SUBJECT: STRATEGIC COST ANALYSIS

Module 2: Material Labour and Overheads accounting and analysis

7 Materials Control Techniques

Material control is a systematic framework designed to regulate the procurement, storage, and utilization of raw materials. It aims to maintain an uninterrupted production flow while minimizing total inventory investment costs, preventing capital tie-up and stock-out bottlenecks.

Strategic Inventory Control Methodologies

- **ABC Analysis (Always Better Control):** An inventory classification system based on Pareto's 80/20 rule. Inventory items are tiered into three distinct categories based on their annual consumption value:
  - **Category A:** High-value items representing roughly 10% of total inventory quantity but commanding 70% of total monetary value. Demands strict, centralized control and low safety stock buffers.
  - **Category B:** Moderate-value items representing roughly 20% of inventory volume and 20% of monetary value. Requires periodic review and standard control parameters.
  - **Category C:** Low-value items representing roughly 70% of total inventory volume but accounting for only 10% of monetary value. Controlled via relaxed, decentralized procedures and high safety buffers.
- **VED Analysis (Vital, Essential, Desirable):** Evaluates inventory strictly based on the operational criticality of the material to production timelines. **Vital (V)** items cause immediate production stoppages if missing; **Essential (E)** items allow short-term operation but degrade system performance; **Desirable (D)** items have local substitutes and cause minimal operational friction.
- **FSN Analysis (Fast, Slow, Non-moving):** Classifies stock lines according to their transactional consumption velocity. It identifies obsolete or dormant materials (Non-moving) that clog physical warehouse footprints, allowing managers to execute inventory clearings.

- **Economic Order Quantity (EOQ):** A mathematical optimization technique that calculates the ideal volume of inventory to purchase per single order, minimizing the aggregate of **Ordering Costs** (clerical processing, transport setup) and **Carrying Costs** (storage rents, insurance, interest losses).

> Economic Order Quantity (EOQ) = $\sqrt{[(2 * A * O) / C]}$
> Where: A = Annual Consumption Volume | O = Cost per single order setup | C = Carrying cost per unit per annum

Inventory Stock Level Limits

To avoid overstocking and stock-out scenarios, cost managers set strict operational thresholds:

- **Reorder Level:** The specific inventory milestone that triggers a fresh procurement request.
  *Formula: Maximum Consumption Rate * Maximum Lead Time*
- **Minimum Stock Level:** The safety margin below which inventory should never fall.
  *Formula: Reorder Level - (Average Consumption Rate * Average Lead Time)*
- **Maximum Stock Level:** The upper capacity limit to protect corporate working capital.
  *Formula: (Reorder Level + Reorder Quantity) - (Minimum Consumption Rate * Minimum Lead Time)*

8 Issue of Material Stock Verification, Methods of Pricing of Material

Material Issue Control

Raw inventory cannot bypass factory storerooms without strict documentation. The movement is authorized via a **Material Requisition Note**, which acts as a formal written directive specifying the precise cost center, manufacturing job, or production process to be debited for the inventory volume issued.

Stock Verification Frameworks

Organizations audit the physical presence of inventory against theoretical bookkeeping records using two distinct operational systems:

1. Periodic Inventory System: Physical verification is performed as a single massive operation at fixed chronological intervals (e.g., at the close of a financial year). It requires a complete production halt and makes it difficult to detect localized stock discrepancies or theft in real time.

2. Perpetual Inventory System: A continuous management methodology that links regular stock record logs with an ongoing, rolling program of physical verification known as **Continuous Stocktaking**. A dedicated audit team reviews selected bins daily without disrupting general manufacturing workflows, ensuring immediate reconciliation of variances and fraud prevention.

The Philosophy of Material Pricing

When raw items are acquired at varying market prices over time, determining the cost of issues to a specific factory job becomes complex. Materials must be priced systematically using consistent accounting rules to accurately calculate product costs, manage gross profitability, and determine the valuation of closing stock left in the warehouse.

9 FIFO, LIFO, Simple Average, Weighted Average

Material cost assignment relies on standardized cost flow assumptions to value inventory issues and remaining stock balances.

1. FIFO (First-In, First-Out)

Assumes that the earliest batches of inventory received into the warehouse are the first to be issued to production. Consequently, inventory issues match historical costs, while remaining closing stock balances match current replacement market values.

- **Impact During Inflationary Markets:** Because older, cheaper materials are charged to current production, the calculated Cost of Goods Sold (COGS) drops, resulting in **inflated, higher reported net profits** and higher corporate tax liabilities.

2. LIFO (Last-In, First-Out)

Assumes that the most recent batches of inventory received are the first to be issued to production lines. This matches current replacement material costs against current sales revenues.

