MF5512 INDUSTRIAL TRAINING/INTERNSHIP

INDUSTRIAL TRAINING REPORT

Submitted by

M. MITHUL (2021109023)

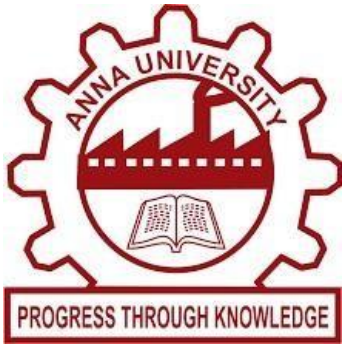
In partial fulfillment for the award of the degree

Of

BACHELOR OF ENGINEERING

IN

MANUFACTURING ENGINEERING



COLLEGE OF ENGINEERING GUINDY

ANNA UNIVERSITY:CHENNAI-600025

NOVEMBER 2023

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this internship titled **"ANALYSIS OF ACTIVE PARTS LIST"** is the bonafide work of **MITHUL M (2021109023)** who carried out the industrial training under my supervision.

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I would like to express my sincere gratitude to **CATERPILLAR INDIA Pvt Ltd** for giving me this wonderful opportunityto gain profound knowledge about the distribution process in **INDIA DISTRIBUTION CENTER(IDC).**

I am highly indebted to my Corporate Mentor **Mr. DHANAVANDHAN U.** I owe a deep sense of gratitude to my Project Guide **Mr. MURALI MURUGESAN** for his guidance to successfully complete my assigned project.

MITHUL M **(2021109023)**

INDUSTRIAL TRAINING CERTIFICATE

CATERPILLAR® Caterpillar India Engineering Solutions Private Limited
CIN No: U74999TN2021FTC141049

July 31,2023

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Mr. Mithul. M (Reg. No:2021109023), student of **Third Year B.E Manufacturing Engineering** from **College Of Engineering Guindy Campus Anna university, Chennai** had successfully completed his internship training on "ANALYSIS OF ACTIVE PARTS LIST" in our PSLD India Distribution Center-facility during the period from June 26,2023 to July 25,2023.

We wish him all the best for his future endeavors.

For Caterpillar India Engineering Solutions Private Ltd

CATERPILLAR INDIA PRIVATE LTD THIRUVALLUR

Viji Venugopal

Logistics Node Manager I

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ABSTRACT

DEGREE AND BRANCH	**:**	BACHELOR OF ENGINEERING (MANUFACTURING ENGINEERING)
INTERNSHIP TRAINING	**:**	INDIA DISTRIBUTION CENTER(IDC)
TITLE OF INTERSHIP PROJECT	**:**	ANALYSIS OF ACTIVE PARTS LIST
NAME & ROLL NUMBER	**:**	MITHUL M (2021109023)
PERIOD	**:**	June 26 2023 - July 25 2023

PLACE : CHENNAI

DATE : 06/11/2023

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CHAPTER 1

PROFILE OF THE INDUSTRY

Caterpillar Inc. is the world's leading manufacturer of construction and mining equipment, off- highway diesel and natural gas engines, industrial gas turbines, and diesel-electric locomotives. For nearly 100 years, we've been helping customers build a better, more sustainable world and are committed and contributing to a reduced carbon future. Our innovative products and services, backed by our global dealer network, provide exceptional value that helps customers succeed .

1.1 PURPOSE

FIG 1.1 PURPOSE

1.2 SUSTAINABILITY

Caterpillar has a long-standing commitment to sustainability, one of its five Values in Action ,and a strategic area of focus. It is part of who they are and whatthey do. They have a legacy of providing products and services that continually improve the quality of life and the environment by fulfilling society's need for infrastructure including shelter, clean water, transportation, and reliable energy –in a sustainable way. They are committed to further reducing Caterpillar's greenhouse gas emissions while helping our customers meet their climate-relatedobjectives. They are supporting their customers during the energy transition toa lower-carbon future through investments in new products, technologies, and services. Fig 1.3shows the caterpillar company logo.

1.3 COMPANY LOGO

FIG 1.2 COMPANY LOGO

1.4 CATERPILLAR THIRUVALLUR

Caterpillar has been a key partner in India's growth since the 1971s, supporting growth in mining, transportation, captive power generation, and the construction of infrastructure. Our India presence includes state-of-the-art manufacturing facilities, research and development centers, and service and support organizations. Caterpillar, our subsidiary companies—Progress Rail, Perkins, and Solar turbines and our independently owned dealers are located throughout the country to serve and support our customers and respond quickly to their needs. Caterpillar began manufacturing products in India 50 years ago in Tiruvallur and

currently has facilities all around the country. With the focus on sustainability and best-in-class productivity, our employees produce world- class products for India and export Indian-made products to other countries. Fig 1.4 is the snapshot of the Tiruvallur factory.

.

FIG 1.3 FACTORY OFFICE

1.5 PRODUCTS FROM THIRUVALLUR PLANT

OFF-HIGHWAY TRUCKS

Tiruvallur plant produces 4 types of OHT trucks namely 777,772(T2, T4), 773,770(T2, T4),424 Backhoe loader, skid steel loader (SSL). These trucks are purchased by mining industries, freight transporters, and cargo movers. The plant also produces excavators' model 320G. Fig 1.5 shows the photos of model 772G,777,770.

FIG 1.4 PRODUCT PHOTOS

1.6 OHT AND EXCAVATOR MODELS

TABLE-1 OHT EXCAVATOR MODELS

MODEL NAME	KEY SPECS	PAYLOAD	ENGINE MODEL	TOP SPEED
770 G	NOMINAL PAYLOAD	42.1 ton (US)	Cat® C15	45.8mile/h
772G	NOMINAL PAYLOAD	51.6 ton (US)	Cat® C18	49.2mile/h
773E	NOMINAL PAYLOAD	61 ton (US)	Cat® C27	46mile/h
777	TARGET PAYLOAD	101.1ton (US)	Cat® C32B	40.9 mile/h
320GC (EXCAVATOR)	NET POWER -ISO 9249 146 HP	OPERATING WEIGHT 48281 lb.	MAXIMUM DIGGING DEPTH 22ft	-

