An

Internship Report

On

Zero Hour Defect Contributions and Their Possible Solutions

In partial fulfilment of the requirement for the award of degree of

BACHELOR OF TECHNOLOGY IN

ELECTRONICS ENGINEERING

Submitted by

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(0901ME201043)

Under the guidance of

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VOLVO EICHER COMMERCIAL
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DEPARTMENT OF ELECTRONICS ENGINEERING

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE
GWALIOR-474005 (M.P)

Deemed to be University

(Declared under Distinct Category by Ministry of Education, Government of India)NAAC ACCREDITED WITH A++ GRADE

June, 2024

DECLARATION BY THE CANDIDATE

I hereby certify that the Internship report entitled **Zero Hour Defect Contributions and Their Possible Solutions** which is being submitted in **Electronics Engineering Department** is a record of my own work carried out under the supervision and guidance of **MR. SHIV BIRLA & Dr. Vikas Mahor**, Department of Electronics Engineering, Madhav Institute of Technology & Science, Gwalior.

All information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I have fully cited and referenced all material and results that are not original to this work.

To the best of my knowledge the material presented in this report has not been submitted to any other place (i.e. institute, university, organization) as thesis/report except the industry, where this work has been carried out.

Ashish Rathore

0901ME201043

Date: 29-05-2024

Place: Gwalior

This is to certify that the above statement made by the candidates is correct to the best of my knowledge and belief.

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ACKNOWLEDGEMENT

I would like to express my sincere appreciation to my supervisor **Dr. VIKAS MAHOR** for his guidance, encouragement, and support throughout the course of this work. It was an invaluable learning experience for me to be one of their students. From them I have gained not only extensive knowledge, but also a careful research attitude.

I am also thankful to **MR. PRAVEEN TRIPATHI (DGM) AND MR. SHIV BIRLA (AM)** for his cooperation with me in facilitating the infrastructure and lab facility during my work.

I am highly indebted to Dr R.K. Pandit, Director M.I.T.S., Gwalior (M.P.) for the facilities provided to accomplish this internship.

I would like to thank Dr. Vandana Thakare, Head department of Electronics Engineering, M.I.T.S., Gwalior (M.P.) for his constructive criticism throughout my internship.

I would like to thank Prof. Deepak Batham, internship coordinator Department of Electronics Engineering for their support and advices to get and complete internship in above said organization.

I am extremely great full to my department staff members and friends who helped me in successful completion of this internship.

Name & Signature of Students

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Place :- Gwalior

PLAGIARISM CHECK CERTIFICATE

This is to certify that I/we, a student of B.Tech. In **Department Of Electronics** have checked my complete report entitled **"FZERO HOUR DEFECT CONTRIBUTIONS AND THEIR POSSIBLE SOLUTIONS"** for similarity/plagiarism using the "Turnitin" software available in the institute.

This is to certify that the similarity in my report is found to be 18% .... which is within the specified limit (30%).

The full plagiarism report along with the summary is enclosed.

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Date: 15/1/2024

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To,

Mr. Rajnish Upadhyay

Senior Manager - Human Resources

Volvo Eicher Commercial Vehicles Ltd. , Pithampur District Dhar

Dear Sir/Ma'am,

We are grateful to the co-operation in imparting Industrial Training/Internship/Vocational Training to the Students of our Institute. Industrial training/Internship is a part of Academic Curriculum in Pre-Final and Final year of B.Tech./MCA/MBA students and the progress of the same will be counted in their overall results and also gives them exposure & improves their skills and personality.

We will be highly obliged, if the following student is/are permitted to undergo Training / Internship at your esteemed Organization for a period of 15/01/2024 to 31/05/2024.

S.No.	Name of the Student	EnrollmentNo.	Course-Branch
1.	Ashish Rathore	0901ME201043	B.Tech-Electronics Engineering

Hoping for your kind cooperation.

Best Regards!

Mr. Vikram Singh Rajput)
Training & Placement Officer

Kindly feel free to contact us for any further information.

Important Declaration: *This is a system generated letter with reference no. after the approval from the authority. There is no need for a signature and seal on hard copy.*

INDUSTRY CERIFICATE

VE COMMERCIAL VEHICLES
A VOLVO GROUP AND EICHER MOTORS JOINT VENTURE

TO WHOM SO EVER IT MAY CONCERN

22nd May 2024

This is to certify that Mr. **Ashish Rathore** student of **Madhav Institute of Technology & Science, Gwalior** has completed his training at VE Commercial Vehicles Ltd. Pithampur from 23rd Jan 2024 to 23rd May 2024.

During this period, he did the project on – **"Defect Analysis."**

He has worked under the guidance of **Mr. Praveen Tripathi – Deputy General Manager.** He has completed the project and his perfiormance was Very Good.

We wish him all the best for his future.

For VE Commercial Vehicles Ltd.
(A Volvo Group and Eicher Motors joint venture)

Reena Mishra
(Manager - Human Resources)

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VOLVO

EICHER

TABLE OF CONTENTS

LIST OF FIGURES

As a part of my B.Tech in Electronics Engineering, I did 4-month internship (16 January-16 May) at VE commercial vehicles.
This report will be focused only on my internship at VECV ETB PLANT, Pithampur.

VE commercial vehicle limited is the joint venture between the Volvo Group and Eicher motors Limited. a leading manufacturer of commercial vehicles and diesel engines in India. It is a partnership that bring together Global Leadership in technology, Quality, Safety & Environment are along the deep knowledge & understanding of the Indian and Global market

VECV is divided into production units which are BIW, Paint shop, cab trim, chassis, & EOLT. I got the
opportunity to work at the ETB plant in production department (Paint shop). In Paint shop line production
department, Cabin painting is done. At the start of the internship, I learned about the types of bu
manufactured at the plant, specifications and the components that are used in different truck & bu
according to customer demand. I saw the full-fledged truck manufacturing from structure to main l
also got the opportunity to visits other departments viz. structure, panel, paint shop, QGA, Proto
the departments that I visited will be discussed in details in this report with their details functi
individual department.

1.1-Introduction to Indian Automobile Industry:

India is an emerging country with huge potential. The domestic economy is now growin
per annum and India's importance in global terms is being reinforced by rapidly
domestic consumption. At a time when numbers of a slowdown and overheating in
have started gaining momentum, the Indian rupee sprang a surprise by pushing th
trillion-dollar (42,00,000 crore) mark.
The automotive industry is at the Centre of India's new global dynamic. The do
rapidly as incomes rise and consumer credit becomes more widely available. N
are being continually expanded, as is the local automotive manufacturing ba
India can develop as a global hub for vehicle manufacturers and as an out
global automotive industry solution high up the automotive value chain.

- India eyes 25 million automotive jobs.
- India's GDP is set to double over the next decade.
- In percentage terms, the automotive industry's cont

With the world's second largest and fastest-growing populatio
both economic and population terms and the effect it will have

The country is already off to a good start with a well-developed components industry and production level of 1 million four-wheeled vehicles, 10.8 million 2 & 3-wheelers and 8 million commercial vehicles.

Indian Automobile industry can be divided into three segments i.e. two-wheeler, three-wheeler & four-wheeler segment. The domestic two-wheeler market is dominated by Indian as well as foreign players such as Hero Honda, Bajaj Auto, Honda Motors, TVS Motors, and Suzuki etc. Maruti Udyog and Tata Motors are the leading passenger car manufacturers in the country. And India is considered as strategic market by Suzuki, Yamaha, etc. Commercial Vehicle market is catered by players like EICHER Motors, Ashok Leyland, Volvo, Force Motors, Tata Motors etc.

- India ranks 4th largest producer of passenger and commercial vehicles.
- Contribute 5% to the GDP.
- Almost 0.6 million exports in year 2021-2022.
- Targeted to be $54.84 billion dollars between 2022-27.

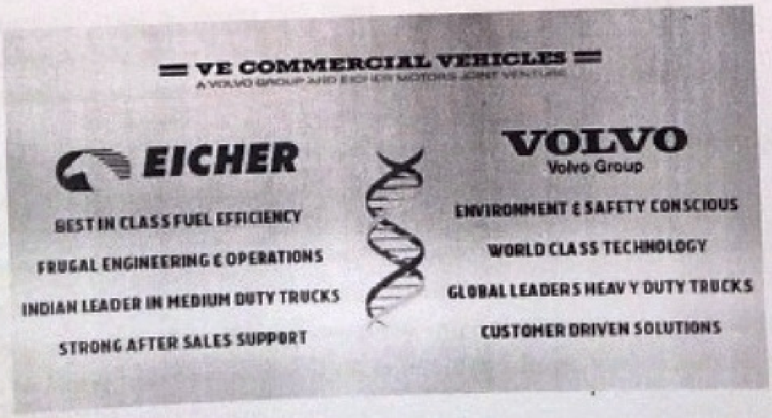
2.1 VECV JOINT VENTURE:

In 2008, two leading players, Volvo Groups and Eicher Motors, in the commercial vehicle joined hands with a common vision of driving modernization in the commercial transport business in India. Volvo Group comes with global expertise, leadership in product technology, well-defined processes and a brand that is respected all over the world. Eicher Motors is a leader in the Light and Medium Vehicle segment and brings to the table frugal engineering, considerable after sales infrastructure, and cost-effective operations. Together they complement each other and combine their strengths to deliver effective solutions that favourably impact the eco-system. This partnership has helped modernize and evolve the industry in India and many other countries with emerging markets.