- **Impact During Inflationary Markets:** Since newer, more expensive materials are charged to production, COGS rises, which results in **lower, more realistic net profits** and reduced immediate tax exposure. However, the remaining closing stock valuation becomes understated on the balance sheet, as it matches older, historical pricing layers.

3. Simple Average Method

The issue price is calculated by dividing the sum of the distinct batch purchase prices by the total number of pricing layers available in stock, completely ignoring the specific quantity volumes held within each batch.

Simple Average Price = **(Price 1 + Price 2 + ... + Price N) / N**

4. Weighted Average Method

The issue price is calculated by dividing the total monetary value of all materials in stock by the total aggregate quantity of units available. A new issue price is recalculated automatically every time a new purchase delivery arrives, smooths out sudden market price fluctuations.

Weighted Average Price = **Total Value of Stock Hand / Total Unit Quantity on Hand**

10 Labour- Meaning, Time Wage system and piece wage system, Halsey and Rowan plan (Simple Problems Only)

Meaning of Labour Cost

Labour cost represents the total human resource spend incurred by an organization to convert raw materials into finished products or to support operational distribution. It is split into **Direct Labour** (wages directly traceable to production tasks) and **Indirect Labour** (support staff wages, such as supervisors and maintenance crews).

Primary Systems of Wage Remuneration

- **Time Wage System:** Earnings are calculated strictly by multiplying the total number of hours worked by a pre-set hourly wage rate, completely independent of individual output volumes.
  Pros: Easy to calculate, guarantees income security for workers, and protects product quality.
  Cons: Provides zero structural incentive for exceptional workers, leading to lower operational efficiency.
- **Piece Wage System:** Earnings are tied directly to the total volume of production units completed, regardless of the time taken.
  Pros: Provides a direct incentive for speed and efficiency, optimizing factory asset usage.
  Cons: Can lead to quality degradation if workers prioritize speed over precision, and creates income volatility for the workforce.

Incentive Premium Plans

Premium plans bridge the gap between time and piece systems, guaranteeing a base time-rate wage while offering a financial bonus for time saved against a defined standard task timeline.

Halsey Premium Plan: Confirms a guaranteed hourly minimum wage. When a worker completes a task in less than the standard time, they receive their standard hourly wage for the actual hours worked plus a **bonus equal to 50% of the time saved** valued at the standard hourly rate.

Halsey Total Earnings = **(T * R) + [0.5 * (S - T) * R]**
Where: T = Time Taken | S = Standard Time Allowed | R = Hourly Wage Rate

Rowan Premium Plan: Similar to the Halsey plan but uses a variable bonus calculation. The bonus is calculated as the ratio of time saved to the standard time allowed, multiplied by the standard earnings for the actual hours worked. This mechanism protects the employer by capping bonus payouts if a worker rushes excessively through a task.

Rowan Total Earnings = **(T * R) + [(S - T) / S * (T * R)]**
Where: T = Time Taken | S = Standard Time Allowed | R = Hourly Wage Rate

Illustrative Practical Problem & Solution

Problem Statement: Calculate the total earnings of a factory worker under both the Halsey Plan and the Rowan Plan using the following parameters:

- Standard Time Allowed (S): 10 Hours
- Actual Time Taken (T): 8 Hours
- Hourly Wage Rate (R): ₹50 per hour
- Time Saved (S - T): 2 Hours

Solution Matrix

Halsey Plan Calculation Steps	Rowan Plan Calculation Steps
• **Base Earnings:** 8 Hours * ₹50 = ₹400 • **Halsey Bonus:** 50% of Time Saved Bonus = 0.5 * (2 Hours) * ₹50 = ₹50 **Total Halsey Earnings: ₹400 + ₹50 = ₹450**	• **Base Earnings:** 8 Hours * ₹50 = ₹400 • **Rowan Bonus:** Proportional Ratio Bonus = (2 Saved / 10 Standard) * (8 * ₹50) = 0.2 * ₹400 = ₹80 **Total Rowan Earnings: ₹400 + ₹80 = ₹480**

11 Overhead- Meaning and Definition

Meaning and Formal Definition

Overheads represent the aggregate of all indirect operating costs incurred by an enterprise that cannot be directly traced or economically attributed to a single product code, job contract, or cost center. Overheads form the shared operational framework required to sustain business activity.

> **Statutory Definition:** Overheads are defined as the structural aggregate of: **Indirect Materials + Indirect Labour + Indirect Expenses**.