CHAPTER 2

ORGANISATIONAL STRUCTURE

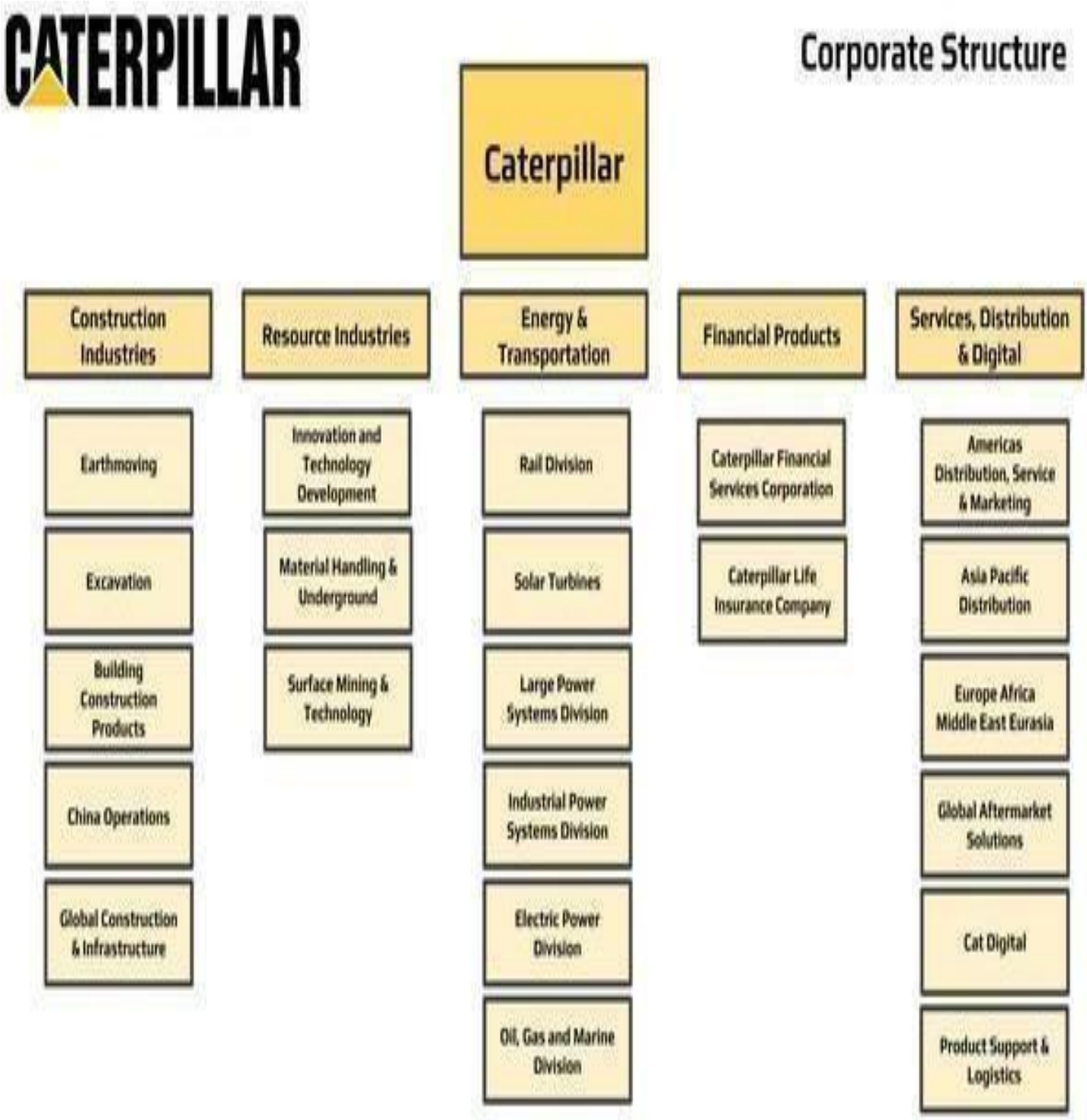

FIG 2.1 ORGANIZATION STRUCTURE

CHAPTER 3
PLANT LAYOUT

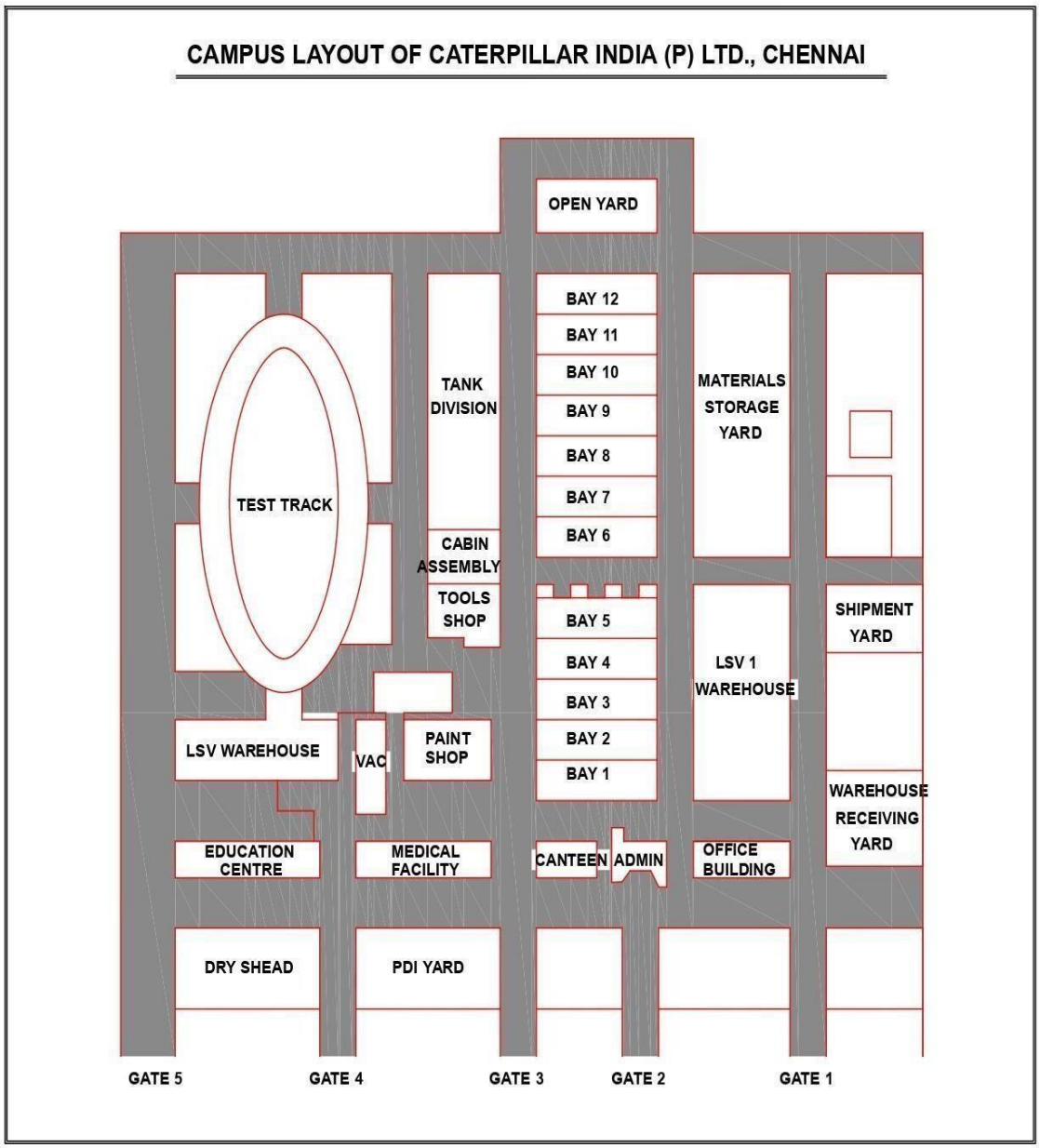

Fig 3.1 PLANT LAYOUT

CHAPTER 4

DEALERS OF CATERPILLAR INDIA PRIVATE LIMITED

Caterpillar has a strong dealer network. In India our dealers are GMMCO Limited and Gainwell Commonsales Private Limited .

4.1 GMMCO LIMITED:

GMMCO that covers a south and south west of India.

GMMCO Limited is the authorized dealer of Caterpillar equipment in India. As aCaterpillar dealer, GMMCO is responsible for sales, service, and support of Caterpillar products throughout the country.

GMMCO's association with Caterpillar dates back to 1986 when they became thefirst dealer in India for Caterpillar's construction equipment. Over the years, GMMCO has established itself as a reliable and trusted partner for customers seeking Caterpillar machinery.

As an authorized dealer, GMMCO offers a wide range of Caterpillar equipment, including excavators, bulldozers, wheel loaders, motor graders, compactors, generators, and more. These machines are designed for various applications in industries such as construction, mining, energy, and infrastructure development.

GMMCO ensures that customers receive high-quality products and services. Theyhave a skilled team of sales professionals who assist customers in choosing the right equipment for their specific requirements. GMMCO's service network is spread across India, with numerous service centers and technicians trained by Caterpillar to provide efficient maintenance and repair services.

Fig 4.1-GMMCO LOGO

