

# Automotive Mechanics

## Level-IV

Based On October, 2023 Curriculum Version-II



**Module Title: - Job Estimation and Costing**

**Module Code : EIS AUM4 M05 1023**

**Nominal Duration : 40 Hours**

**Prepared by: Ministry of Labor and Skill**

**October, 2023**

**Addis Ababa, Ethiopia**

## Acknowledgment

The Ministry of Labor and skill wishes to thank and appreciation to MoLS leaders and experts, Regional Labor and skill/training Bureaus leader, experts, TTVT College Deans, Instructors and industry experts who contribute their time and professional experience to the development of this Training Module.

## Table of Content

### Table of Contents

Acknowledgment .....	2
Table of Content .....	3
Acronyms .....	4
Introduction to the Module .....	5
<b>Unit One: Introduction To Cost Estimation.....</b>	<b>6</b>
1.1.Cost Estimates.....	7
1.1.1. Defining of Cost Estimates .....	7
1.1.2 Purpose of estimating.....	7
1.1.3. Types of cost and Estimates.....	8
1.1.4 Role of Estimator .....	9
1.2 Components of an Estimate .....	11
1.3 Stages of Estimate.....	12
<b>Unit Two: Elements of cost Estimation.....</b>	<b>15</b>
2.1 Gather Information.....	16
2.2 Estimate Materials and Duration .....	16
2.2.1 Cost-Based Estimating.....	16
2.2.2 Elements of a Cost-Based Estimate .....	16
2.3 Calculate Cost .....	18
2.3.1 Calculating Variable Costs .....	18
2.3.2. Calculate Overhead Costs .....	19
2.3.3 Labor Cost vs. Material Cost .....	20
2.3.4 Labor and overheads rates .....	21
2.3.5. Organizational work specifications and requirements .....	21
2.4 Document details .....	22
Self-check-1.....	23
<b>Unit Three: Process Costing of Automotive .....</b>	<b>25</b>
3.1 Estimating time requirements .....	26
3.2. Verification of Costs and calculations .....	27
Operation sheet 3:1 .....	29
Lap Tests.....	30
Reference .....	31

## Acronyms

VAT	Value Add Tax
IRS	Internal Revenue Service
LAP	Learning Activity Performance
OHS	Occupational Health Safety
TM	Training Module

## Introduction to the Module

This module describes the skills and knowledge required to estimate and calculate the costs to repair, maintain or modify a vehicle taking into account materials, labor, duration and overhead costs. It requires the ability to estimate and calculate costs, analyze information, and report and document the costs.

### This module covers the units

- Introduction to Cost Estimation
- Elements of Cost Estimation
- Automotive Costing Process

### Learning Objective of the Module

- Understand Cost Estimation
- Identify Elements of Cost Estimation
- Discuss Automotive Costing Process

### Module Instruction

For effectively use these modules trainees are expected to follow the following module instruction:

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the “LAP test” given at the end of each unit and
5. Read the identified reference book for examples and exercise

## Unit One: Introduction To Cost Estimation

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Defining of Cost Estimation
- Purpose of Estimating
- Types of Costs and Estimates
- Components of an Estimate
- Consideration of Cost Estimate

This unit will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- Defining of Cost Estimation
- Understand Purpose of Estimating
- Differentiate Types of Costs and Estimates
- Identify Components of an Estimate
- Discuss Consideration of Cost Estimate

## 1.1. Cost Estimates

### 1.1.1. Defining of Cost Estimates

**Cost estimation** is the process of estimating the relationship between costs and the cost drivers that cause those costs. When vehicle is damaged or needs for modify, the owner and any insurance and road authority that are involve may want to have estimates of damaged. The cost estimates will let the concerned parties know how much the repair will cost.

Estimates may be for body repair, glass replacement, refinishing, or other services. The person, who prepares the estimates, or the estimator, must have a thorough knowledge and experienced of automotive technology in an automobile repair. In addition, an estimator should have good interpersonal skills. He or she must deal directly with customers and insurance company representatives and must be able to maintain good working relationships with this people.

An estimate involves calculating the costs of work on the basis of probabilities.

- Measurements: all measurements are approximate.
- Pricing: the degree of approximation is even greater because of the difficulty in predicting all the probabilities of items such as labor productivity and site conditions
- Costs do not just happen; they are caused by activities.