Functional Classification of Overheads

To ensure accurate cost allocation, overheads are categorized by department function:

- **Factory / Production Overheads:** Indirect workshop expenses (e.g., plant depreciation, factory power utilities, supervisor salaries).
- **Administration Overheads:** Costs linked to corporate governance and corporate management (e.g., head office rents, director fees, legal charges).
- **Selling Overheads:** Expenses to create market demand and secure customer orders (e.g., showroom advertising, sales catalog printing).
- **Distribution Overheads:** Logistics outlays to store and deliver finished goods to the final consumer destination (e.g., warehouse rents, delivery truck maintenance).

12 Concepts of overhead Allocation

Meaning of Overhead Allocation

Overhead Allocation is the process of charging the whole amount of a specific, identifiable item of indirect cost directly to a single cost center or department. This technique is applied when an expense can be traced entirely to a single business unit without requiring secondary estimation or division.

Operational Examples of Allocation:

- The salary of a dedicated supervisor managing only the machine stamping department is allocated entirely to that specific unit.
- The electricity bill from a sub-meter installed exclusively inside the IT server room is allocated directly to the technology service cost center.

13 Apportionment and Absorption of Overheads

When an indirect expense is shared across multiple organizational departments, cost managers must transition from allocation to apportionment and eventual product absorption.

1. Overhead Apportionment

Overhead Apportionment is the process of dividing a shared indirect cost across multiple departments or cost centers using equitable bases that reflect each unit's relative consumption. It is split into two sequential phases:

- **Primary Distribution:** Spreading shared overhead expenses (e.g., factory rent, heating, building depreciation) across both Production Departments (A, B, C) and Service Departments (X, Y) using logical, standardized bases.
- **Secondary Distribution:** Re-allocating the accumulated overhead totals from Service Departments (which do not create physical products) to the primary Production Departments. This is executed using methods like the *Simultaneous Equation Method* or the *Step-Down Method*, as final products cannot absorb service costs directly.

Standard Apportionment Bases

Shared Overhead Expense Type	Most Equitable Apportionment Base
Factory Building Rent, Rates, and Taxes	Floor Area occupied by each department (Sq. Ft.)
Plant Machinery Depreciation and Insurance	Capital Value of the machinery in each department
Heavy Machine Power Utilities	Horsepower (HP) rating of machines * Operating Hours
Canteen Expenses, Labor Welfare Codes	Total Number of Employees in each department
Light & Ventilation Utilities	Number of Light Points or Floor Area occupied

2. Overhead Absorption

Overhead Absorption is the final structural stage where the total accumulated and apportioned overheads of a production department are charged to individual units of finished products. This step is necessary to determine total product cost for pricing and inventory valuation. Overheads are absorbed using standardized rates, including:

- **Machine Hour Rate (MHR):** Total departmental overheads divided by the total operating hours of production machinery; ideal for highly automated environments.

- **Direct Labour Hour Rate:** Total overheads divided by total manual labor hours worked; ideal for labor-intensive assembly environments.

14 Simple problems on allocation and apportionment of overheads

This practical calculation demonstrates the execution of a primary distribution matrix to apportion shared expenses across factory units.

Problem Statement: Apportion the shared expenses of a factory across three Production Departments (A, B, C) and one Service Department (X) using the following operational data parameters:

- Total Factory Rent: ₹40,000
- Total Machine Depreciation: ₹20,000
- Total Canteen Expenses: ₹10,000

Departmental Metrics:

- Floor Area (Sq. Ft.): Dept A = 400 | Dept B = 300 | Dept C = 200 | Dept X = 100 *(Total = 1,000 Sq. Ft. Ratio = 4:3:2:1)*
- Value of Machinery (₹): Dept A = 50,000 | Dept B = 30,000 | Dept C = 20,000 | Dept X = Nil *(Total = 1,000,000. Ratio = 5:3:2:0)*
- Staff Count: Dept A = 20 | Dept B = 15 | Dept C = 10 | Dept X = 5 *(Total = 50. Ratio = 4:3:2:1)*

Primary Overhead Distribution Sheet Solution

Overhead Expense	Apportionment Base	Dept A (₹)	Dept B (₹)	Dept C (₹)	Dept X (₹)
Factory Rent (₹40,000)	Floor Area (4:3:2:1)	16,000	12,000	8,000	4,000

Overhead Expense	Apportionment Base	Dept A (₹)	Dept B (₹)	Dept C (₹)	Dept X (₹)
Machine Depreciation (₹20,000)	Machine Value (5:3:2:0)	10,000	6,000	4,000	0
Canteen Expenses (₹10,000)	Staff Count (4:3:2:1)	4,000	3,000	2,000	1,000
TOTAL APPORTIONED	**Primary Matrix Summary**	**30,000**	**21,000**	**14,000**	**5,000**

End of Module 2 • Strategic Cost Analysis