to avoid major damage or for safety reasons, e.g. timing belt replacement.

Types of Maintenance

- Preventive Maintenance
- Periodic Maintenance
- Break down maintenance
- Predictive maintenance

5.9.1 Preventive Maintenance (PM) has the following meanings:

1. The care and servicing by personnel for the purpose of maintaining equipment and facilities in satisfactory operating condition by providing for systematic
2. Inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects.
3. Maintenance, including tests, measurements, adjustments, and parts replacement, performed specifically to prevent faults from occurring.
The primary goal of maintenance is to avoid or mitigate the consequences of failure of equipment. This may be by preventing the failure before it actually occurs which Planned Maintenance and Condition Based Maintenance help to achieve. It is designed to preserve and restore equipment reliability by replacing worn components before they actually fail.

Preventive maintenance activities include partial or complete overhauls at specified periods, oil changes, lubrication and so on. In addition, workers can record equipment deterioration so they know to replace or repair worn parts before they cause system failure. The ideal preventive maintenance program would prevent all equipment failure before it occur.

5.9.2 Predictive Maintenance (Pdm)
Techniques are designed to help determine the condition of in-service equipment in order to predict when maintenance should be performed. This approach promises cost savings over routine or time-based preventive maintenance, because tasks are performed only when warranted.

The main promise of Predicted Maintenance is to allow convenient scheduling of corrective maintenance, and to prevent unexpected equipment failures.

The key is "the right information in the right time". By knowing which equipment needs maintenance, maintenance work can be better planned (spare parts, people, etc.) and what would have been "unplanned stops" are transformed to shorter and fewer "planned stops", thus increasing plant availability.

Other potential advantages include increased equipment lifetime, increased plant safety, fewer accidents with negative impact on environment, and optimized spare parts handling.

5.9.3 Breakdown Maintenance
It means that people waits until equipment fails and repair it. Such a thing could be used when the equipment failure does not significantly affect the operation or production or generate any significant loss other than repair cost.
5.9.4 Periodic Maintenance (Time Based maintenance – TBM)

Time based maintenance consist of periodically inspecting, servicing & cleaning equipment and replacing parts to prevent sudden failure and process problems
Chapter 6 Cost Reduction:

6.1 Transportation cost:

Transportation fee is relevant to delivery time and route. In order to reduce transportation fees, it is essential to improve routes and shorten delivery time for the third-party logistics company and automobile manufacturer.

Order cost:

The quantity can be ordered in an economical approach. Order cost is relevant with the maintenance fee, delivery cost and cycle of demand. According to the different Reality of the situation, order costs can be reduced via the method of EOQ.

Inventory cost:

It is the inventory cost that the manager in the company wants to reduce dramatically. One approach is to reduce the inventory cost which is to categorize the raw materials in the warehouse into three classes, managing them with a different role. The information system also plays an important role in reducing inventory costs. Among a variety of information systems, Toyota’s Just-in-time is imitated by other automobile companies because ‘zero inventories’ result is to reduce cost both to the manufacturer and suppliers obviously.

Recessive cost:

This kind of cost is unstable, due to uncertain factors. However, recessive cost in Automobile manufacturers can be reduced by outsourcing logistics. The qualified staff and professional services could have a positive effect on satisfying the requirements that delivery is achieved safely and without damage from automobile
Manufacturers. In addition, delivering raw materials at the right time, in the right places and in the Right quantity is also helpful to reduce the recessive costs of stock-out cost.

There is an undoubted relationship between production sectors and cost reduction,

Which has been proved by empirical data and analysis, the production sectors include Labour and materials and they can help automobile companies reduce production costs directly through some different measures, such as priority of cheaper labour, standardization and improvement of productivity, all of which have been mentioned in figure.

Although the theories which have been shown in the literature review, in the field of logistics, the explicit cost includes transportation costs, order costs and inventory costs. In addition, the return cost and the stock-out cost are composed to the implicit cost. These five costs can be solved by planning the best route, the method of economic order quantity, the method of activity based classification and Just-in-time. However, it is necessary for those methods of cost reduction to be supported by a management information system, and executing these actions by outsourcing logistics. Therefore, an automobile company can reduce the cost of logistics by two tools-outsourcing and a management information system, and implement different methods to reduce different parts of costs.

Therefore, overseas automobile companies and local automobile companies tend set up manufacturing factories in the cheaper labour areas, which can help automobile companies reduce production costs directly. Materials are factors to help automobile companies reduce costs in the production sectors. According to the interview, standardization of materials and improvement of productivity have been provided; the effective implementation of those two measures can help automobile companies reduce production costs directly in the automobile market.

6.2: SAFETY FEATURES

6.2.1 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).

6.2.2 Electronic Stability Control (ESC):

Operation:

ESC reduces the risk of a car going off-path or losing control. ESC uses intelligent sensors to detect when a car has deviated from its steered direction, then reduces engine torque and selectively applies the brake to individual wheels to bring the car back on track. ESC is also known as: Electronic Stability Program (ESP); Dynamic Stability Control (DSC); Vehicle Stability/Swerve Control (VSC) or Active Stability Control (ASC).