The company includes the complete range of Eicher branded trucks and buses, Volvo buses, exclusive distribution of Volvo Trucks in India, engine manufacturing and exports for Volvo Group, nonautomotive engines and Eicher component business. A multi-brand, multi-division company, backed by innovative products & services, VECV today, is recognized as an industry leader in CV industry.

VECV offers a range of ultra-modern trucks across 4.9-55T, along with a wide range of safe and efficient buses with seating capacity of 12- 72 across light, medium and heavy-duty applications.

The world of commercial vehicles is always on the move, be it new emerging markets, state-of-the-art infrastructure, new policies and the aspirations of customer. And VECV is always ahead with a continuous transformation of a holistic ecosystem which is based on progressive thinking, advanced technology and unshakable values. This keeps VECV miles ahead from the rest.



2.2 Eicher Motors:

Eicher Motors Limited is an Indian multinational automotive company that is manufactures motorcycles and commercial vehicles, headquartered in New Delhi. Eicher is the parent company of Royal Enfield, a manufacturer of middle weight motorcycles.

Eicher Motors Limited

EICHER

Type	Public
Traded as	BSE: 505200 NSE: EICHERMOT NSE NIFTY 50 Constituent
ISIN	INE066A01013
Industry	Automotive
Founded	1948; 75 years ago
Founder	Vikram Lal
Headquarters	New Delhi, India
Area served	Worldwide
Key people	S Sandilya (chairman) Siddhartha Lal (managing director)
Products	Commercial vehicles Motorcycle
Revenue	▲ ₹15,037.29 crore (US$1.9 billion) (2023)[1]
Operating income	▲ ₹3,799.63 crore (US$480 million) (2023)[1]
Net income	▲ ₹2,913.94 crore (US$360 million) (2023)[1]
Total assets	▲ ₹19,197.64 crore (US$2.4 billion) (2023)[1]
Total equity	▲ ₹14,990.28 crore (US$1.9 billion) (2023)[1]
Owner	Siddhartha Lal (49.28%)
Number of employees	4,899 (March 2020) [1]
Subsidiaries	Royal Enfield VE Commercial Vehicles (54.4%)
Website	www.eicher.in

Eicher Motors is a commercial vehicle manufacturer in India. The company's origins date back to 1948, when good earth Company was established for the distribution and service of imported tractors. In 1959 the Eicher Tractor Corporation of India Private Ltd was established, jointly with the Eicher tractor company, a German tractor manufacturer. Since 1965, Eicher in India has been completely owned by Indian shareholders. The German Eicher tractor was partly owned by Massey Ferguson from 1970, when they bought 30%. Massey Ferguson bought out the German company in 1973.

In October1982, collaboration agreement with Mitsubishi for the manufacture of the light commercial vehicles (LCVs) was signed in Tokyo and in the same period the incorporation of Eicher Motors Limited also took place. LCVs were sold under the "Eicher Mitsubishi" brand. In February 1990, Eicher Good earth bought 26% stake in Enfield India Ltd and by 1993 Eicher acquired a majority stake (60% equity shareholding) in Royal Enfield India

In 2005, Eicher Motors Ltd sold their tractors and engines business to TAFE Tractors (Tractors and Farm Equipment Ltd) of Chennai, the Indian licensee of Massey Ferguson tractors.

In July 2008, Eicher Motors Limited (EML) and Volvo Group's formed a 50:50 joint venture called VE Commercial Vehicles (VECV) which designs, manufactures and markets commercial vehicles, engineering components and provides engineering design. At present, Volvo Group owns 45.6% of VECV, while Eicher Motors holds the remaining 54.4%. In 2020, VECV bought Volvo Buses India operations for ₹100 crore.

In 2012, Eicher Motors started a joint venture with American company Polaris Industries called Eicher Polaris to make personal utility vehicles, starting with Eicher Polaris Multix in 2015. This joint venture company ceased operations in 2018.

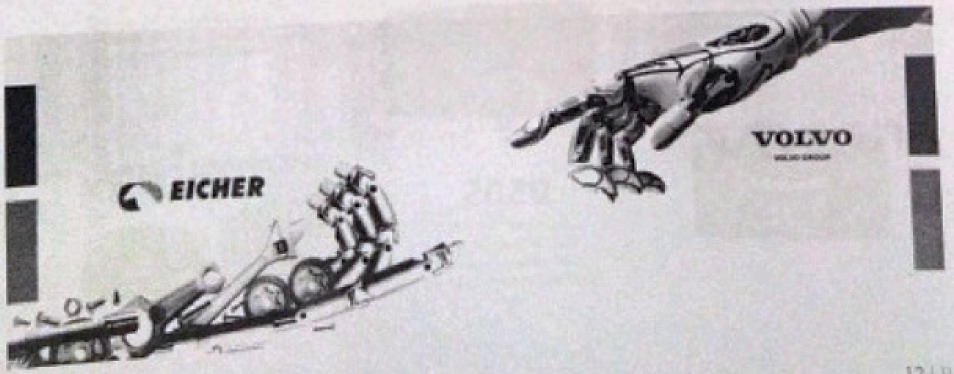
The Eicher Group has diversified business interests in design and development, manufacturing, and local and international marketing of trucks, buses, motorcycles, automotive gears, and components. Eicher has invested in the potential growth areas of management consultancy services, customized engineering, and maps and travel guides.

VE Commercial Vehicles (VECV) Limited is a joint venture between Volvo Group and Eicher Motors Limited. VECV is divided into five business units.

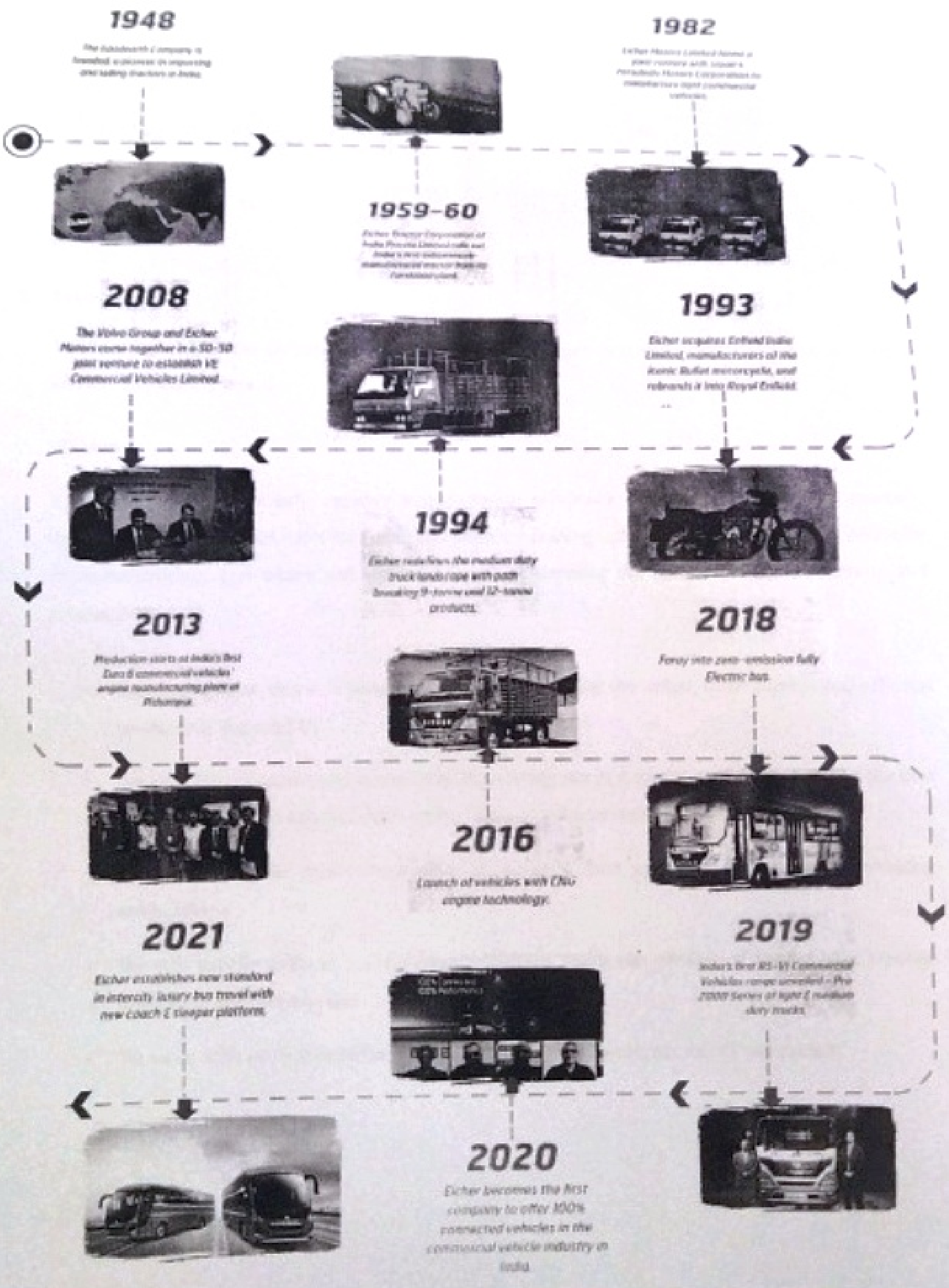
- Eicher Trucks and Buses
- Volvo Trucks India
- Eicher Engineering components
- VE Powertrain
- Royal Enfield Motors, the motorcycle manufacturing subsidiary, is a part of Eicher Motors.