4.2 GAINWELL COMMOSALES PRIVATE LIMITED

Gainwell covers a north and north east of India.

Gainwell Commosales Private Limited (formerly known as Gainwell Machines & Services Pvt. Ltd.) is one of the authorized dealers of Caterpillar equipment in India. Gainwell Commosales operates as a joint venture between Gainwell, an Essel Group company, and West Bengal-based TIPL (Tractors India Pvt. Ltd.).

As a Caterpillar dealer, Gainwell Commosales offers a wide range of Caterpillar construction and mining equipment, power systems, and industrial engines. Their product portfolio includes excavators, wheel loaders, backhoe loaders, motor graders, dozers, compactors, pavers, articulated trucks, generators, and more. These machines cater to various industries such as construction, mining, infrastructure, energy, and manufacturing.

Gainwell Commosales provides end-to-end solutions to its customers, including sales, rentals, spare parts supply, maintenance, repairs, and technical support for Caterpillar equipment. They have a network of branches and service centers across India, ensuring prompt service and support to their customers.

FIG 4.2 GAINWELL LOGO

CHAPTER 5

PROCESS FLOW

5.1 PROCESS FLOW OF INDIA DISTRIBUTION CENTER

FIG 5.1 PROCESS FLOW

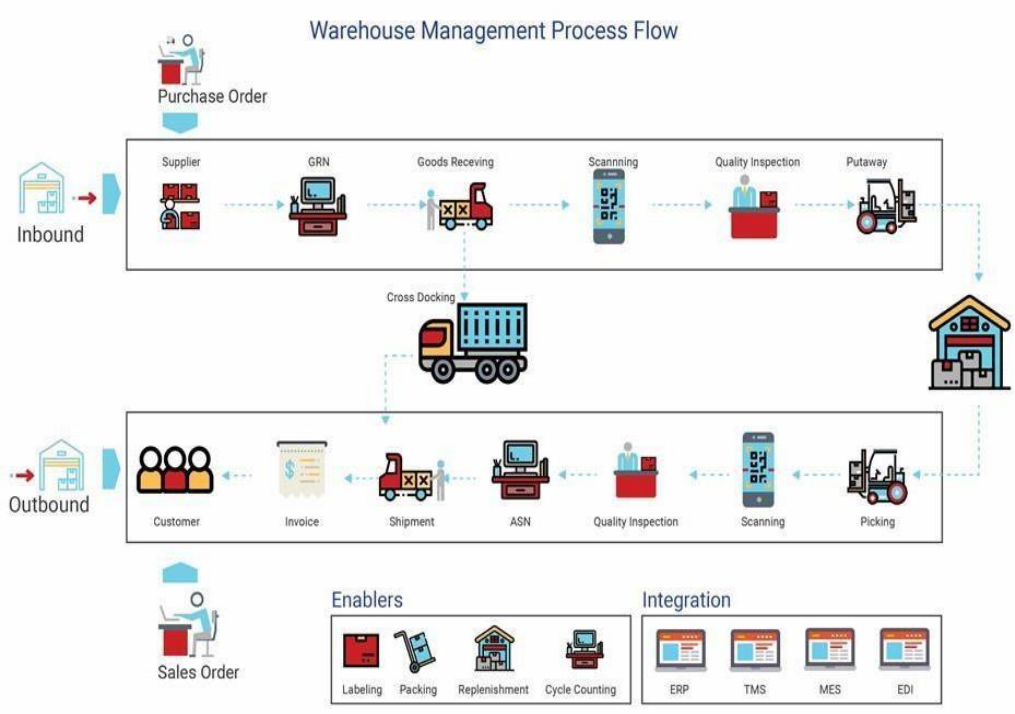

FIG 5.2 WAREHOUSE MANAGEMENT PROCESS FLOW

5.2 ORDER MANAGEMENT

Order management is the process of efficiently handling and fulfilling customer orders from the initial placement to final delivery. It involves various stages and activities that ensure the smooth execution of the order and customer satisfaction. Here is a typical process of order management:

- ✓ **Order Placement:** The process begins when a customer places an order through various channels such as an e-commerce website, phone, email, or in-person. The customer provides the necessary information, including product details, quantity, shipping address, and payment method.
- ✓ **Order Capture:** Once the order is received, it needs to be captured and recorded in the order management system. The system collects and stores the relevant order information for further processing.
- ✓ **Order Processing:** This stage involves verifying the order details, checking product availability, and performing any necessary validations. The order management system may also perform inventory checks, credit checks, and address validation to ensure accurate and efficient order processing.
- ✓ **Order Fulfillment:** After the order has been processed, the fulfillment process begins. This typically involves tasks such as picking the items from the warehouse, packaging them securely, and generating shipping labels.
- ✓ **Shipping and Delivery:** Once the order is packaged and labeled, it is handed over to the shipping carrier or logistics partner for transportation. The customer is provided with tracking information to monitor the progress of their shipment.
- ✓ **Order Tracking and Customer Support:** Throughout the order fulfillment process, the order management system tracks the status of the order and updates it in real-time. This information can be accessed by the customer service team.
- ✓ **Order Returns and Exchanges:** In the event of a product return or exchange, the order management system facilitates the process by generating return labels, initiating refund or replacement requests, and managing inventory updates.
- ✓ **Order Completion and Reporting**: Once the order is successfully delivered, the order management system marks it as complete. It also generates reports and analytics on various order-related metrics such as sales revenue, order volume,

fulfillment cycle time, and customer satisfaction.

- ✓ **Order Analysis and Optimization:** The order management process is continuously monitored and analyzed to identify any bottlenecks, inefficiencies, orareas for improvement. Based on the analysis, adjustments can be made to optimize the order management process, enhance customer experience, and improve overall operational efficiency

5.3 SUPPLY CHAIN PROCESS

The supply chain process encompasses the activities involved in the creation and delivery of products or services to customers. It involves the coordination of various stages, from sourcing raw materials to delivering the final product to the end consumer. Here is an overview of the typical supply chain process:

- ✓ **Planning and Forecasting:** The process begins with demand planning and forecasting. This involves analyzing historical data, market trends, and customer demand to estimate the expected demand for products or services. It helps in determining production levels, inventory requirements, and overall supply chain strategy.
- ✓ **Sourcing and Procurement:** Once the demand is estimated, the next step is to source and procure the necessary raw materials or components. This involves identifying suppliers, negotiating contracts, managing supplier relationships, and ensuring the timely availability of materials at the required quality and quantity.
- ✓ **Production:** The sourced materials are then used in the production process to create finished products or services. This stage involves manufacturing, assembly, testing, and quality control. Production can occur in-house or be outsourced to third-party manufacturers.
- ✓ **Inventory Management:** Throughout the supply chain process, inventory management plays a crucial role. It involves tracking and controlling the levels of raw materials, work-in-progress (WIP), and finished goods.
- ✓ **Warehousing and Distribution**: Once the products are manufactured and ready for shipment, they are stored in warehouses or distribution centers. These facilities serve as hubs for inventory storage, consolidation, and order fulfillment. Distribution involves activities such as order picking, packing, and shipping.

- ✓ **Transportation and Logistics**: The transportation and logistics stage involve selecting the most suitable transportation methods (e.g., trucking, air freight, ocean shipping) to move the products from the distribution centers to the end customers. It includes route optimization, carrier selection, freight management, and tracking the movement of goods.
- ✓ **Reverse Logistics:** Reverse logistics deals with the return, repair, or disposal of products. It involves handling customer returns, managing warranty claims, recycling or disposing of defective or end-of-life products, and refurbishing or reselling returned items when applicable.

FIG 5.3 WAREHOUSE

5.4 WAREHOUSE MANAGEMENT

Warehouse management involves the efficient handling and organization of inventory within a warehouse or distribution center. It includes a range of activities that ensure optimal utilization of space, accurate inventory control, and smooth operations. Here is an overview of the typical process of warehouse management:

- ✓ **Receiving:** The process begins with receiving incoming shipments of goods. This involves inspecting the received items, verifying the quantity and quality against purchase orders or packing slips, and recording the received inventory in the warehouse management system. The items are typically assigned unique identifiers, such as barcodes or RFID tags, for tracking purposes.

- ✓ **Inventory Storage:** Once received, the items are properly stored in designated locations within the warehouse. This stage involves organizing the inventory based on factors such as product type, SKU (Stock Keeping Unit), size, and demand. Efficient space utilization and layout optimization techniques are applied to maximize storage capacity and facilitate easy access to items.
- ✓ **Inventory Management**: Warehouse management systems are used to track and manage inventory levels accurately. This includes real-time updating of inventory quantities as items are received, picked, or replenished. The system helps in monitoring stock levels, setting reorder points, conducting regular cycle counts or physical inventories, and generating reports on inventory status.
- ✓ **Order Processing:** When customer orders are received, the warehouse management system generates pick lists or work orders to guide the warehouse staff in fulfilling the orders. The system provides information on the location of items to be picked, the quantity required, and any special handling instructions. The staff retrieves the items from their respective storage locations and prepares them for packing.
- ✓ **Order Packing:** In this stage, the picked items are packed securely and appropriately for shipping. Packaging materials such as boxes, crates, or pallets are selected based on the nature of the products and the shipping requirements. The packages may also be labeled with shipping information, barcodes, or RFID tags for easy tracking and identification.
- ✓ **Outbound Shipment**: Once the orders are packed, they are handed over to the shipping carrier or logistics partner for delivery to customers. The warehouse management system generates shipping labels or documents and updates the order status as shipped. It may also provide real-time visibility of shipments and track their progress until delivery.
- ✓ **Returns Processing:** In the event of customer returns or product exchanges, the warehouse management system facilitates the returns process. It generates return labels, records the returned items, inspects their condition, and updates inventory levels accordingly. Depending on the return policy, items may be restocked, repaired, or disposed of as necessary.

5.5 MANUFACTURING BILL OF MATERIALS

EBOMs are created in engineering, are typically driven from the CAD tool and are usually centric to the final assemblies list of parts or components that make up the as designed or EBOM.

MBOMs will contain, or be 'driven' by the EBOM. MBOMs make up the 'end item', or product as shipped. **Manufacturing bill of materials (MBOM),** also referred to as the manufacturing BOM, contains all the parts and assemblies required to build a complete and shippable product. MBOM is a type of **bill of materials (BOM).** Unlike **Engineering bill of materials (EBOM),** which is organized with regards to how the product is designed, the MBOM is focused on the parts that are needed to manufacture a product.