### 1.1.2 Purpose of estimating

- The purpose of estimating is to forecast the cost required to complete a service in accordance with the contract plans and specifications.
- There are two distinct tasks in estimating:
  - To determine the probable real cost of the project
  - To determine the probable real time to build the project
- Because automotive engine service estimates are prepared before a service is done, an estimate is, at best, a close approximation. Organizations estimate costs primarily for three reasons
  - To manage costs
  - To make decision
  - To plan and set standards

### 1.1.3. Types of cost and Estimates

Cost is the expenditure required to create and sell a product and service, or to acquire assets. Is a decrease in owner's equity that result from operating the business and consumed or services used in the process of earning revenue

#### Types of Cost

- **Direct costs** are those costs that can be specifically traced to the cost object.
- **Indirect costs** are costs that cannot be specifically traced to the cost object.

#### The challenge for cost manager is

- To identify the activities that cause costs
- To estimate the relationship between costs and their causes
- To manage the activities that cause & costs

#### There are four types of estimates made by the estimator, including:

- Visual estimates
- Courtesy estimates
- Noncompetitive estimate
- Competitive estimates

**Visual Estimates:** are simply experienced guesses by an estimator about the cost of repairing damaged. An experienced estimator will normally be fairly close to the actual cost of repair. Visual estimates may help customers decide about having damaged repaired or decide about submitting a claim to the insurance company.

**Courtesy Estimates:** are more accurate than visual estimates and are represented to the customer in written form the estimator uses various estimating aids to assist in arriving material, labor, and cost when preparing courtesy estimates.

Courtesy estimates are prepared without incentives, as estimator will know in advance whether or not they will be doing the repair job.

**Noncompetitive Estimates:** are usually done for minor damaged. A customer is considering the shop do the work. No claims are to be filed with an insurance company. Noncompetitive estimates are detailed and accurate. They are prepared with the help of various estimating aids.

**Competitive Estimates:** this type of estimate is the most common. Often, an insurance company will ask the three written estimates be obtained for a damaged claim. These competitive estimates are so named because different shops are independently competing for the work. The shop estimator knows that the detailed estimates have been requested by an insurance company and that it will be compared to others. The estimator tries to offer the most favorable terms.

Some insurance companies will have one of their own representatives help determine if estimates are accurate. This person is call *adjuster* (appraiser). The adjuster's job is to approve collisions repairs and sees that the customer's vehicle is being repaired to pre-collision condition.

Adjuster sometimes alters, or *adjusts*, estimates to negotiate a final cost that is acceptable to the insurance company

#### 1.1.4 Role of Estimator

- The estimator's job is to prepare estimates of engine repair operation costs.
- The success of a service provider business depends on the accuracy of these estimates.
- The estimator's success will be based on his previous experience and knowledge of the automotive industry.
- A service provider or estimator lacking this experience may over-, or under-estimates his service costs

In either case, this could be detrimental to the success of his company:

- If costs are too high, his jobs will be few
- If costs are too low, he will not be able to stay in business
- All cost data is acquired from experience. If an estimator does not have cost data from his own experience, He must use cost data from price books.
- The more valid data the estimator has available, the better he will be able to estimate the probabilities of costs.

He must have a thorough(complete)knowledge of the automotive servicing trades.

- This includes:
  - Types of construction
  - Methods of construction.
- He must be able to read manual and notes, and understand the specifications.
- If he finds any ambiguity between the manual and specifications, he will bring them to the attention of the automotive expert or owner for solution.

When all the questions are answered & problems are solved, he can then prepare and finish the cost estimate

- The estimator must have understood the sensor codes and system construction in the area the service is to be done
- He must have understood the component parts & its relationship.
- He must understand the sizes, the degree of damage, & the capabilities of the materials with which he works.
- He must be able to substitute equal quality materials when specified material are not available.
- He must keep up with the new automotive industry products and materials
- To keep current, he should frequently visit trade shows and subscribe to automotive magazines
- He has to possess some basic mathematical ability.
- He has to have at his fingertips reference materials, books, tables, and tabulating equipment's to speed up his job.
- In time he will acquire reference materials in the form of material catalogs, brochures, and manufacturer specification sheets for the product he uses.
- Finally, he must know service labor cost changes.
- The estimator must realize that labor costs may vary in different model and brand of the vehicle.
- He must also realize service in his estimate's future increases in labor costs because of upcoming events

## Factors Affect the Accuracy of Cost Estimates

- Site, location and accessibility
- Subsurface and soil conditions
- Time and season
- Climatic conditions
- Wage (labor cost) agreements
- Market prices of basic materials
- Availability of money
- The demand for engine service operation.

### 1.2 Components of an Estimate

**Materials:** The estimator makes a take-off of all the different materials required on the project from the plans and specifications

**Labor:** The estimator estimates the hours needed to do the required work and then multiply by the appropriate wage

**Equipment:** The cost of equipment includes ownership or rental (kefeya) fees, moving to the job site, erecting, dismantling and operating.

