INTERNSHIP REPORT PAKISTAN AERONAUTICAL COMPLEX KAMRA

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# Introduction

first of all, I would like to show my join this internship program and letting me see various industry professionals and workers carry out their daily task within the industry. And giving me the chance to learn from them and their experience and gain some practical level. Here I am going to talk about my weekly agendas within this three-week internship program. The operation, maintenance and task of various machines and their know-how at industry level, their role and task of various departments are also included.

# Week 1

# METAL PARTS PRODUCTION

first day we were given briefings about the industry's role and task as a whole. How they adhere to the organisation's rules and carry out their role and task keeping the safety environment in check. After entrance into Kamra Aeronautical Complex and going through all necessary security checks, we were gathered in an Auditorium where after getting briefed about our stay and going through necessary dispatched to our designated house and Colony 3 DSF battalion and factory AMF. we would have to stay and carry out our internship within the three-week tenure.

In 1975 and Independence project by the name of p751 was launched at risalpur assembly of mfi 17 aircraft to full fill primary flying requirements of Pakistan Air Force in 1981 the Assembly Plant was shifted to its present location in camera and renamed as aircraft manufacturing factory amf. Today AMF is a sole producer of super Mushshaq aircraft. AMF was established in 1975 to undertake the flying of primary flying training aircraft under licence from saab s c a n i a from Sweden. the aircraft was named Mushshaq meaning proficient and was initially produced from the kits provided by SAAB. After successfully producing 92 aircrafts, AMF acquired the status of original equipment manufacturer OEM in 1981 within 40 years of establishment a MFS produce more than 345 Mushshaq aircraft which are successfully flying not only in Pakistan but also in foreign countries such as Saudi Arabia Oman South Africa Qatar Nigeria and Azerbaijan the request of international aviation standards but also confirms to Pakistan and South African Civil Aviation standards that is why it is the Frontline aviation product of Pakistan.

Today AMF has complete infrastructure core capabilities and state of the earth technology is for manufacturing of JS 17 aircraft machining Centre for production of aircraft parts is equipped with state of the art conventional and CNC machines .Production of aircraft parts involving higher accuracy and Precision and computer edit manufacturing systems the manufacturing of j7 group of countries computer edit manufacturing systems the manufacturing j17 Thunder JF 17 Thunder at AMF has brought Pakistan among selected group of countries of Aviation war attainment of this capability in less than a quarter of a century itself speaks of the highest standards of dedication that PAC engineers technicians showed since the word go.

This week this is the first week of a visit we went to the raw material Production department where raw materials are rough parts are manufactured on conventional machines such as late and milling machines the raw material goes through many different processes such as milling facing turning boring and drilling the produce parts after proper inspection is sent to its further designation according to the MPs in case of part rejection during inspection on NC is raised non confirmation that races and investigation for the reason of failure of the part if the investigation is approved the rejected part is the destroyed otherwise it will be sent to fail over where it is further given to the technology is to make its designation as for the design or to reject it in final product the final product part can then be issued from the log department forward for a table purpose but is mostly used in making sub assembly of a major part in the aircraft in the production line assembly parts of aircraft to be fitted the whole manufacturing process able to produce of aircrafts and Mushtaq with minimal minimal Rejection and maximum production rate.

## LATHE MACHINE

A lathe machine is a type of machine tool that is used to cut, shape, and drill a variety of materials such as metal, wood, and plastics. It works by rotating the workpiece against a cutting tool that is fixed in place. The cutting tool is typically made of metal and is shaped to create the desired shape or cut on the workpiece.

There are several types of lathe machines, including engine lathes, turret lathes, and CNC lathes. Engine lathes are the most common type and are typically used for general purpose machining. Turret lathes are capable of performing multiple operations at once and are often used in mass production settings. CNC lathes are computer-controlled and can perform complex operations with a high degree of precision.

Lathe machines are used in a variety of industries, including manufacturing, automotive, aerospace, and woodworking. They can be used to create a wide range of products, including engine parts, furniture components, and musical instruments.