The details in an MBOM are good enough to allow it to be used in a **Manufacturing Operations Management (MOM)** System **or Manufacturing Execution System (MES)**. The MBOM typically contains more information than what is needed to do the **MRP (Materials Resources Planning)** part of an **MPS (Master Production Schedule)** in **ERP**

	A	B	C	D	E	H	I	J
1	Lev	Component numbe	RevLe	Object description	Quantl	SortStrn	SupplyAre	Std pric
2	1	HN_RM874 WS 1		WORK STATION 1	1			3,049,195.53
3	2	HN_RM874LA0010		FRAME LOWERING	1			1,452,399.29
4	3	8F5658	0	RING SNAP	2	3042501		10.46
5	3	9D3434	4	PIN	1	3042501	B03S01	514.5
6	3	3042502	7	FRAME AS.	1	3042501		1,451,775.01
7	4	3042503	9	FRAME AS.-BASIC	1	3042502		1,228,665.59
8	5	3592792	0	BLOCK	4	3042503	B04FAB	460.72
9	5	1444546	2	PLATE	2	3042503	B04FAB	941.4
10	5	2717945	2	STRIP	2	3042503	B04FAB	144.05
11	5	2717947	0	PLATE	2	3042503	B04FAB	347.36
12	5	2717995	0	PLATE	4	3042503	B04FAB	251.76
13	5	2718009	2	PLATE AS	2	3042503	B04FAB	2,792.00
14	6	2G7984	3	SPACER	4	2718009	B04FAB	300.6
15	6	2718010	0	PLATE	2	2718009	B04FAB	507.13
16	5	2718042	2	SUPPORT-LH	1	3042503	B04FAB	3,932.00
17	5	2718043	2	SUPPORT-RH	1	3042503	B04FAB	3,932.00

TABLE 2-MBOM

CHAPTER 6

PERSONEL WELFARE SCHEMES

Caterpillar, Inc. offers many options for pension and welfare benefits. A large number of companies like Caterpillar, Inc., provide group health plans for their employees, through which businesses typically pay a significant portion of their employees' health insurance premiums. In this setup, companies receive tax deductions for their contributions and employees collect the benefits tax-free. Caterpillar, Inc. offers health, dental, and vision benefits. Caterpillar, Inc. also offers group life insurance, long-term disability insurance, and short-term disability insurance for accidents or illnesses. Employer-funded retirement plans help to ensure a dependable income stream later in life. Caterpillar, Inc. offers defined benefit pension plans and defined contribution pension plans. A defined benefit pension plan pays retirees a predetermined amount upon retirement. With a defined contribution retirement plan, employers help workers save and invest for retirement.

6.1 PERSONNEL WELFARE SCHEMES

Management, support, and production employees who follow the Employee Health, Life, and Disability Benefits Program are eligible for:

- A PPO option administered through United Healthcare (UHC)
- Two CDHP options administered through United Healthcare (UHC)
- An EPO option administered through Blue Cross Blue Shield (BCBS)

6.2 ABOUT THE PLAN OPTIONS

The CDHP options and the traditional PPO plan option provide you and your covered family members with comprehensive medical coverage with the same services, network providers, and network discounts. The traditional Blue Cross Blue Shield EPO option also provides comprehensive medical coverage, but it uses a different provider network

and may provide different services and network discounts. The plans are **self-funded**. That means Caterpillar (along with the employee premiums collected) pays the costs of the plans. UHC and BCBS administer the medical claims but don't insure the benefits under the plans. Choosing lower-cost healthcare options, when available and appropriate for your situation, reduces costs for you, the plans, and Caterpillar. Fig 4.2 shows the objectives of the employee welfare scheme.

FIG 6.1 OBJECTIVES OF WELFARE SCHEMES

CHAPTER 7

DETAILS OF THE TRAINING UNDERGONE

7.1 GEOMETRIC DIMENSIONING & TOLERANCING

GD&T is a means of dimensioning & tolerance a drawing that considers the function of the part and how this part functions with related parts. Fig 6.1 showssymbols used in GD&T.

SYMBOL	GEOMETRIC CHARACTERISTIC	TOLERANCE TYPE	CONTROL SUMMARY
	FLATNESS	FORM (NO RELATION BETWEEN FEATURES)	CONTROLS FORM (SHAPE) OF SURFACES AND CAN ALSO CONTROL FORM OF AN AXIS OR MEDIAN PLANE DATUM REFERENCE IS NOT ALLOWED
	STRAIGHTNESS		
	CYLINDRICITY		
	CIRCULARITY (ROUNDNESS)		
	PERPENDICULARITY	ORIENTATION (NO RELATION BETWEEN FEATURES)	CONTROLS ORIENTATION (TILT) OF SURFACES, AXES, OR MEDIAN PLANES FOR SIZE AND NON-SIZE FEATURES DATUM REFERENCE REQUIRED
	PARALLELISM		
	ANGULARITY		
	POSITION	LOCATION	LOCATES CENTER POINTS, AXES, AND MEDIAN PLANES FOR SIZE FEATURES ALSO CONTROLS ORIENTATION
	PROFILE OF A SURFACE		LOCATES SURFACES ALSO CONTROLS SIZE, FORM, AND ORIENTATION OF SURFACES BASED ON DATUM REFERENCE
	PROFILE OF A LINE		
	TOTAL RUNOUT	RUNOUT	CONTROLS SURFACE COAXIALITY ALSO CONTROLS FORM AND ORIENTATION OF SURFACES
	CIRCULAR RUNOUT		
	CONCENTRICITY	LOCATION (DERIVED MEDIAN POINTS)	LOCATES DERIVED MEDIAN POINTS OF A FEATURE *NOT COMMON...CONSIDER USING POSITION, RUNOUT, OR PROFILE*
	SYMMETRY		

TABLE 3 GD&T- SYMBOLS

7.2 ENGINEERING DRAWING

Engineering drawing is a language that is understood throughout the world by engineers and fabricators. Other languages may fail to describe the size, shape, physical aspects, inner details, finish, etc., but the engineers' language known as 'Engineering Drawing' never fails. The most intricate assemblies with their various complicated parts can be easily represented by engineering graphics. There are various types of engineering drawings and all have one simple purpose, i.e., the communication of ideas to others. The drawings used for communicating the ideas of the design engineer to the production engineer and technicians are renowned as 'Workshop Drawing'. Engineering Drawing – A drawing Prepared by an engineer, for an engineering purpose is known as an engineering drawing. It is the graphic representation of physical objects and their relationship. It is prepared, based on certain basic principles, symbolic representations, standard conventions, notations, etc. It is the only universal means of communication used by engineers and technicians. Fig 7.1 shows the representation of freehand sketching and different views in engineering drawing.