Benefits:

ESC reduces the risk of single car crashes by:
- correcting over steering or under steering
- stabilizing the car during sudden movements (e.g. swerving)
- improving handling on gravel and unmade roads (e.g. road shoulders)
- Improving traction on slippery or icy roads.

6.2.3 Intelligent Speed Assistance (ISA) or speed alert system

Operation:

ISA is an emerging safety technology that uses GPS (Global Positioning Systems) and digital speed maps to alert drivers when they speed.

Benefits:

ISA can act in two ways, as a passive warning device or as an active speed limiter.

6.2.4 SRS (Supplemental Restraint System) Airbag

Operation:

Front airbags are designed to stop your head hitting the dashboard, steering wheel and windshield. Side curtain airbags are usually found in

The roof rails above the doors. They deploy downwards, creating a ‘curtain’ that covers the side windows.
6.3: Accidental Vehicle Studies

6.3.1 Various Causes of Road Accidents:

- **Road Users** - Excessive speed and rash driving, violation of traffic rules, failure to per-chive traffic situation or sign or signal in adequate time, carelessness, fatigue, alcohol, sleep etc.
- **Vehicle** - Defects such as failure of brakes, steering system, tire burst, lighting system.
- **Road Condition** - Skidding road surface, pot holes, ruts.
- **Road design** - Defective geometric design like inadequate sight distance, inadequate width of shoulders, improper curve design, improper traffic control devices and improper
- **Lighting**
- **Environmental factors** - unfavourable weather conditions like mist, snow, smoke and heavy rainfall which restrict normal visibility and makes driving unsafe.
- **Other causes** - improper location of advertisement boards, gate of level crossing not closed when required etc.

Accidental vehicle study involves using specialized tools and equipment to measure the location of reference points on the vehicle. These instruments are then compared to published dimension from an undamaged vehicle. By comparing known good and actual measurements, you can determine the extent of damage.

The difference in the two measurements indicates the direction and amount of frame or body misalignment.

When vehicle is in a high speed crash, powerful impact forces can bend frame or unibody structure of the vehicle. The frame or body is designed to absorb some of the energy of the collision and protect its occupants when vehicle is heavily damaged in collision.

**Section 6.04: Cost Estimates of Major Repairs**

6.4.1 Accident Rate per Kilometre:

On this basis the total accident hazard is expressed as the number of accidents of all types per km of each highway and street classification.

\[ R = A \]
L

Where, \( R = \) total accident rate per km for one year,
\[
A = \text{total number of accident occurring in one year},
\]
\[
L = \text{length of control section in km}
\]

6.4.2 Accident involvement Rate:

It is expressed as numbers of drivers of vehicles with certain characteristics who were involved in accidents per 100 million vehicle-km of travel.

\[
R = \frac{N \times 100000000}{V}
\]

Where,
\[
R = \text{accident involvement per 100 million vehicle-km of travel.}
\]
\[
N = \text{total number of drivers of vehicles involved in accidents during the period of Investigation.}
\]
\[
V = \text{vehicle-km of travel on road section during the period of investigation.}
\]
Chapter No 7: Special and Challenging Experience Training

During the training Once I had get the job of disassembling the engine then my supervisor had told me To remember specific places of every nut and bolt it was challenging experience.

Here are some pics of that movement

(Fig 7.1 my special challenge)
(Fig no 7.2 my special challenge)

One day my service manager give me the post of floor supervisor. That was so challenging part of service department. That day I have to take the notes of cars and responsibility to complete the all cars at the same given to customer & also take care of the cars in workshop. And help the mechanics if they have any query about service. I have to fill up the job card in service department
Chapter no 8: My Likes and Dislikes At Workshop

8.1 Likes:-

I like the sales department because all the customer who wants to buy new car they come to sales department in showroom. So I like to convince the customer about car. Let them know about the all feature of car and convince them about car. If they agree with me then I will give them test drive and give the experience of car. then if they want compare the car with other company’s same segment car I’ll give them the comparison of cars. Overall I like to convince the customer so I like the sales department.

Service department is also my favourite department I like to service the car at workshop. Now I am able to do all type of service of car.

CRE (Customer relation executive) I like the customer relation executive department also because in this department we have to call the customer and take them feedback after service. And also let them know about their next service. Then I have to call the irregular customer and then call them for service of their car. Take the advanced booking of service car overall I like this CRE department.

8.2 Disliking:

Some rules of workshop
Customer entry allowed in workshop
Replacement parts not returning back
Test drive is not according to customers problems.
Customer is not allowed in test drive before and after repair.
References

Internet:

- www.Hyundai-india.com
- www.wikipedia.com

Magazines:

- TOP GEAR
- OVER DRIVE
- MOTOR BEAM
- BOOK OF THE CAR
- AUTO CAR
- R B GUPTA
- AUTO MOBILE ENGINEERING (VOL.1)