VECV has total 7 manufacturing plant across the country. These are: -

- SEZ Pithampur plant: specialized manufacturing facilities for gearbox.
- ETB Pithampur plant: Eicher truck and buses manufacturing plant.
- Bhopal plant: Industry 4.0 compliant manufacturing with capacity of 1lac vehicle per year.
- Baggad plant: The multi model bus body plant manufacturing light to heavy duty buses. It also ranked top in FY23 in India.
- VE powertrain plant: A global hub for meeting the medium-duty engine requirements of Volvo Groups.
- Hosakote plant: India's first complete bus manufacturing facility.
- Dewas plant: One of the largest Gear manufacturing facilities backed by advance facilities.



2.3 MILSTONES:



2.4 Company Vision & Mission:

- **Vision**

To be recognized as the industry leader driving modernization in commercial transportation in India and the developing world

- **Mission**

VECV aims to continuously improve transportation efficiency in India and developing markets, thereby reducing logistics costs for goods and people – leading to higher enablement of specialization in manufacturing, agriculture and services, thereby increasing the nation's economic activity and productivity.

- We choose to do this in a sustainable manner by having the safest, most durable and efficient products in the market.
- We care for our customers holistically by offering not just trucks and buses, but also the best services and soft products which enable them to achieve maximum profits.
- We work with the driver community to enhance their productivity and overall working environment
- We will partner with all stakeholders to deliver maximum uptime of the vehicles through innovative support services
- We work with professionalism, passion, and the greatest respect for all individuals.

2.5 Core Values:

Respect - At VECV, respecting all our stakeholders is a central belief that makes us deliver on our promises and hold ourselves accountable to all commitments

Fair & Ethical – We strive to conduct our business with integrity, treat everyone fairly, and be reasonable and ethical in all our dealings.

Excellence – We constantly challenge ourselves to innovate for the future and strive uncompromisingly to develop new standards for exceeding customer expectations.

Customer Centric – At VECV, we aim to create a mutually beneficial long-term relationship with our customers by proactively focusing on their changing needs and consistently delivering excellent service.

Passion – We revel in our work, demonstrate constant enthusiasm and strongly believe in making a difference to our customers by walking the extra mile.

CHAPTER 3: FUNCTIONING OF VARIOUS DEPARTMENT

At VECV ETB Plant, to capitalize on the opportunity of improved road infrastructure and growth of smart cities, an ultra-modern bus body manufacturing facility was set up at Pithampur (Madhya Pradesh). The plant is spread over a huge expanse 88 acres has a current installed capacity of 15,600 per annum, expandable to 19,200 per annum.

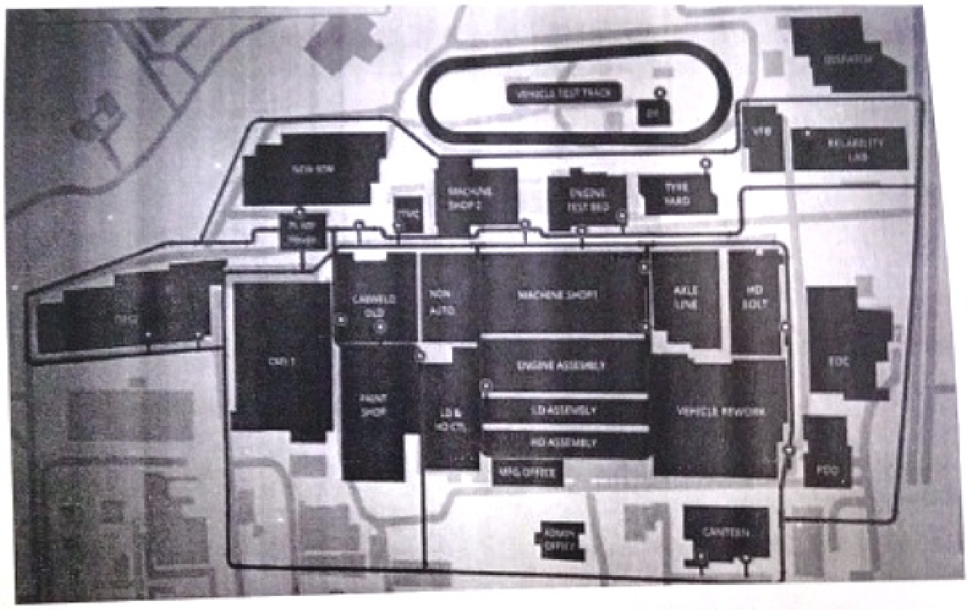


Fig.3.1 Site Emergency layout of VECV ETB Plant, Pithampur

At VECV ETB plant, various departments are: -

- Administrative department
- Proto shop
- Manufacturing
- Quality department
- Warehouse
- Maintenance department

3.1 Administrative department:

An administrative department is a unit in an organization that oversees all its daily operations. This can include overseeing the organization's financial management, managing its strategic planning, directing its budgeting operations, managing its legal affairs and satisfying its human resource (HR) needs. These departments monitor the organization's performance and make decisions regarding future endeavours.

The roles and responsibilities of an administrative unit can include the following:

- Managing accounting
- Overseeing staffing
- Maintaining public relations (PR)
  - Media relations
  - Production relation
  - Investor relation
  - Investor relation
  - Internal relation
- Maintaining legal documents
- Ensuring compliance
- Purchasing and safeguarding assets
- Monitoring company performance

3.2 Prototype Department:

This department is responsible of development of new products or any new variant of products, before its mass production, as a sample product for testing and finalizing of the products. The prototyping department includes an area dedicated to mechanical manufacture, a control quality room and a separate area dedicated to the assembly.

Fig.3.2 Proto shop.

The prototype is the concrete realization of the idea, which becomes a product. The realization of each prototype represents a fundamental moment in the passage from the research, validation and development phase to the production process design phase, and its industrialization, conceived here in Strepera as a single development flow.

3.3 Manufacturing Engineering Department:

Manufacturing engineering is a discipline of engineering dealing with different manufacturing practices and includes the research, design and development of systems, processes, machines, tools, and equipment Manufacturing Engineering department provides solutions to the production department. It is mainly responsible for all the new projects brought to the company and updating of the older ones keeping in mind the factors such as Quality, Production Rate, Investment and Time. ME department has direct control over HD & LMD Engine Line. Processes such as Piloting are done by the same department.

3.4 Manufacturing Department:

The Manufacturing department is responsible for designing and developing new vehicle models, as well as improving existing ones. It includes divisions like product engineering,
design, and research and development. Manufacturing department is involved in the conversion of the raw material to a finished product. The process plan is given by the MSE team and the manufacturing team does the manufacturing, assembly, inspection, packing of the products as per the process plan. Production of parts, assembly, testing and packing of the parts will be covered under the manufacturing Department.

Manufacturing department includes shops which are: -

- **Structure line:** This is the first step towards the manufacturing of the product on line and it include various process such as cutting, bending, welding and assembling of raw materials—generally steel— to create structure of Truck body, which is then forwarded to the panel line.

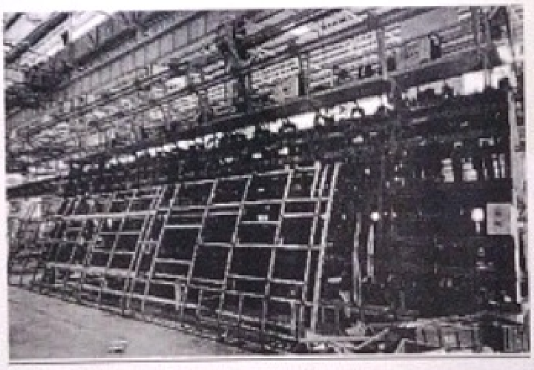


Fig.3.3 Fixture for structure.

- **BIW/CAB WELD line:** It is the next step after the structure shop, on the panel line a thin metal sheet and is welded together to produce a bus body for assembling. it includes various function such as welding of sheets, fabrication, wood turning and roof body harnessing. Here in vecv, there are two panel line where line 1 is mainly dedicated for the LD trucks while Line 2 is dedicated for the HD trucks.

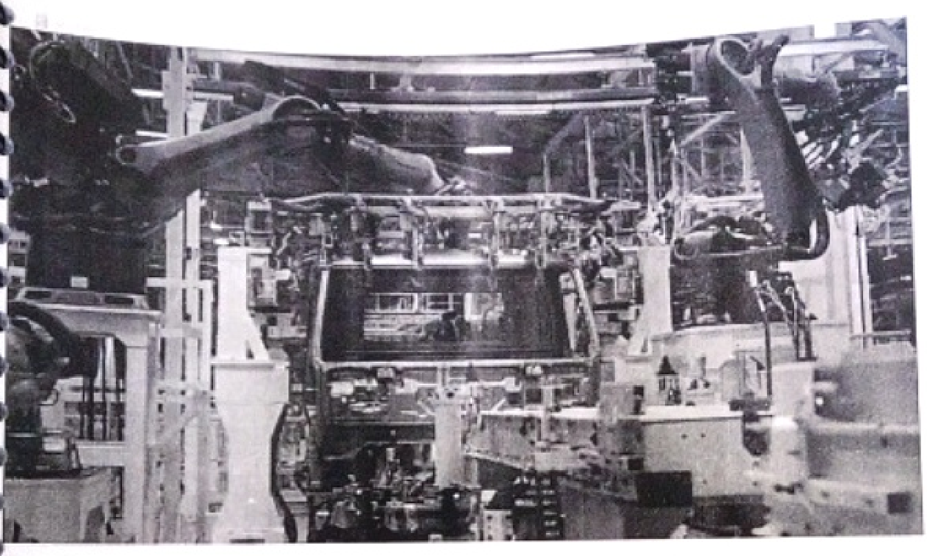


Fig.3.4 Cab weld line

- **Paint shop:** The next step after the panelling of body is painting of body. Painting of cabin include various process mainly-

1. A body is cleaned with the thinner to clear any dust particles on the body for better result.
2. The next step is body surfacing, where sanding and wiping of body is done to smoothen the body.
3. Then sealant, wiping, sanding, putty, white filling wiping is done before sanding is for paint.
4. Roof masking is done on body to protect the parts or body from pain which are not required to paint or have different colour.
5. Now the body is sent for painting, where robot arms are used to paint the body and the parts which are left or have any defects are later on painted manually.
6. As last body is sent into an oven for heating at 65 degree for 45 min and then it is ready for dropping.