Lathe machines can perform a variety of operations on different types of materials. Here are some common types of work that can be performed on lathe machines:

1. Turning: The most basic operation performed on a lathe is turning, where the workpiece is rotated against a cutting tool to remove material and create a cylindrical shape.
2. Facing: This operation is used to create a flat surface on the end of a workpiece. The cutting tool moves perpendicular to the workpiece, creating a smooth, flat surface.
3. Drilling: A lathe can be used to drill holes in a workpiece. A drill bit is fixed in the tailstock of the lathe, and the workpiece is rotated against the bit.
4. Boring: This operation is used to create a larger diameter hole in a workpiece. A boring bar is used, which is a cutting tool that moves through the hole while the workpiece rotates.
5. Knurling: Knurling is a process of creating a pattern of small ridges or bumps on a surface. This is commonly used on parts that require a better grip, such as tool handles or knobs.
6. Threading: A lathe can also be used to create threads on a workpiece, such as for screws or bolts. A threading tool is used to cut the thread into the workpiece as it rotates.

These are just a few examples of the types of work that can be performed on a lathe machine. The specific operations and techniques used will depend on the type of material being worked with and the desired outcome of the project.

## MILLING MACHINE

A milling machine is a machine tool that is used to remove material from a workpiece using a rotating cutter. The cutter is typically a multi-toothed tool that rotates on its axis, and the workpiece is fed into the cutter to remove material.

Milling machines come in a variety of sizes and types, including vertical and horizontal milling machines. In a vertical milling machine, the cutter is mounted on a spindle that is oriented vertically. The workpiece is mounted on a table that moves in three axes, allowing the cutter to remove material from different angles. In a horizontal milling machine, the cutter is mounted on a horizontal spindle, and the workpiece is mounted on a table that moves in two axes.

Milling machines can perform a wide range of operations, including:

1. Facing: This operation is used to create a flat surface on the end of a workpiece.
2. Slotting: This operation is used to create slots in a workpiece.
3. Drilling: A milling machine can be used to drill holes in a workpiece.
4. Contouring: This operation is used to create complex shapes on a workpiece, such as a curved or angled surface.
5. Tapping: A milling machine can also be used to create threaded holes in a workpiece.
6. Grooving: This operation is used to create a groove in a workpiece.

Milling machines are used in a variety of industries, including manufacturing, automotive, aerospace, and construction. They are commonly used to create parts such as gears, shafts, and engine components. CNC (computer numerical control) milling machines are also available, which are controlled by a computer and can perform complex operations with a high degree of precision.

## POWER DRILL

A power drill, also known as an electric drill, is a handheld power tool that is used to make holes and drive screws into a variety of materials such as wood, metal, and plastic. Power drills come in many different sizes and styles, from small cordless models to larger models with cords that plug into an electrical outlet.

Power drills can be used for a variety of tasks, including:

1. Drilling holes: The most common use of a power drill is to make holes in various materials. The drill bit is inserted into the chuck of the drill, which holds the bit in place while it rotates.
2. Driving screws: Power drills can also be used to drive screws into a variety of materials. A screwdriver bit is inserted into the chuck of the drill, and the drill is used to turn the screw.
3. Mixing: Some power drills are equipped with a mixing attachment that can be used to mix paint, drywall compound, and other materials.
4. Sanding: Power drills can also be used for sanding by attaching a sanding pad to the chuck.
5. Grinding and cutting: Some power drills can be used for grinding and cutting by attaching grinding or cutting attachments to the chuck.

Power drills are an essential tool for DIY projects and professional construction work. The ability to switch out drill bits and attachments make them versatile and able to handle many different tasks. The availability of cordless models makes them portable and easy to use in locations without an electrical outlet.

## METAL FORMING

Metal folding press machines, also known as metal folding machines or sheet metal brakes, are machines used in the metalworking industry to bend and fold sheet metal into various shapes and angles. Metal folding press machines can be used for a wide range of applications, from fabricating HVAC ductwork and auto body parts to creating metal furniture and decorative items.