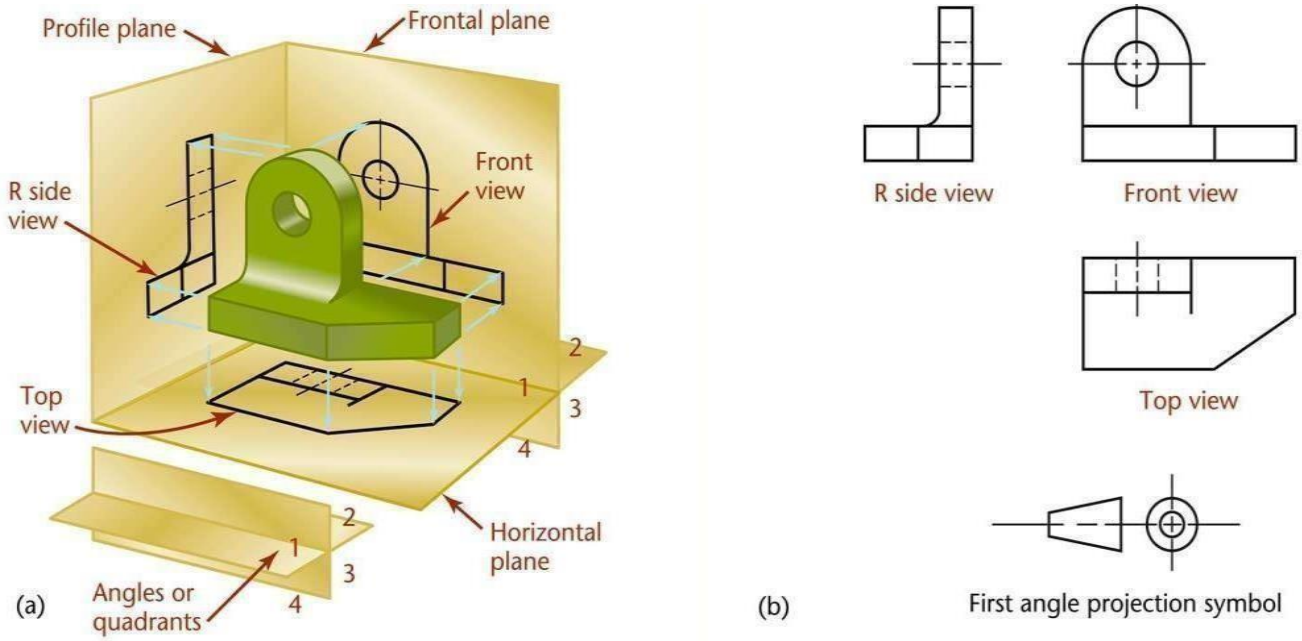

FIG 7.1 ENGINEERING DRAWING

7.3 5S

5S is often summarized by the philosophy of "a place for everything and everything in its place." You may have heard of "KonMari," a home organization system propagated by Marie Kondo. TheKonMari method transforms cluttered homes into tidy and simplified living spaces. The 5S principles are similar to KonMari. However, saying that 5S is just about tidying is like saying yogais just about stretching. In other words, there is much more depth. So, let's explore the true intent and meaning of 5S.5S originated as 5 Japanese words: Seiri, Seiton, Seisou, Seiketsu, and Shitsuke. In English these have come to be known as:

Sort: Eliminate that which is not needed.

Straighten: Organize what remains after sorting.

Shine: Clean and inspect the work area.

Standardize: Write standards for 5S.

Sustain: Consistently apply the 5S standards.

FIG 7.2-5S

7.4 LEAN MANUFACTURING

The core principle in implementing lean manufacturing is to eliminate waste to continually improve a process. By reducing waste to deliver process improvements, lean manufacturing sustainably delivers value to the customer. The types of waste include processes, activities, products, or services that require time, money, or skills but do not create value for the customer. These can cover underused talent, excess inventories, or ineffective or wasteful processes and procedures. Removing these inefficiencies should streamline services, reduce costs and ultimately provide savings for a specific product or service through the supply chain to the customer.

- **Eliminate Waste**: Waste is a negative factor for cost, deadlines, and resources. It provides no value to products or services

FIG 7.3 -8 WASTES OF LEAN MANUFACTURING

- **Improve Quality**: Improved quality allows companies to stay competitive and meet the changing needs and wants of customers. Designing processes tomeet these expectations and desires keeps you ahead of the competition, keeping quality improvement at the forefront

- **Reducing Costs**: Overproduction or having more materials than is required creates storage costs, which can be reduced through better processes and materials management. Reducing Time, Wasting time with inefficient working practices is a waste of money too, while more efficient practices create shorter lead times and allow for goods and services to be delivered faster.

8.PROJECT UNDERTAKEN DURING THE INTERNSHIP

8.1 PURPOSE OF THE PROJECT

To Implement an Active parts Database management in a Spare Parts Distribution center that can track and analyze sales data. This will help us to identify Active parts list based on current sales trends and patterns

- **Analyze Sales Data:** Examine the historical sales data of parts to identify the ones that have the highest demand. Look for parts with consistent and frequent sales patterns, indicating their popularity.

- **ABC Analysis: Employ** the ABC analysis technique to classify parts based on their importance and demand. Categorize parts into three groups: A, B, and C. A-class parts are the most critical and fast-moving, while C-class parts are slow moving with lower demand. Focus on the A class parts to optimize their availability and reduce stockouts.

- **FMS Analysis:** Employ the FMS analysis technique to classify parts based on their Frequency. Categorize parts into three groups: F, M, and S. F-Fast Moving parts are the, orders received more than 10 times in a year In general terms these are the parts that are in High Demand and are frequently ordered by Dealers and sold in large quantities M-Medium Moving parts-Orders received between 4 to 9 Calls In general terms these are parts that experienced moderate level of Demand and regularly ordered and sold but not as frequently are in a high quantities as Fast Moving parts while slow-moving are with lower demand rate.

  Focus on the Fast-moving A-class parts to optimize their availability and reducestockouts

- **Regularly Review and Adjust:** Continuously monitor sales data and inventory levels to identify any changes in demand patterns. Review the performance of parts periodically and make necessary adjustments to inventory levels and storage locations

8.2 SOFTWARE USED-SAP

. **FIG 8.1** SAP LOGO

SAP, which stands for Systems, Applications, and Products in Data Processing, is a leading provider of enterprise software solutions. SAP offers a wide range of software products and services that help businesses manage various aspects of their operations, including finance, human resources, supply chain management, customer relationship management.

8.3 MAINTAINING A VENDOR CODE:

Maintaining vendor codes, also known as supplier codes or vendor identifiers, provides several benefits for businesses. Here are some reasons why maintaining vendor codes is important:

- **Effective Communication and Documentation:** Vendor codes serve as unique identifiers for suppliers in a business's internal systems and documentation. By assigning a specific code to each vendor, communication becomes more efficient and accurate. It ensures that purchase orders, invoices, contracts, and other relevant documents are properly labeled and easily associated with the correct supplier.
- **Streamlined Supplier Management:** Vendor codes facilitate effective supplier management. With unique codes assigned to each vendor, businesses can easily organize and categorize their supplier database. This allows for quick and reliable

supplier identification, contact information retrieval, and centralized management of supplier-related data.