Fig.3.5 Paint shop Area

Fig 3.6 Robo Arm for painting

- **Cab Trim line:** After the body dropping, trim line is the line where assembling of parts is done and bus took its original look. It is the line where all the functions and interior are completed in 9 different station which different works divided. The stations are divides as:

- Station 1A – Body Dropping, Under body and harness routing.
- Station 1B – ABS fitment and seat belt
- Station 2- driver door, emergency door, grab rail, VLTS.
- Station 3- vinyl, side marker, Eicher base latter
- Station 4A – windows and rood light, peep glass.
- Station 4B- ABC Guard rail. RVM, Hight marker
- Station 5 – AI, Beading, engine hood, dashboard, hatch
- Station 6E- all electrical and underbody
- Station 6S – Seat marking and tightening
- Station 7J – JK door, wiper, jack rod, tommy rod

- Station 7I- Hatrack assembly and fitment
- Station 8- wind shield and partitions
- Station 9 – front bumper and roll out

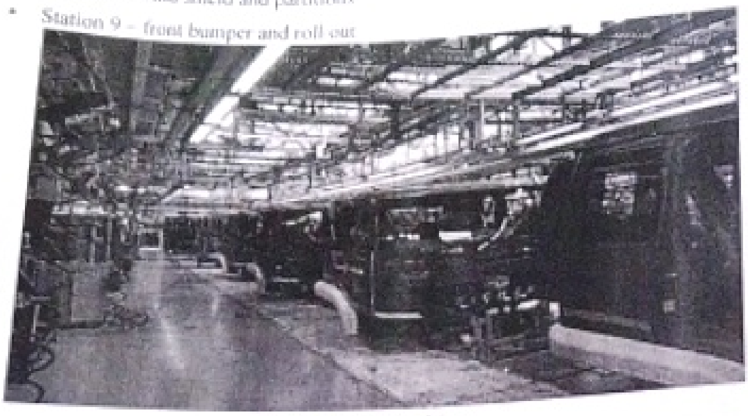


Fig.3.7 Cab Trim Line

3.5 Quality Department:

The Quality Department ensures the proper deployment of the Quality management Systems that is in practice to ensure that the quality of the products produced are acceptable by the customer. The Quality Management ensures Quality Planning, Quality assurance, Quality control and Quality improvements are practiced in the organization.

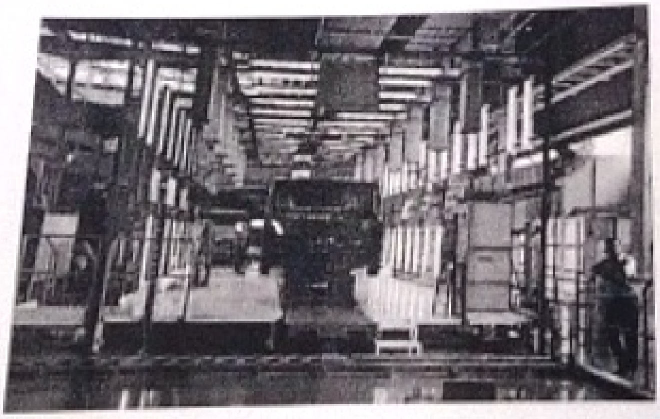


Fig.3.8 Quality Gate

It has two other stages for final roll out of the bus and finishing of the any remaining work and do some testing before dispatching:

- **FVI shop:** Known as Final Vehicle Inspection Area, this department looks after the remaining work left in the vehicle, also vehicle testing is done here like AC gas filling, shower test etc. All the finishing work is done here, this shop ensures that the vehicle is complete and is ready to be dispatched.

Fig.3.9 Shower testing

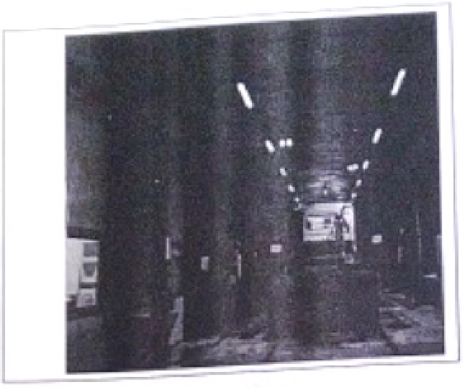


Fig.3.10 FVI Area

➢ **Export shop**: In export CKD department we used to learn about various technical terms, software and documentations related to the export of buses and trucks. In this department I learned about assembly operation sequence of a particular model, bills of material, SAP , 3D experiences software with the help of which we used to get drawings or design of a particular model.

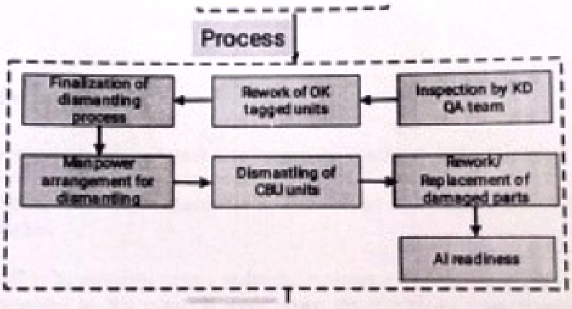


Fig.3.11 export Shop

Human Resources Department: The HR department oversees employee recruitment, training, and development, as well as managing employee relations and welfare programs. It ensures the availability of skilled and qualified staff for various departments within the organization.

Finance and Accounts Department: This department manages the financial aspects of the organization, including budgeting, financial planning, accounting, and cost control. It also handles financial reporting and compliance with relevant regulations.

Sales and Marketing Department: The sales and marketing department is responsible for promoting and selling VECV vehicles. It includes divisions such as sales operations, dealer development, marketing communications, and customer support.

3.6 Warehouse:

Warehousing is the process of storing physical inventory for distribution. It is responsible for storing, sorting and delivering parts and material to the stations and shops to its demand. warehouses provide safe and secure storage around the clock, they also allow you to have your goods stored in one central place, which makes planning and organizing your logistics that much easier.

Fig.3.12. Warehouse

3.7 Maintenance Department:

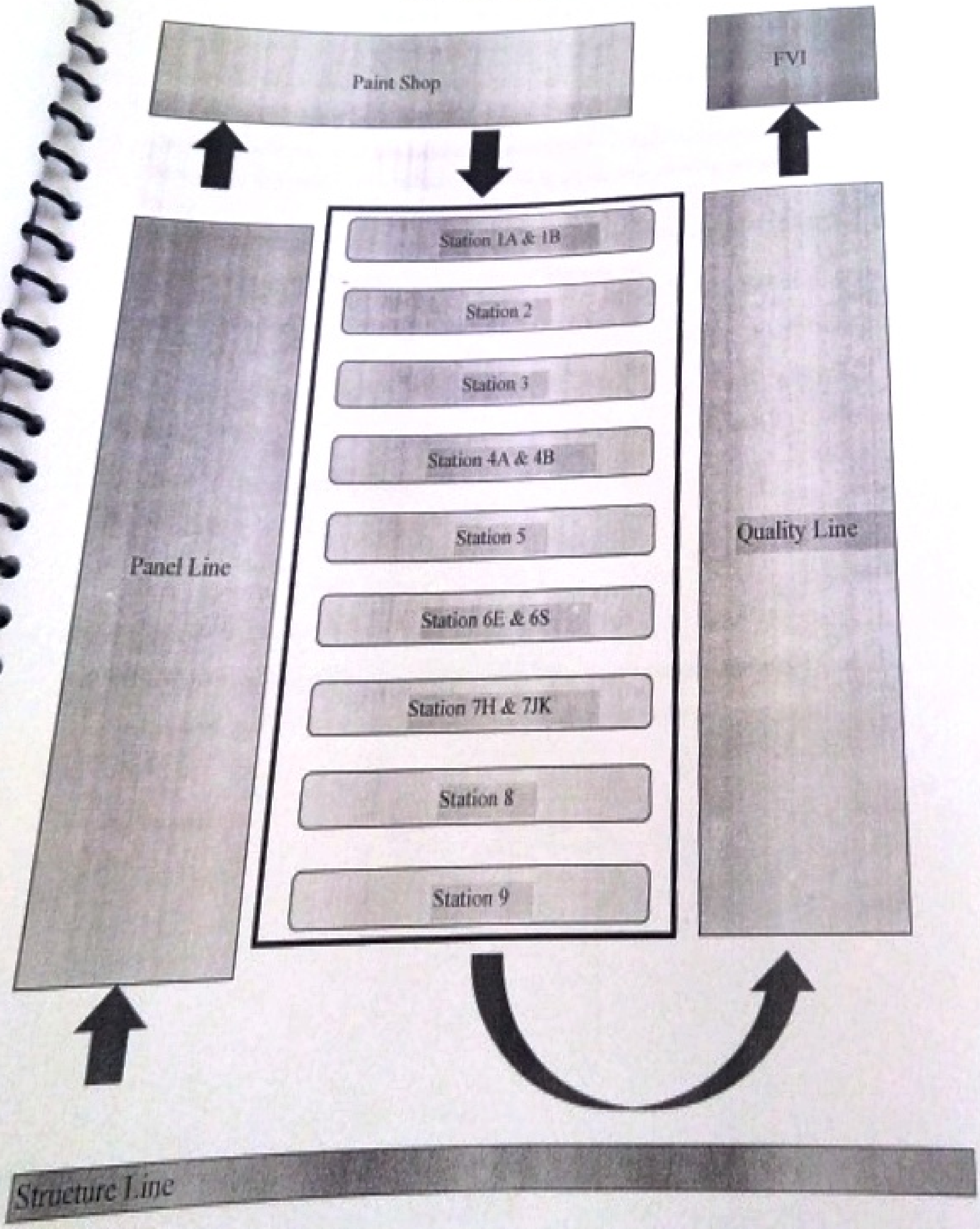
The Function of the Maintenance department is to ensure the machines and equipment in the organization are in good working condition. The maintenance department carries out various maintenance activities such as Preventive maintenance, break down maintenance, Time based maintenance etc. to keep the down time minimal in the organization.