Metal folding press machines work by applying pressure to a hinged beam, or brake, that is positioned above a flat metal sheet. The metal sheet is then bent along a predetermined axis or bend line, using a set of adjustable bending fingers or a segmented bed. Metal folding press machines can be operated manually or with the assistance of hydraulic or pneumatic systems, which can provide greater force and precision.

Metal folding press machines come in a variety of sizes and styles, ranging from small, portable machines used for light-duty applications to large, industrial machines used for heavy-duty work. Some of the most common types of metal folding press machines include:

1. Box and pan brakes: These machines are used to bend sheet metal into boxes, trays, and other three-dimensional shapes.
2. Straight brakes: These machines are used to bend sheet metal in a straight line, such as for creating metal flashing or roofing.
3. Press brakes: These machines use hydraulic or pneumatic pressure to bend sheet metal into a variety of shapes and angles, ranging from simple bends to complex, multi-bend parts.

Metal folding press machines are an essential tool for metalworking shops and fabrication businesses, as they can increase productivity and accuracy while reducing waste and labor costs. They are often used in industries such as construction, automotive, and aerospace, and are capable of producing high-quality parts with consistent precision

## ASEA and MORGAN

ASEA (American, Sweden, Europe, Asia) machine is collaboratively made hydraulic folding machine. This machine has capability to hydraulic press a part for canopy made purposes. It can press up to 3mm steel + aluminum and has 14 type of motors. It can do stretching jocking and buckling and has craft + former.

Morgan is Italy made but is both pneumatic and hydraulic press. It can do same things but is more complex and can do more sophisticated parts.

## METAL FORMING

Metal forming machines are a type of industrial machinery used in the metalworking industry to shape and manipulate metal into various forms and products. Metal forming machines can be used to create a wide range of products, from simple metal brackets and hardware to complex automotive parts and aircraft components.

There are many different types of metal forming machines, each with a specific purpose and design. Some of the most common types of metal forming machines include:

1. Presses: Presses are machines that use pressure to shape or cut metal. They come in a variety of types, including mechanical, hydraulic, and pneumatic presses.
2. Roll forming machines: Roll forming machines are used to shape metal into long, continuous strips by feeding metal through a series of rollers.
3. Stamping machines: Stamping machines are used to create shapes or designs in metal by using a die to cut or stamp the metal into a specific shape.
4. Bending machines: Bending machines are used to bend metal into specific angles or shapes. They come in a variety of types, including press brakes and tube bending machines.
5. Shearing machines: Shearing machines are used to cut metal into specific shapes or sizes. They come in a variety of types, including hydraulic shears and mechanical shears.

Metal forming machines are an essential tool for metalworking shops and manufacturing businesses. They can increase productivity and accuracy while reducing waste and labor costs. Metal forming machines are used in many industries, including automotive, construction, aerospace, and manufacturing, and are capable of producing high-quality parts with consistent precision.

## SURFACE TREATMENT

Surface treatment refers to a variety of processes used to modify the surface properties of a material, often for the purpose of improving its functionality, durability, or appearance. Surface treatment can be used on a wide range of materials, including metals, plastics, and ceramics.

Some of the most common types of surface treatment include:

1. Coatings: Coatings are applied to a material's surface to protect it from corrosion, wear, and other types of damage. Common coating materials include paint, enamel, powder coatings, and electroplated metals.
2. Surface texturing: Surface texturing is the process of creating a specific texture on a material's surface to improve its functionality or appearance. Common texturing methods include sandblasting, etching, and laser texturing.
3. Surface cleaning: Surface cleaning is the process of removing contaminants or impurities from a material's surface to improve its functionality or appearance. Common cleaning methods include solvent cleaning, abrasive blasting, and chemical cleaning.
4. Surface hardening: Surface hardening is the process of increasing a material's surface hardness to improve its wear resistance and durability. Common surface hardening methods include heat treatment, case hardening, and surface nitriding.
5. Surface modification: Surface modification is the process of altering a material's surface properties to improve its functionality or performance. Common surface modification methods include plasma surface modification, surface alloying, and surface coating deposition

Metal surface treatment refers to a range of processes used to modify the surface properties of metal materials, typically for the purpose of improving their performance or appearance. Metal surface treatment can be used on a variety of metals, including steel, aluminum, copper, and brass.