- **Accuracy in Financial Transactions:** Maintaining vendor codes helps ensure accuracy in financial transactions, particularly in accounts payable and receivable processes. When processing invoices, payments, or credit notes, having a vendor code ensures that transactions are correctly linked to the respective supplier, reducing the risk of errors, duplicate payments, or misallocations.
- **Enhanced Reporting and Analysis:** Vendor codes enable businesses to generate comprehensive reports and perform data analysis related to supplier performance, purchasing trends, and expenditure patterns. By associating transactions with specific vendor codes, businesses can evaluate supplier relationships, monitor spending patterns, and identify opportunities for cost savings or process improvements.
- **Consistent Procurement Processes:** Vendor codes contribute to standardized procurement processes. When procurement professionals and employees across different departments use vendor codes consistently, it improves clarity, reduces confusion, and enhances collaboration. It also helps maintain consistency in the selection, evaluation, and onboarding of new suppliers.
- **Improved Supplier Relationship Management:** Vendor codes facilitate effective supplier relationship management. By easily identifying and referencing suppliers through their codes, businesses can maintain accurate records of communication, track performance metrics, negotiate contracts, and develop stronger partnerships with suppliers.
- **Integration with Information Systems:** Vendor codes play a crucial role in integrating procurement and accounting systems. They enable seamless data exchange between different systems, such as enterprise resource planning (ERP) systems, inventory management systems, and supplier management platforms. This integration improves process efficiency, data accuracy, and overall system performance.
- **Regulatory Compliance and Auditing:** Maintaining vendor codes helps ensure compliance with regulatory requirements. It allows businesses to accurately track

and report supplier-related information, support audits and inspections, and demonstrate transparency and accountability in their procurement processes.

- Overall, maintaining vendor codes provides a standardized and efficient approach to supplier management, improves accuracy in financial transactions, supports data analysis, and enhances communication and collaboration with suppliers. It contributes to better procurement practices, process optimization, and compliance with regulatory obligations.

8.4 MAINTAINING A PURCHASE ORDER RATES:

Maintaining proper purchase order rates, also known as purchase order accuracy, in procurement and purchasing processes offers several benefits. Here are some key advantages:

- **Accurate Financial Reporting:** Proper purchase order rates ensure accurate tracking and recording of procurement transactions. This leads to more precise financial reporting, allowing businesses to have a clear understanding of their expenses, budgeting, and cost control.
- **Cost Control and Budgeting**: Maintaining purchase order rates helps businesses monitor and control their procurement spend. By accurately capturing and tracking purchase orders, organizations can identify areas of overspending, negotiate better pricing with suppliers, and implement cost-saving measures.
- **Streamlined Approval and Authorization**: Having accurate purchase order rates enables smoother approval and authorization processes. By maintaining proper rates, businesses can ensure that all purchase requests are appropriately reviewed, authorized, and aligned with budgetary guidelines, preventing unauthorized or unnecessary purchases.
- **Vendor Management and Negotiation**: Accurate purchase order rates provide businesses with valuable data for vendor management and negotiation. With proper rates, organizations can evaluate supplier performance, assess pricing trends, identify opportunities for consolidation or volume discounts, and negotiate favorable terms and conditions with suppliers.

- **Inventory and Supply Chain Optimization:** Proper purchase order rates contribute to effective inventory and supply chain management. By accurately capturing purchase orders, businesses can maintain optimal stock levels, reduce stockouts or excess inventory, improve lead times, and enhance overall supply chain efficiency.
- **Compliance and Audit Trail:** Maintaining accurate purchase order rates helps ensure compliance with regulatory requirements and internal policies. Accurate records provide an audit trail, enabling businesses to demonstrate transparency, adhere to legal and financial regulations, and support internal and external audits.
- **Dispute Resolution:** Accurate purchase order rates play a crucial role in resolving disputes or discrepancies with suppliers. Proper records enable businesses to compare received goods or services against the original purchase order, making it easier to identify and resolve any issues related to quantity, quality, or pricing.
- **Data Analysis and Decision Making:** Accurate purchase order rates provide reliable data for analysis and decision making. By analyzing purchasing patterns, businesses can identify opportunities for process improvements, negotiate better terms with suppliers, optimize procurement strategies, and make informed decisions based on historical purchasing data.
- Maintaining proper purchase order rates ensures transparency, control, and accuracy throughout the procurement process, leading to improved financial management, vendor relationships, and overall operational efficiency. It helps businesses mitigate risks, reduce errors, and make more informed decisions regarding procurement and purchasing activities.

8.5 TYPES OF WAREHOUSE STORAGE:

There are several types of warehouse storage methods commonly used in logistics and supply chain management. These methods are designed to maximize space utilization, improve accessibility, and optimize inventory management. Here are some of the most common warehouse storage types:

- **Pallet racking**: Pallet racking is a popular storage method that utilizes horizontal rows of vertical frames and beams to store palletized goods. This method provides

high-density storage and allows for easy access to individual pallets using forklifts.

- **Shelving:** Shelving systems consist of multiple levels of shelves, often made of metal or wood, to store smaller items or products that do not require pallets. Shelving can be adjustable to accommodate different product sizes and is commonly used for order picking and organizing inventory.
- **Mezzanine storage:** Mezzanines are raised platforms or floors built within a warehouse to create additional storage space. Mezzanine storage is especially useful when vertical space is underutilized. It allows for storing goods both above and below the platform, effectively doubling the storage capacity.
- **Carton flow racks:** Carton flow racks are designed for high-volume order picking of smaller items. These racks consist of inclined shelves with rollers or wheels, allowing cartons or boxes to flow forward automatically as items are removed from the picking face. Carton flow racks enable efficient order fulfillment and rotation of stock.
- **Drive-in and drive-through racking**: Drive-in and drive-through racking systems are suitable for high-density storage of homogeneous products. With drive-in racking, forklifts drive into the racking system to load and retrieve pallets, whereas drive-through racking allows access from both ends. These methods maximize storage capacity but may have limited accessibility.
- **Push-back racking:** Push-back racking is a dynamic storage system that utilizes inclined rails and carts to store multiple pallets in a single lane. When a new pallet is loaded, it pushes the previously loaded pallets backward. This method provides high-density storage while maintaining a Last-In, First-Out (LIFO) inventory management approach.
- **Automated storage and retrieval systems** (AS/RS): AS/RS systems use automated machinery, such as robotic cranes or shuttles, to store and retrieve pallets or individual items from designated storage locations. AS/RS systems improve efficiency, accuracy, and space utilization, particularly in high-volume warehouses.