- Utility block: The utility department comes under the maintenance department, it looks after the power supply and utilities provided to the plant. It steps down the electricity from transformers and supply throughout the plant according to the need in various department.

Procurement Department: This department handles the sourcing and procurement of raw materials, components, and parts required for vehicle production. It involves establishing relationships with suppliers, managing inventory, and optimizing the supply chain.

Safety and Environment Department: This department focuses on ensuring a safe working environment for employees and compliance with environmental regulations. It includes implementing safety protocols, conducting safety audits, and promoting eco-friendly practices.

Flow Chart of production



Chapter 4: What I Have Learned

During my Internship I was deployed at Paint shop Line to manage the line, man power and improve the Quality in order to improve the overall production.

Also, I have prepared a tool list with its daily attendance sheet for tools safety, moreover i have prepared OPL's in order to minimize and eliminating the errors by giving proper training and instruction to the workers.

Furthermore, I made a file for each station for daily audit and was filled by station coordinators to maintain the data of tools and parts. The file consists of following lists:

- Attendance list
- Tool list
- Check list
- AOS
- OPL (of their respective station)
- Example of 5s
- MBOM of vehicle

o **DWM:**

In order to manage departments, functions, and processes, Daily Work Management (DWM) is a system whereby processes are defined, standardized, regulated, and improved by the process owners.

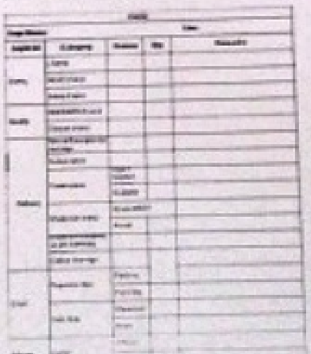


Fig.4.1 DWM

4.1 SQDCM:

An SQDCM Dashboard is a process or production area which quickly conveys how manufacturing is performing in five key areas. Specifically, they are Safety, Quality, Delivery, Cost and Morale. KPI metrics and results for each category are shown below each letter in the SQDCM and updated each day. Determining the right metrics for each section of the board is an important first step. While every organization with have different standards surrounding SQDCM, the following are examples of measurements to track in each category:

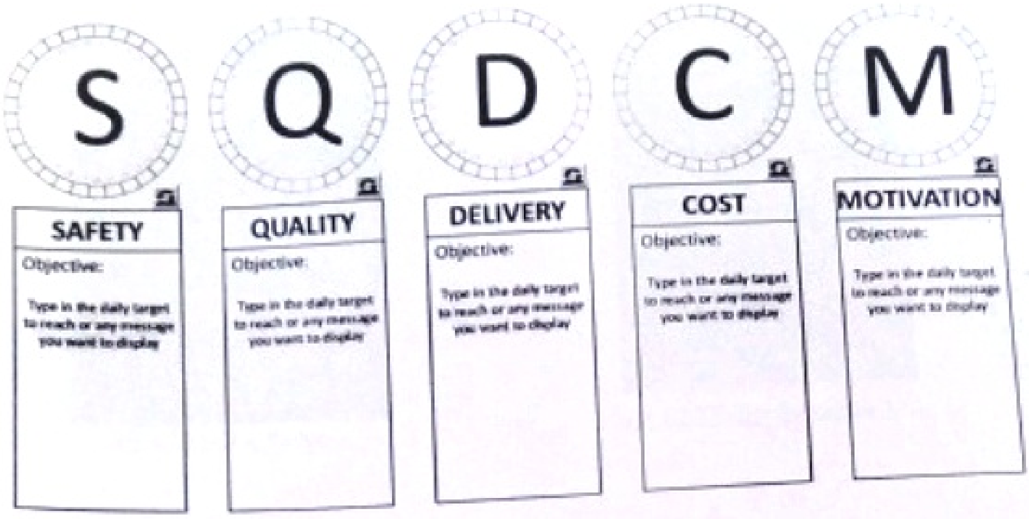
Safety should always come first, and could show near misses, safety violations, missed work due to injuries, and unsafe work practices observed.

Quality metrics can include the number of product defects found in a day or returns due to poor manufacturing quality.

Delivery measurements would include On-time shipments to customers, or the number of shipments made per day versus the goal.

Cost is related to metrics surrounding waste and leftover raw materials, overtime costs and late fees

Morale Is more difficult to ascertain, but can be measured with employee engagement surveys, turnover rates, years of service averages and levels of absenteeism.



- **Safety:**

Fig.4.2 Safety

- **Lost Man Days:** Number of man-days lost should include days lost due to injury in previous months, that is, if any accident which occurred in previous month is still causing loss of time in the month under review, such loss of time is also to be included in the month under review.

- **Lost time incidents:** Lost Time Injury refers to incidents that result in a disability or an employee missing work due to an injury. Employees who return to work after sustaining an injury may also be counted as a Restricted Work Injury if they are unable to completely perform their job duties as outlined in their job.

- **First Aid Injury/Near Miss:** A Near miss is considered any incident which has the potential to escalate to accident status. First aid injury (medical attention not needed or first-aid was self-applied).

Fig.4.2.3 Safety Poster

Fig.4.2.2 Safety Excellence Area

- **Quality:**
  - **Engine First Time Through:** In a service organization, the most efficient method for cutting waste is to attack anything and everything that is not done right the first time. This concept, known as first time right, involves making sure that all activities are carried out in the right manner the first time and every time. Example include Engine getting through from the assembly line in the first time
  - **Product Audit Score:** Product Audits. The American Society for Quality (ASQ) defines a product audit as: "An examination of a particular product or service (hardware, processed material, software) to evaluate whether it conforms to requirements (that is, specifications, performance standards and customer requirements).

- **Delivery:**
  - **Rollout:** Rollout is an informal business term for numbers of products released per hour, day or month.

- **OLE:** Overall labour effectiveness (OLE) is a key performance indicator (KPI) that measures the utilization, performance, and quality of the workforce and its impact on productivity. Similar to overall equipment effectiveness (OBE), OLE measures availability, performance, and quality

- **Job per hour (JPH):** JPH/Production rate, in terms of manufacturing, refers to the number of goods that can be produced during a given period of time. Alternatively, the production rate is also the amount of time it takes to produce one unit of a good.

- **Cost:**
  - **Rejection cost:** The most stereotypical and commonly thought of costs of rejects are time, materials, and money. While these are three main categories, they are just the tip of the iceberg. The costs are often underestimated and greatly misjudged as they affect much more than appears.

    Rejection rate (%) = (waste material cost ÷ total cost of production) × 100%

  - **Indirect consumable & Tool cost:** Indirect consumables are consumed as part of the production process, but are not integrated in substantial amounts into a product or job. Examples of indirect materials are cleaning supplies, disposable safety equipment, disposable tools, fittings and fasteners, glue, oil, and tape. Cost of these consumables is called indirect consumable cost. The tooling cost per part is the depreciated tooling price over the life of the tool divided by the number of parts made during the tool life.

  - **Power cost:** The cost of electricity, fuel oil, gasoline, heating oil, natural gas, or other source of energy connected to the operation of a plant.

- **Morale:**
  - **Total Kaizen:** Kaizen is a Japanese term meaning "change for the better" or "continuous improvement." It is a Japanese business philosophy regarding the processes that continuously improve operations and involve all employees. Kaizen sees improvement in productivity as a gradual and methodical process. Total number of Kaizens performed by the company/department in the given period of time is called Total kaizen.

  - **Kaizen per person per month:** Total number of Kaizens performed by an Associate in a month.

- **Absenteeism:** Absenteeism is broadly defined as employee absence from work for lengths beyond what is considered an acceptable time span. Frequent causes of absenteeism include burnout, harassment, mental illness, and the need to care for sick parents and children.