Some of the most common types of metal surface treatment include:

1. Chemical surface treatment: This involves using chemicals to alter the surface properties of the metal. Examples include acid pickling, electroplating, and anodizing.
2. Thermal surface treatment: This involves using heat to alter the surface properties of the metal. Examples include annealing, case hardening, and quenching.
3. Mechanical surface treatment: This involves using mechanical processes to alter the surface properties of the metal. Examples include grinding, polishing, and shot peening.
4. Coatings: Coatings can be applied to the surface of the metal to improve its performance or appearance. Examples include paint, enamel, powder coatings, and electroplated metals.
5. Surface texturing: Surface texturing is the process of creating a specific texture on the metal surface to improve its functionality or appearance. Common texturing methods include sandblasting, etching, and laser texturing.

Metal surface treatment can improve the corrosion resistance, wear resistance, and appearance of metals, and can help to extend their useful life. It is used in a wide range of industries, including automotive, aerospace, electronics, and construction.

## HEAT TREATMENT

Heat treatment is a group of industrial and metalworking processes used to alter the physical and mechanical properties of metals, typically for the purpose of improving their performance or characteristics. Heat treatment can be used on a wide range of metals, including steel, aluminum, copper, and brass.

There are several types of heat treatment processes, including:

1. Annealing: This involves heating the metal to a specific temperature and then allowing it to cool slowly to make it softer and more ductile.
2. Quenching: This involves rapidly cooling the metal by immersing it in a quenching medium, such as oil or water, to increase its hardness and strength.
3. Tempering: This involves heating the metal to a specific temperature and then allowing it to cool slowly to improve its toughness and reduce brittleness.
4. Case hardening: This involves hardening only the surface layer of the metal to improve wear resistance while maintaining a more ductile core.
5. Normalizing: This involves heating the metal to a specific temperature and then allowing it to cool in still air to improve its machinability and ductility.
6. Stress relieving: This involves heating the metal to a specific temperature and then allowing it to cool slowly to reduce internal stresses and improve its dimensional stability.

Heat treatment can improve the mechanical properties of metals, such as hardness, strength, and ductility, and can also improve their resistance to wear and corrosion. Heat treatment is used in a wide range of industries, including automotive, aerospace, construction, and manufacturing, and is essential in the production of many metal products.

## WELDING

Welding is a fabrication process that involves joining two or more pieces of metal or thermoplastics together by heating them to a melting point and then allowing them to cool and solidify, often with the addition of a filler material. The resulting joint is typically as strong or stronger than the surrounding material.

There are several types of welding processes, including:

1. Arc welding: This involves using an electric arc to melt and join the metals. The most common types of arc welding include shielded metal arc welding (SMAW), gas metal arc welding (GMAW), and gas tungsten arc welding (GTAW).
2. Resistance welding: This involves passing an electric current through the metals to create heat and join them together. The most common types of resistance welding include spot welding, seam welding, and projection welding.
3. Laser welding: This involves using a laser beam to melt and join the metals. Laser welding is typically used for high-precision applications, such as in the medical and aerospace industries.
4. Electron beam welding: This involves using a high-energy electron beam to melt and join the metals. Electron beam welding is typically used for high-precision applications, such as in the aerospace and nuclear industries.
5. Friction welding: This involves rubbing the two metals together to generate heat, and then pressing them together to create the joint. Friction welding is typically used for joining dissimilar metals.

Welding is used in a wide range of industries, including construction, automotive, aerospace, and manufacturing. It is essential in the production of many metal products, and is often used to repair or modify existing metal structures.