These are just a few examples of warehouse storage types. The choice of storage method depends on factors such as product characteristics, order picking

requirements, space availability, equipment capabilities, and operational needs. Warehouse managers often combine different storage methods within a facility to optimize storage and retrieval operations.

FIG-8.2 SHELVING

FIG - 8.3 MEZZANINE STORAGE

8.6 HSN CODE

HSN code stands for “Harmonized System of Nomenclature”. This system has been introduced for the systematic classification of goods and products for taxation and trade purposes all over the world. HSN code is a 6-digit uniform code that classifies 5000+ products and is accepted worldwide. HSN codes are used to classify products based on their characteristics and facilitate uniformity in trade across different countries.it is a globally recognized system for classifying goods and products for taxation and trade purposes. HSN codes are used to classify products based on their characteristics and facilitate uniformity in trade across different countries.

8.7 FIFO METHOD

FIFO stands for “First In, First Out.” It is a method of inventory management and cost accounting that assumes the first items purchased or produced are the first ones sold or used.

In FIFO, the inventory is treated as a queue or line, where the oldest items in stock are assumed to be sold or used first. This means that the cost of goods sold (COGS)

and the remaining inventory value are calculated based on the cost of the oldest items in stock.

FIFO is commonly used in industries where products have a limited shelf life, such as food and beverages, as it ensures that older products are sold before they expire. It also provides a more accurate representation of the actual flow of goods and helps in maintaining inventory accuracy.

To illustrate how FIFO works, consider a simple example:

Suppose a company purchases 100 units of a product at different times and costs: 50 units at $5 each and 50 units at $6 each.

When the company sells 80 units, under the FIFO method, it assumes that the first 50 units purchased at $5 each and 30 units from the batch purchased at $6 each were sold.

The COGS will be calculated as (50 units * $5) + (30 units * $6), and the remaining inventory will consist of the 20 units from the second batch purchased at $6 each.

FIFO is one of the commonly used inventory valuation methods, along with LIFO (Last In, First Out) and weighted average cost. Each method has its own advantages and implications on financial statements and tax obligations. The choice of the method depends on factors such as industry practices, inventory turnover, pricing trends, and regulatory requirements.

8.8 LEAD TIME

Lead time refers to the amount of time it takes to complete a process or task from start to finish. It is commonly used in business and manufacturing contexts to plan and manage production schedules, inventory levels, and order fulfillment.

Lead time can vary depending on the specific industry, product, or service. It typically includes several components, such as processing time, production time, transportation time, and waiting time. The total lead time is the sum of all these individual components.

Lead time is an essential factor in supply chain management as it helps businesses estimate when they need to place orders, schedule production, and deliver products

or services to customers. By accurately predicting lead times, companies can optimize their operations, reduce inventory costs, improve customer satisfaction, and make informed decisions regarding production and procurement.

It's worth noting that lead time can be influenced by various factors, including supplier reliability, production capacity, transportation efficiency, and any unforeseen disruptions or delays in the process. Therefore, businesses often analyze historical data and use statistical methods to estimate lead times and account for potential uncertainties.

8.9 MAINTAINING UNIQUE PURCHASE ORDER NUMBERS IN SAP

Maintaining unique purchase order numbers in SAP (Systems, Applications, and Products in Data Processing) is essential for effective procurement and supply chain management. Here are some key reasons for using unique purchase order numbers in SAP:

- **Identification and Tracking:** Unique purchase order numbers serve as identifiers for individual purchase orders within the SAP system. Each purchase order is assigned a unique number, allowing for easy identification and tracking of specific orders throughout their lifecycle. This facilitates efficient search, retrieval, and reference to specific purchase orders when needed.
- **Accuracy and Integrity:** Unique purchase order numbers contribute to data accuracy and integrity. When each purchase order has a distinct number, it minimizes the risk of duplication, confusion, or errors caused by using the same number for multiple orders. It ensures that purchase orders are uniquely identified and eliminates any ambiguity in the system.
- **Streamlined Workflow:** Having unique purchase order numbers enables a streamlined workflow in the procurement process. As purchase orders progress through various stages, such as creation, approval, and fulfillment, the unique numbers provide a consistent reference point for tracking and monitoring the order’s status. It helps stakeholders easily understand the progress and location of each order within the system.

- **Integration with Financial Processes**: Unique purchase order numbers facilitate integration with financial processes in SAP. The unique numbers allow for proper linkage between purchase orders and subsequent financial transactions, such as accounts payable and invoice processing. This integration ensures accurate financial reporting, improves budgeting, and supports effective cost control.
- **Audit and Compliance:** Unique purchase order numbers are essential for audit and compliance purposes. They provide a clear audit trail, enabling internal and external auditors to trace the flow of purchase orders, review approvals, and validate the accuracy of transactions. Compliance requirements, such as regulatory audits or internal control assessments, can be effectively addressed with a well-maintained system of unique purchase order numbers.
- **Supplier Communication and Documentation**: Unique purchase order numbers simplify communication and documentation with suppliers. When sharing purchase order information with vendors, having a unique number helps in accurate identification, reduces communication errors, and ensures alignment between the buyer and supplier on the specific purchase order being referred to. It facilitates clear and unambiguous communication, reducing the chances of misinterpretation or confusion.
- **Reporting and Analysis:** Unique purchase order numbers support reporting and analysis in SAP. With unique identifiers, businesses can generate reports, analyze purchasing patterns, track spending, and evaluate supplier performance based on specific purchase orders. It enables data-driven decision-making, contract management, and performance measurement.

  By maintaining unique purchase order numbers in SAP, businesses can streamline procurement processes, enhance data accuracy, support financial integration, ensure compliance, and facilitate effective communication with suppliers. It contributes to better order management, increased transparency, and improved operational efficiency within the procurement function

LEARNING POINT

During one month of the training period, I gained a lot of experience in the field of supply chain, warehouse management and total quality management.

This gave me a huge exposure as I could apply what I had learned in day-to-day Industry problems. The study sessions organized in Caterpillar taught me about various topics like total quality management, lean manufacturing etc., This implant trainee acted as a bridge that helped me connect my textbook learnings to the practical world. This internship also gave me an idea of how one should prepare to face technical interviews and what one should learn to gain control over industry-facing problems. I also gained knowledge on how to use software like SAP and Microsoft apps.

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BOOKS:

Total Quality Management (TQM) Principles, Methods, and Applications

Sunil Luthra, Dixit Garg, Ashish Agarwal, Sachin K. Mangla