4.2 4M's of Manufacturing:

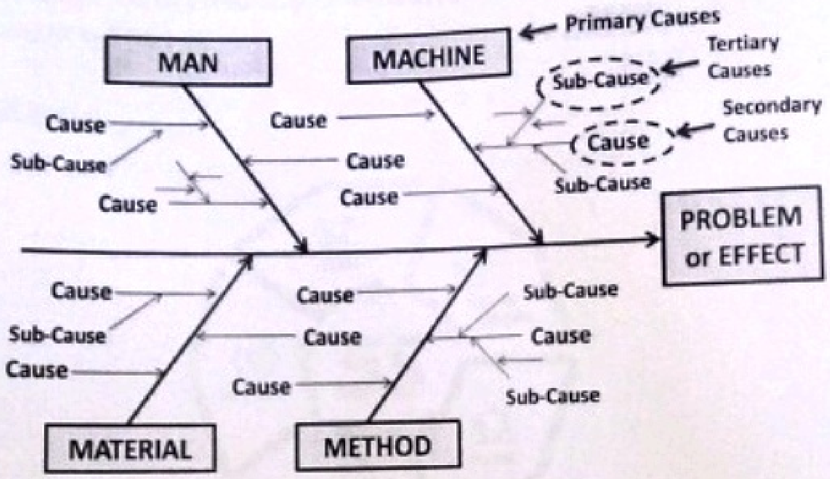


Fig.4.3 Cause and Effect fish bone diagram

The 4M analysis is a problem-solving method used to identify the root cause of a problem or defect in a process. It is based on the premise that most problems can be traced back to one or more of the following four elements:

Man: This refers to the human factors involved in the process, such as operators, supervisors, or other personnel.

Machine: This refers to the equipment or machinery used in the process.

Material: This refers to the raw materials, components, or products involved in the process.

Method: This refers to the procedures, processes, or systems used to produce the product or provide the service.

By analysing each of these elements, it becomes easier to identify the root cause of a problem and develop appropriate corrective actions. The 4M analysis can be used in a variety of settings, including manufacturing, service industries, and healthcare.

A Fishbone diagram, also known as an Ishikawa diagram or cause-and-effect diagram, is a visual tool used to organize and analyse the potential causes of a problem or defect. The diagram takes the shape of a fish skeleton, with the problem being the head of the fish and the causes being represented as bones branching off from the spine.

4.3 5S System:

Fig.4.4 5S

5S is a system for organizing spaces so work can be performed efficiently, effectively, and safely. This system focuses on putting everything where it belongs and keeping the workplace clean, which makes it easier for people to do their jobs without wasting time or risking injury.

In English, these words are often translated to:

Sort

Set in Order

Shine

Standardize

Sustain

What are the 5S?

- **Sort**

The first step of 5S, Sort, involves going through all the tools, furniture, materials, equipment, etc. in a work area to determine what needs to be present and what can be removed.

- **Set in Order**

Once the extra clutter is gone, it's easier to see what's what. Now work groups can come up with their strategies for sorting through the remaining items.

- **Shine**

The Shine stage of 5S focuses on cleaning up the work area, which means sweeping, mopping, dusting, wiping down surfaces, putting tools and materials away, etc. In addition to basic cleaning, Shine also involves performing regular maintenance on equipment and machinery. Planning for maintenance ahead of time means businesses can catch problems and prevent breakdowns. That means less wasted time and no loss of profits related to work stoppages.

- **Standardize**

Once the first three steps of 5S are completed, things should look pretty good. All the extra stuff is gone, everything is organized, spaces are cleaned, and equipment is in good working order. Standardize assigns regular tasks, creates schedules, and posts instructions so these activities become routines. It makes standard operating procedures for 5S so that orderliness doesn't fall by the wayside.

- **Sustain**

Sustain refers to the process of keeping 5S running smoothly, but also of keeping everyone in the organization involved. Managers need to participate, as do employees out on the manufacturing floor, in the warehouse, or in the office. Sustain is about making 5S a long-term program, not just an event or short-term project. Ideally, 5S becomes a part of an organization's culture. And when 5S is sustained over time, that's when businesses will start to notice continuous positive results.

4.4 Kaizen:

Fig 4.5 Kaizen

The word "kaizen" is a Japanese word meaning "change for the better." In English, kaizen translates to "improvement" and encompasses both short- and long-term improvement processes. In lean manufacturing, kaizen refers to brainstorming ideas and implementing daily activities that continuously improve processes. It involves all employees – from the higher-ups to plant-floor workers.

The goal of kaizen is to "go lean" with manufacturing processes by improving current standardized processes and programs to eliminate waste and increase efficiency. Kaizen is sometimes referred to as part action plan and part philosophy. Action plans consist of organizing focus groups or teams and events set on improving specific areas within the organization. Teams should include employees from all levels and focus heavily on employees on the plant floor.

o KAIZEN EVENTS

A typical Kaizen event has a process that goes something like this:

1. Set goals and provide any necessary background.
2. Review the current state and develop a plan for improvements.
3. Implement improvements.
4. Review and fix what doesn't work.
5. Report results and determine any follow-up items.

This type of Kaizen process cycle is frequently referred to as PDCA (Plan, Do, Check, and Act). PDCA brings a scientific approach to making improvements:

- Plan: develop a hypothesis
- Do: run experiment
- Check: evaluate results
- Act: refine your experiment; then start a new cycle.

4.5 7QC Tool:

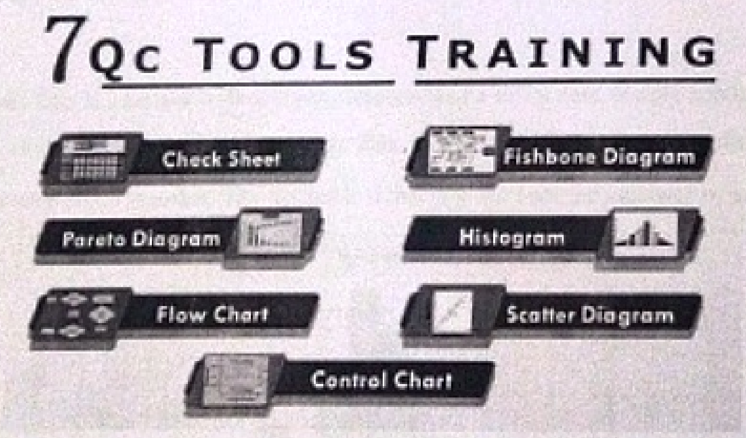


Fig 4.6 7QC Tool

I also got knowledge about 7QC tools used in production. The 7QC tools are used for assessing the entire production process. The seven basic tools of quality are fixed set of visual exercises identified as being most helpful in troubleshooting issue related to quality. 7 QC tools are a set of graphical data representation and problem-solving techniques. These seven basic quality tools are integral to any process improvement methodology, including Six Sigma, total quality management (TQM), etc. They help in troubleshooting a variety of quality-related issues. By doing so, any business can create a better strategic quality management plan and improve the customer experience.

- **Check sheet:** A form to collect and tally data for further analysis.

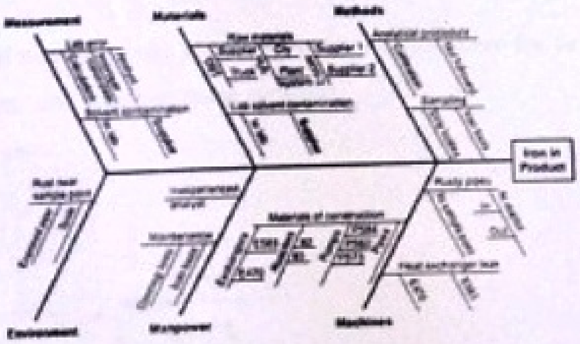
CHECK SHEET – COMPUTER RELATED PROBLEMS

S. NO.	Problem	Weekly Status				Total
		1	2	3	4	
1	Network problem	||	卌 ||	||||	|||	16
2	Server Problem	|	卌	|	卌	13
3	Email	||	卌 |	|||	卌 |	18
4	Server Access	卌	||	|||	卌 ||	17
	Total	10	20	13	21	

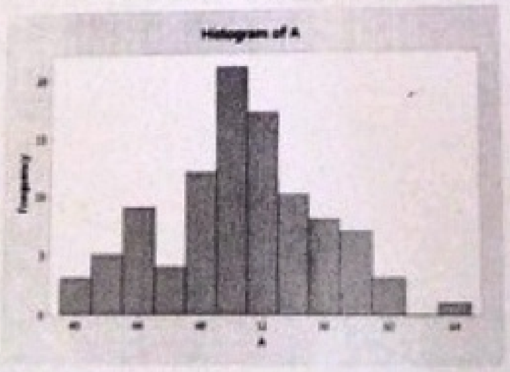
The 7 QC tools are:

1. Check sheet
2. Fishbone diagram (cause and effect diagram, or Ishikawa diagram)
3. Histogram
4. Pareto chart
5. Control chart
6. Scatter diagram
7. Stratification

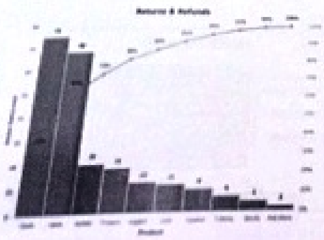
- **Fishbone diagram:** Fishbone diagrams are used to drill down to find the root cause of a problem. As the name implies, the diagram looks like the bones of a fish, where each main bone represents a specific category of possible root cause, and the subsequent drilling down is shown as smaller and smaller bones.



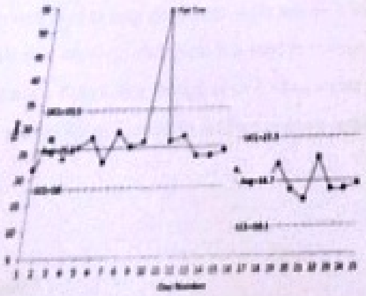
- **Histogram:** This is a bar graph showing the frequency of a set of data, usually continuous data. The histogram allows you to see the centre of the data, the range of the data, and the distribution of the data. It is a very useful snapshot. The downside is that you can't see the sequence or order of the data.