# WEEK 2

# 107-WORKSHOP

In week 2, we were allocated to the manufacturing section of factory where aircraft products are produced by high level CNC machines. In this section we will talk about the Machines used to develop the parts and control and management process behind it using CNC machine. CNC machine is a computer numerical control machine used to perform various milling and drilling operations on raw materials to give it a shape. Machine has spindle, cutting tool post installed where different cutting tools are placed. There is a bed where the raw material is held in place. A pump for moving the bed and tool, and a tube release installed, for rejecting the coolant during milling and drilling operations. In 3 axis, CNC machine the bed moves in x-plane and the tool moves in y-plane, Z plane for operations on the part. The coolant used in this section is soluble oil the section involves in various machines from China Italy and France each being either electric spindle for aluminium and soft cutting or mechanical spindle for steel parts. a machine with mechanical spindle has more torque and less speed and a machine with electrospindle has less torque and high speed. Aluminium is the raw material, the machines are controlled using PLCs through HMI (human machine interface) code for the specific part isometrically generated by use of software and send to the HMI controller, which administrators the code and reference zero program is set either automatically or manually, which is very time consuming that tools are change manually and contains up to 42 capacity in one magazine or two magazine. Milling machines installed to hold the parts and place by vacuum or by means of nuts and bolts or by shrink fit. 3-axis used to produce of parts and not used for finishing purposes. The coolant is spread after operation by means of pipe which is stored in drums to be ejected out later. For safety reasons the door of machine is kept shut during hole operation.

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## 3AXIS CNC MILLING MACHINES

**THS 100: PARPAS**

x-axis: 2500mm

y-axis: 1050mm

z-axis: 1200mm

RPM: 1-15000 rad/sec

Torque:60Nm

Tool Capacity: 32 in one magazine

Holder: BT 50

**THS 120: GANTRY**

x-axis: 8000mm

y-axis: 2700mm

z-axis: 1000mm

RPM: 1-6000 Nm

Torque: 1250Nm

Tool Capacity:1 tool at a time

**MINIMAC**

x-axis: 8000mm

y-axis: 2500mm

z-axis: 1000mm

RPM: 1-15000

Torque: 57Nm

Tool Capacity: 2 tool magazine 24 each

Holder: HSKA63

Controller: Sinumerik 840D powerline SIEMENS Controller

## 5 AXIS CNC MILLING MACHINE

**AEROSTAR Vertical CNC Milling**

x-axis: 3500m

y-axis: 1500mm

z-axis: 600mm

a-axis: +/-110 (x-axis)

c-axis: +/- 340 (z-axis)

**MINUMAC**

x-axis: 9000mm

y-axis: 2500mm

z-axis: 1000mm

a-axis: +/- 110 (x-axis)

c-axis: +/- 400 (y-axis)

RPM: 24000 (Electro-spindle)

Torque: 57Nm

Tool Capacity: 1 magazine 24 tool

Holder: HSKA63 shrink fit cutter

**MODUMILL**

x-axis: 8000mm

y-axis: 2500mm

z-axis: 1000mm

a-axis: +/- 110 (x-axis)

c-axis: +/- 200 (y-axis)

RPM: 1-6000

Torque: 1250Nm

Tool Capacity: 1 magazine 30 tools

Holder: VG10

**BF 130**

x-axis: 3000mm

y-axis: 1300mm

z-axis: 800mm

a-axis: +/- 30 (y-axis)

b-axis: +/- 30 (x-axis)

RPM: 15000 (electro-spindle)

Torque: 130Nm

Tool Capacity: 32 tools

Holder: BT 80

**DIAMOND**

x-axis: 300mm

y-axis: 500mm

z-axis: 800mm

a-axis: +/- 110 (x)

c-axis: +/- 370 (y)

RPM: 22000

Torque: 120Nm (mechanical)

Tool Capacity: 1 magazine 32 tool

Holder: AHKA38

## PRODUCTION CONTROL OFFICE

An FO is created which is control document for each specific part in production the PCO (production Control Office) which monitors the production sequence and destination of the part where the part has been where it is now and where it is headed. The FO (fabrication order) contains the part number, part design, main material used that is aluminium or steel and destination of future placement and an FO is presented to get raw materials for the part from log department.

## BENCHWORK

After rough and finished machining the part goes for benchwork where extra part or material used for fixing purposes are cleanly cut off by use of cutting saw. Pneumatic control tools are used for safety purposes. Grinding and polishing machines are used to trail holes and polish surfaces where cutter marks have been left after batch work the part goes to 110 workshop for inspection and if part is not with in tolerance levels, it is rejected on the spot and investigation is issued. Raw material such as Steel also goes through it for inspection and penetration test for aluminium before being transform into parts inspection occurs at each step after it is type the worker is stamps operation performed the part coms back to workshop17 for inspection to the foreign Chinese team for inspection, where the part is from batch number and their it has to go that is quality code according to the lot number is needed in the factory

# WEEK 3

# PLANT MAINTENENACE AND INSTALLATION

PMI is the main workshop where all maintenance and installation and repair of machinery is held. The workshop has several other sub workshops like boiler room, compressor room and HVAC, where the installation of miscellaneous working is done.

## COMPRESSOR

A compressor is a mechanical device that is used to reduce the volume of a gas or air by compressing it. Compressors are commonly used in a wide variety of industries, including HVAC (Heating, Ventilation, and Air Conditioning), refrigeration, manufacturing, and power generation.

There are several types of compressors, including reciprocating compressors, rotary screw compressors, centrifugal compressors, and axial compressors. Each type of compressor has its own unique design and characteristics, and is used in different applications based on its efficiency, pressure capacity, and other factors.

Reciprocating compressors use a piston to compress gas, while rotary screw compressors use two interlocking screws to compress gas. Centrifugal compressors use a spinning impeller to increase the velocity of gas, and axial compressors use a series of rotating blades to compress gas.

Compressors are used in a wide variety of applications, including powering pneumatic tools, pressurizing gas for storage, and providing compressed air for industrial processes. They can also be used in refrigeration and air conditioning systems to compress refrigerant and facilitate heat transfer

## BOILER

A boiler is a device that is used to heat water or generate steam. It is commonly used in industrial and commercial settings to provide hot water and steam for heating and power generation.

Boilers can use various types of fuels to generate heat, including natural gas, oil, coal, and biomass. The fuel is burned inside the boiler to generate heat, which is transferred to the water or steam. The hot water or steam can then be used for various purposes, such as heating buildings or powering turbines to generate electricity.

There are several types of boilers, including fire-tube boilers, water-tube boilers, and electric boilers. Fire-tube boilers are the most common type of boiler and have a large cylindrical vessel with a firebox at one end and tubes running through the center of the vessel. Water-tube boilers, on the other hand, have a series of tubes that run through the water-filled vessel. Electric boilers use electricity to heat the water or generate steam.

Boilers require regular maintenance and inspections to ensure they are operating safely and efficiently. Issues such as leaks, low water levels, and pressure problems can cause the boiler to malfunction or even explode, so it is important to follow proper safety procedures and have trained professionals perform maintenance and repairs.

Boilers are essential for many industries, including manufacturing, food processing, and power generation. They provide reliable and efficient heating and steam generation, and are a critical component of many industrial processes.

## EFFLUENT TREATMENT PLANT

An effluent treatment plant (ETP) is a type of wastewater treatment plant that is specifically designed to treat industrial wastewater or effluent before it is discharged into the environment. The effluent from industries can contain a wide variety of pollutants, such as heavy metals, organic compounds, and other harmful chemicals, and it can have a significant impact on the environment if it is not treated properly.

The ETP process is similar to that of a standard wastewater treatment plant, but it is designed to handle a higher volume of pollutants and more complex wastewater. The process typically includes several stages of treatment, including physical, chemical, and biological treatment, to remove or neutralize the pollutants in the effluent.