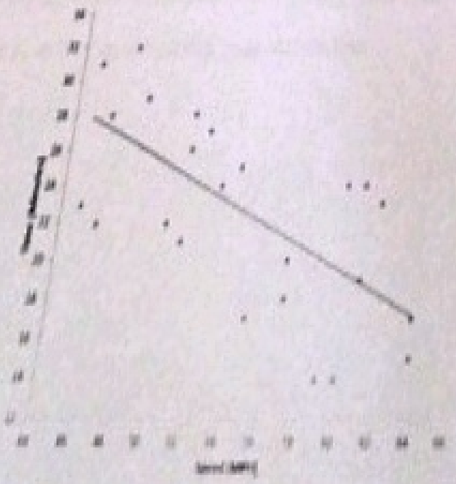
- **Pareto chart:** *This chart is based on the 80/20 principle that says 80% of your effect is caused by 20% of your causes.*



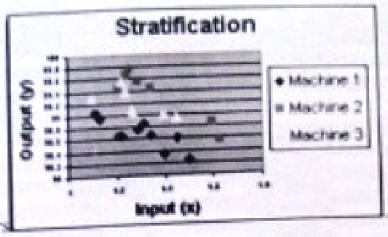
- **Control chart:** *A control chart is a statistical tool that looks at your process data over time for the purpose of distinguishing between special cause and common cause variation.*



- **Scatter diagram:** *These are also known as scatter plots. They're used to show a graphical correlation between a set of paired data on an X and Y axis. It is the graphical representation of what you would use for regression analysis.*



- **Stratification:** This is a graph that shows data that has been stratified when the data comes from different sources. It is useful to view the data by certain strata such as shift, gender, geographic



location, machines, or suppliers.

4.6 What is a skills matrix?

A skills matrix is a framework used to map employees' skills and their levels. It's a grid that contains information about available skill and their evaluation. It is used to manage, plan, and monitor existing and desired skills for a role, team, department, project, or an entire company. Sometimes a skills matrix is also called a competency matrix. We will cover the difference down below but in general, they're the same thing.

Why is a skills matrix important?

Skills matrices are essential tools for any company that is driven by data, particularly for the HR department and project management team leaders.

Matrices are ideal for keeping track of your staff's skills, qualifications, certifications, and competencies throughout the whole organization. When used correctly, they work really well in practice and improve efficiencies within teams, as well as increasing your bottom line.

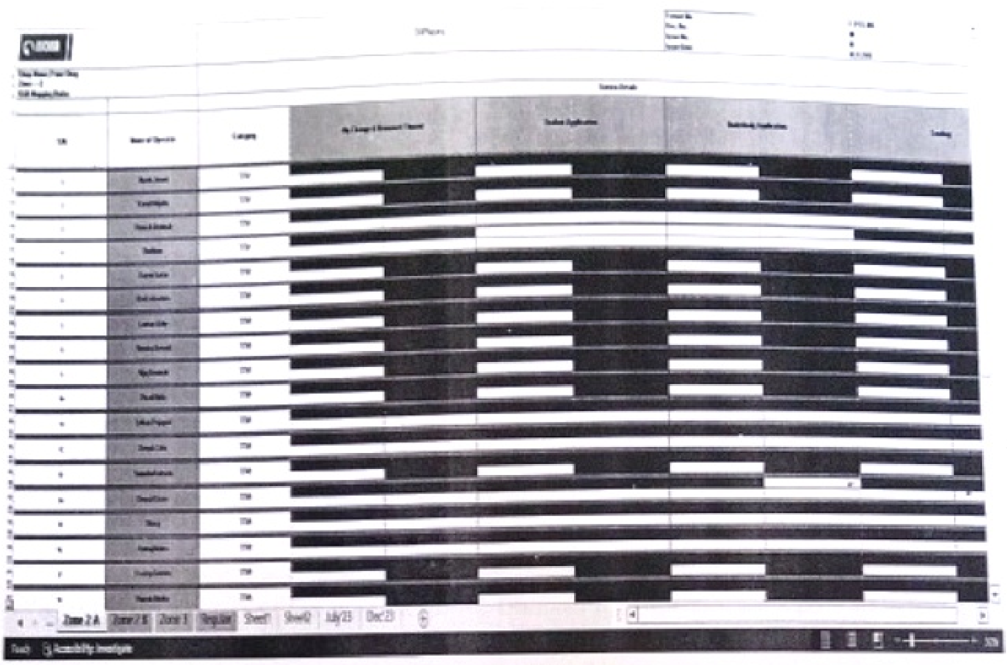
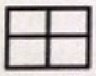


Fig 4.7 Skill matrix chart

Certification Criteria

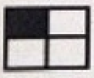
Level 0: Untrained



- A worker who has just cleared induction training and undergoing nesting or a workman who is not trained on particular station. He is not yet skilled to work desired pace and quality.

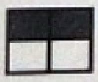
Level 1: Learns to perform basic and routine tasks off the line

- Reads the Assembly operation sequence (AOS) sheets and can repeat the key points



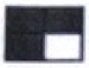
- Learns the operation with the Assembly operation sequence (AOS) sheets.
- Learns basic responsibilities of the role (e.g., Start-up)
- Completes any mandatory training specific to the operation (e.g. Industrial Safety)

Level 2: Learns to perform the operation on the line



- Performs the operation on the line with AOS sheets & with assistance.
- Works to standard(s)
- Begins to develop deep knowledge of the operation, a clearer understanding of the operation and the importance of following standards as they pertain to Safety, Quality & Flow

- **Level 3: Certified to perform the operation**



- Performs the operation for an entire shift of production*:
  - without the Assembly operation sequence (AOS) sheets
  - without assistance
  - within cycle time
  - according to standard(s)
- Manages abnormalities with assistance
- Has no major or minor abnormalities
- Continues to develop deep knowledge of the operation. Continuous Improvement opportunities are identified and discussed.

*Due to varying work elements, line speeds, and production complexity (e.g., models options and features), the Supervisor and Manager may adjust the number of repetitions required for certification.

The Supervisor and Manager certify the Team Member is capable of performing the operation by using the Phase I, Part 1 tool of the Periodic Job Observation. Certification can happen at any time during the shift / crew, including the time. designated reviewed monthly.

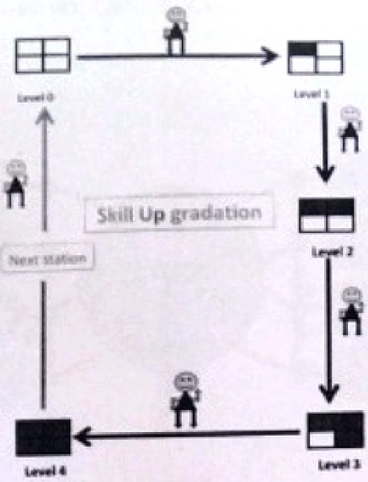
Level 4: Certified to teach the operation

- Performs the operation to standard consistently over time
- Manages abnormalities independently
- Has deep knowledge of the operation
- Can teach deep knowledge of the operation

The Supervisor and Manager certify the Team Member can teach the operation.

Supervisor must be certified to teach all operations within the team's area. Note:

- 1. Team member =RAIT & NEEM
  2. Skill upgradation exam passing marks minimum 50%



4.7 OPL:

One-point lessons (OPLs) are short, visual instructions that guide frontline workers on how to perform a single, relatively small action or task. OPLs are closely related to standard operating procedures (SOPs), but the two should not be confused.

Where SOPs can be long, text-heavy documents, one-point lessons have the following characteristics:

Short: an OPL is usually only a single page and creating one should take one-hour max.

Visual: OPLs contain lots of images (the rule is 90% images, 10% text)

Focused: OPLs are limited to a single action or task. It can therefore be a part of an SOP, clarifying one of its steps.

In short, an OPL should be simple, concise, and precise, so that operators can put its guidelines into practice effortlessly.

As OPLs deal with very specific actions, they should also be easy to find.

They should, for example, be hung near the areas they apply to or be categorized according to a machine's error codes.