The physical treatment stage involves the removal of larger particles and solids from the effluent through processes such as screening, sedimentation, and filtration. The chemical treatment stage involves the addition of chemicals such as coagulants and flocculants to the effluent to help remove smaller particles and contaminants. The biological treatment stage involves the use of microorganisms to break down organic matter and other pollutants in the effluent.

Once the effluent has been treated, it is typically discharged into a nearby body of water or reused for other industrial processes. However, before discharge, the treated effluent must meet specific standards and guidelines set by local and national environmental agencies to ensure that it does not harm the environment.

Effluent treatment plants are essential for many industries, including chemical and petrochemical industries, pharmaceuticals, textiles, and food processing. They help to protect the environment and ensure that industrial activities do not have a negative impact on the surrounding ecosystems.

## WATER PURIFICATION PLANT

A water purification plant for surface treatment of metal is a facility designed to treat water used in the surface treatment of metals, such as in metal finishing, electroplating, and other metal treatment processes. The water used in these processes can become contaminated with various pollutants, such as heavy metals, organic compounds, and other harmful chemicals, which must be removed before the water can be safely discharged or reused.

The water purification process for metal surface treatment typically involves several stages of treatment, including physical, chemical, and biological treatment, to remove or neutralize the pollutants in the water. These stages may include:

1. Coagulation and Flocculation: Chemicals are added to the water to neutralize and coagulate the pollutants, forming larger particles that can be more easily removed.
2. Sedimentation: The coagulated particles settle to the bottom of the tank, where they can be removed.
3. Filtration: The water is passed through a filter to remove any remaining particles and impurities.
4. Activated Carbon Treatment: The water is passed through activated carbon, which absorbs any remaining organic compounds.
5. Reverse Osmosis: The water is forced through a semipermeable membrane, which removes dissolved salts and other impurities.
6. Disinfection: The water is treated with disinfectants, such as chlorine, to kill any remaining bacteria and viruses.

Once the water has been treated, it can be safely discharged or reused in the surface treatment processes. The treated water must meet specific standards and guidelines set by local and national environmental agencies to ensure that it does not harm the environment.

Water purification plants for metal surface treatment are essential for many industries, including metal finishing, electroplating, and other metal treatment processes. They help to protect the environment and ensure that industrial activities do not have a negative impact on the surrounding ecosystems

## HVAC

Heating, ventilation, and air conditioning (HVAC) is a system used to control the temperature, humidity, and air quality in buildings. HVAC systems are commonly used in residential, commercial, and industrial buildings to provide a comfortable and healthy indoor environment.

The main components of an HVAC system include a furnace or boiler for heating, an air conditioning unit for cooling, ductwork to distribute the conditioned air, and a system of vents or grilles to deliver the conditioned air to different areas of the building. Other components may include air filters, humidifiers, and dehumidifiers.

The HVAC system works by drawing in outside air and passing it through the furnace or air conditioning unit to either heat or cool it, depending on the desired temperature. The conditioned air is then distributed through the ductwork and delivered to the different areas of the building through vents or grilles.

In addition to controlling the temperature, HVAC systems are also designed to regulate the humidity levels and air quality in buildings. This is important for maintaining a healthy and comfortable indoor environment, as high humidity levels can lead to mold growth and poor air quality can cause respiratory issues.

Proper installation, maintenance, and operation of an HVAC system are critical to ensure that it functions efficiently and effectively. Regular maintenance, including changing filters, cleaning ducts, and inspecting and repairing components, can help prevent breakdowns and extend the life of the system. Additionally, upgrading to more energy-efficient components or systems can help reduce energy costs and improve the overall performance of the HVAC system

# CONCLUSION

We learnt a lot in the factory specially the experience with the factory men and workers was very delighting. This experience was really thoughtful and memorable for me. The work experience and the interpersonal skills we have developed here is second to none.