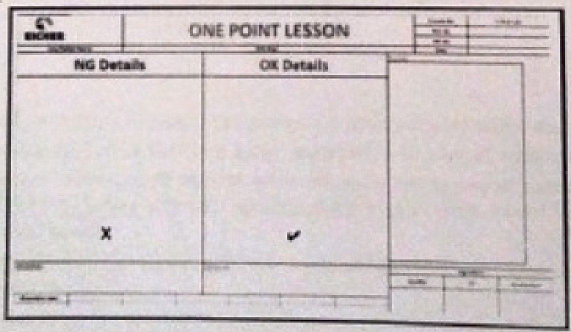
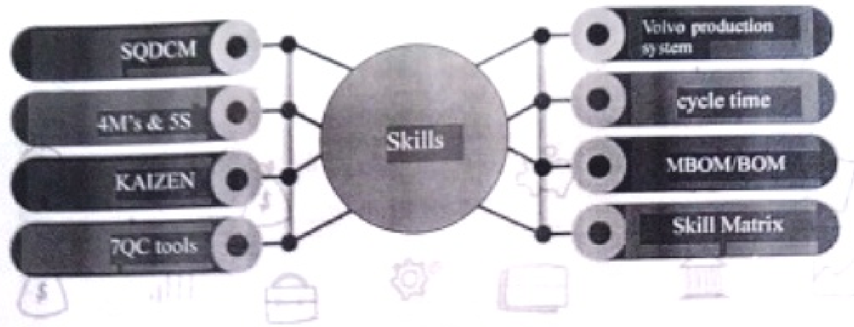
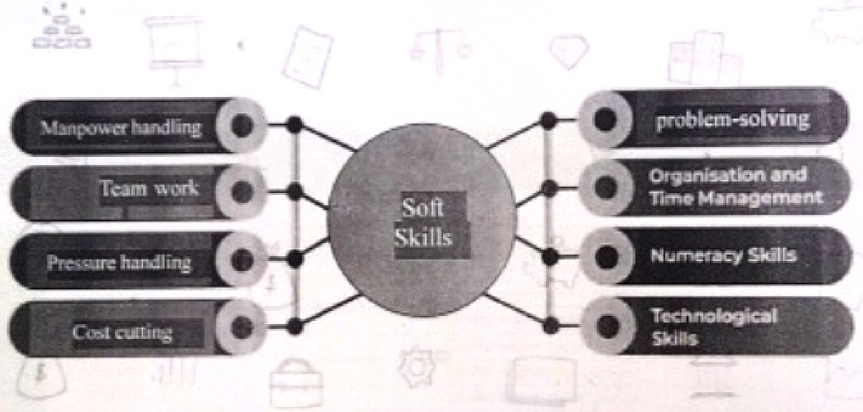


Fig 4.8 OPL Format





- I have learned how to handle the manpower in an industry where the production is on large scale apart from handling I also learned how to interact with new manpower.
- I have also learned about various assembly, tools and aggregates used in different types of vehicles including with their specifications which I think would be beneficial for my future endeavours.
- I gained knowledge regarding how to make an assembly operation sequence of a particular design.
- I learned about fundamentals of excel operations.
- I gained knowledge regarding different software and applications used in the industry for the productivity of the vehicle.
- I learnt note making, discipline, punctuality, and deadlines.
- I gained knowledge about bill of materials used in a particular vehicle.
- I gained knowledge of safety norms of the plant.

1: Monthly Overview of Internship Activities

Date	Name of the topic / module completed
16/01/24	Introduction and discussion
18/01/24	Introduction and discussion
24/01/24	Departmental visit
27/01/24	Departmental visit
29/01/24	Introduction to Paint shop
31/01/24	Introduction to Paint shop
02/02/24	Introduction to Paint shop
05/02/24	Introduction to Paint shop
07/02/24	Introduction to Paint shop
09/02/24	Introduction to Paint shop
11/02/24	Process understanding of paint shop
13/02/24	Process understanding of paint shop
14/02/24	Process understanding of paint shop
15/02/24	Process understanding of paint shop
16/02/24	Process understanding of paint shop

2: Monthly Overview of Internship Activities

Date	Name of the topic / module completed
18/02/24	Quality improvement project
19/02/24	Quality improvement project
21/02/24 .	Quality improvement project
23/02/24	Quality improvement project
25/02/24	Quality improvement project
27/02/24	Quality improvement project
29/02/24	Quality improvement project
02/03/24	Quality improvement project
04/03/24	Quality improvement project
06/03/24	Quality improvement project
08/03/24	Quality improvement project
10/03/24	Quality improvement project
12/03/24	Quality improvement project
14/03/24	Quality improvement project
16/03/24	Quality improvement project

3: Monthly Overview of Internship Activities

Date	Name of the topic / module completed
18/03/24	Paint shop & Cab Trim line Demerit control project
20/03/24	Paint shop & Cab Trim line Demerit control project
22/03/24	Paint shop & Cab Trim line Demerit control project
24/03/24	Paint shop & Cab Trim line Demerit control project
26/03/24	Paint shop & Cab Trim line Demerit control project
28/03/24	Paint shop & Cab Trim line Demerit control project
30/03/24	Paint shop & Cab Trim line Demerit control project
01/04/24	Paint shop & Cab Trim line Demerit control project
03/04/24	Paint shop & Cab Trim line Demerit control project
05/04/24	Paint shop & Cab Trim line Demerit control project
07/04/24	Paint shop & Cab Trim line Demerit control project
09/04/24	Paint shop & Cab Trim line Demerit control project
11/04/24	Paint shop & Cab Trim line Demerit control project
13/04/24	Paint shop & Cab Trim line Demerit control project
16/04/24	Paint shop & Cab Trim line Demerit control project

4: Monthly Overview of Internship Activities

Date	Name of the topic / module completed
18/04/24	Paint shop line management
20/04/24	Paint shop line management
22/04/24	Paint shop line management
24/04/24	Paint shop line management
26/04/24	Paint shop line management
28/04/24	Paint shop line management
31/04/24	Paint shop line management
01/05/24	Paint shop line management
03/05/24	Paint shop line management
05/05/24	Paint shop line management
07/05/24	Volvo production system training
09/05/24	Volvo production system training
11/05/24	Conclusive session
13/05/24	Internship training overview
16/05/24	Report submission and verification

Conclusion

The internship at Volvo Eicher commercial vehicle was full of practical experience and learnings.

I got to know about the process, production method, technologies and material used in plant for manufacturing of the Trucks & buses.

It was very interesting to know the process, method, errors and difficulties and how to solve them while making such a huge product.

It was fascinating to know about the methods used in manufacturing of products like 5S, SQDCM, Kaizen, Herca, etc.

I got to know about how to manage man power and proper deployment to maintain the shop floor line to functioned properly.

I also get to know about the pneumatic gun which work on air pressure instead of electricity. Due to which accidents due to electricity is eliminated from the industry. Tools such as nut runner, sealant gun, grinder, etc.

Moreover, I also got to know about the different and their working with proper production planning and control.

It was a wonderful experience doing internship as VECV ETB plant. All the learning ad experience will always stay with me throughout my career and will always help me to do better in my career.

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MONTHLY PROGRESS REPORT (MPR) FROM INDUSTRY MENTOR

Name of student	ASHISH RATHORE		Department	ELECTRONICS	
Industry/Organization	VOLVO EICHER PVT LTD		Date/Duration	16/01/24 – 15/02/24	
Criterion	**Poor**	**Average**	**Good**	**Very Good**	**Excellent**
Punctuality/Timely completion of assigned work					✓
Learning capacity/Knowledge up gradation					✓
Performance/Quality of work					✓
Behaviour/Discipline/Team work					✓
Sincerity/Hard work				✓	
Comment on nature of work done/Area/Topic	Ashish is looking at quality enhancement project. He is learning very fast and taking ownership.				
OVERALL GRADE	excellent.				
Name of Industry Mentor	GIRISH YADAV | Ashwin Shah				
Signature of Industry Mentor	Girish | [signature]				

Receiving Date	15/02/24	Name of Faculty Mentor	Dr. Vikas Mahor	Sign	[signature]

MONTHLY PROGRESS REPORT (MPR) FROM INDUSTRY MENTOR

Name of student	ASHISH RATHORE	Department	ELECTRONICS
Industry/Organization	VOLVO EICHER PVT LTD	Date/Duration	15-02-24 to 15-03-24

Criterion	Poor	Average	Good	Very Good	Excellent
Punctuality/Timely completion of assigned work					✓
Learning capacity/Knowledge up gradation					✓
Performance/Quality of work					✓
Behaviour/Discipline/Team work					✓
Sincerity/Hard work					✓

Comment on nature of work done/Area/Topic	Ashish is looking out and work hard on this project.
OVERALL GRADE	Excellent
Name of Industry Mentor	Girish Yadav | Ashwin Shah
Signature of Industry Mentor	Girish Ashwin

Receiving Date	15/03/24	**Name of Faculty Mentor**	Dr. Vikas Mahor.	**Sign**	

MONTHLY PROGRESS REPORT (MPR) FROM INDUSTRY MENTOR

Name of student	ASHISH RATHORE		Department	ELECTRONICS	
Industry/Organization	VOLVO EICHER PVT LTD		Date/Duration	15-03-24 to 15-04-	
Criterion	Poor	Average	Good	Very Good	Excellent
Punctuality/Timely completion of assigned work					✓
Learning capacity/Knowledge up gradation					✓
Performance/Quality of work					✓
Behaviour/Discipline/Team work					✓
Sincerity/Hard work					✓
Comment on nature of work done/Area/Topic	Ashish is working on Quality improvem project and drive the system houst				
OVERALL GRADE					
Name of Industry Mentor	Girish Yadav | Ashwin Shah.				
Signature of Industry Mentor	Girish	[signature]			

Receiving Date	15/04/24	Name of Faculty Mentor	Dr. Vikas Mahor	Sign	[signature]

<u>MONTHLY PROGRESS REPORT (MPR) FROM INDUSTRY MENTOR</u>

Name of student	ASHISH RATHORE		Department	ELECTRONICS	
Industry/Organization	VOLVO EICHER PVT LTD		Date/Duration	15-04-24 to 15-05-24	
Criterion	Poor	Average	Good	Very Good	Excellent
Punctuality/Timely completion of assigned work					✓
Learning capacity/Knowledge up gradation				✓	
Performance/Quality of work				✓	
Behaviour/Discipline/Team work					✓
Sincerity/Hard work					✓
Comment on nature of work done/Area/Topic	Ashish is working on quality improvement project in Product Audit as well in Aggregate audit.				
OVERALL GRADE	Excellent				
Name of Industry Mentor	Girish Yadav / Ashwin Shah				
Signature of Industry Mentor	Girish Ashwin				

Receiving Date	15/05/24	**Name of Faculty Mentor**	Dr. Vikas Mohar.	Sign	