**Overhead:** There are two types of overheads:

- General overhead: includes all costs that cannot be directly charged to any particular, such as the cost of office supplies, rent, travel expenses and salaries.
- Job overhead: includes all costs which apply indirectly to the service and cannot be charged to materials, labor, or equipment.

**Profit:** Most estimators show the profit expected from a job as a percentage of the total estimated cost of the service. The profit varies from 6-15%

Approximate profits usually expected are:

- Small service 6-8%
- Medium service 10%
- Large service 12%
- Very large service 15-20%

## Sources of Errors in Estimates

- Mistakes in replace instead repair take-off (Which one 1st).
- Mistakes in estimating the labor time required for certain items of work.
- Errors in estimating hourly wages of labor.
- Failure to allow for rising costs of materials.
- Failure to allow for delays due to breakdown of machines and acts of technician.
- Making no provisions (careless) to have estimates checked.
- Insufficient allowance for overhead.
- mission of profit

## Consideration of Cost Estimate

Every estimate, whether it is generated in the conceptual phase of a service or at bidding time, must be consider a number of issues.

The price of the service is affected by a number of factors:

- The size of the collision.
- The quality of the body.
- The location of collision.
- The service starts and duration.
- Market conditions.

## 1.3 Stages of Estimate

1. Conceptual phase.
2. Schematic phase.
3. Design development phase.
4. Procurement phase
  1. Conceptual phase

The description of a project may be a sketch or a brief written description. Top management are involved in cost Estimation and damage identification.

e.g., chief executive officer, vice chairman, general manger

The size of the maintenance is known, although it may be described in terms of capacity like:

- The degree of damage body.
- The number of replaced parts

Page 12 of 32	Ministry of Labor and Skills Author/Copyright	Job Estimation and Costing	Version -1 October, 2023
---------------	--	----------------------------	-----------------------------

The time needed to prepare this type of estimate is short in the range of a half day or less. The presentation of the estimate is generally informal for the purpose of providing a target budget. The estimates are often prepared for many different options the best alternative(s) can be selected

## 2. Schematic Phase Estimate

In this Phase, the technician & operational manager have become involved in the accident analysis (problem identification) & estimating of the project

A schematic estimate will be based on a design that is approximately 30% designed and include the following information:

- Damaged parts.
- Impact direction for collision
- Body parts repair mechanism manual.

This estimate includes some area take-off, & calculation of the major collide elements. Such as:

- The gross area of collision.
- The repaired paint part area.
- The gross cubic meters of paint to be removed

This estimate will take one to two weeks & will carry a 10% contingency for unknown design. and engineering details in the next design stage. At the end of the schematic design stage the presentation of the design to the owner is accompanied by an estimate of the cost of the project. Before the service team moves on to the next phase of design, the owner will decide on the basic design parameters and on the service budget. Any cost reduction ideas will be presented and priced by the estimators. Some of these ideas may be accepted or rejected at this stage, and may be carried forward to be better defined in the next phase.

## 3. Design Development Phase Estimate

The design development estimate is based on much more defined information. B/C of this the time taken to prepare this type of estimates is longer but the accuracy is greater

The estimate in this stage will be based on a design that is 60% complete and includes the following information:

- Detailed on the degree of collision parts.

- Parts to be replaced even if they work well.
- All relevant specification sections.
- Well defined mechanical and electrical systems

Most of the major servicing items will be quantifiable, and the more important unit prices should be known at this point

The preparation of this estimate should take two to three weeks and the accuracy is within 5 to 10% of the final cost. The costs of the materials and methods will be known and should be compared to past similar service. Major assumptions should be noted and compared to what was assumed at the schematic design stage. The estimate at this stage is a tool used to verify that the design service operation is within the owner's budget, and to identify any good cost saving ideas

#### 4. Procurement Phase Estimate

In this stage, an estimate would be prepared by all the service provider who are bidding for the service of the given engine, as well as the technical team. The service provider prepares the estimate to identify a price to bid (for bidding). The owner team prepares an estimate to be in a position to negotiate a fair price and to verify the accuracy of the servicer's price.

The estimate is prepared based on a complete set of servicing documents. Estimates done for bidding require a complete understanding of material quantities, which are taken from the problem identification & collision analysis. Estimates also require accurate unit prices, which usually involves input from local material suppliers. An exact schedule will be prepared. This will be used to identify the duration of the project



Figure 1.1 Cost Estimate

Depending on the size of the project, a bid estimate can take three weeks or longer to prepare

## Unit Two: Elements of cost Estimation

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Gather information
- Estimate Materials and Duration
- Calculate Costs
- Document Details

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Explain the process of gathering information
- Illustrate the steps involved in estimating materials and duration
- Analyze the role of calculating costs
- Describe the importance of documenting project details

## 2.1 Gather Information

Information gathering refers to gathering information about the issue you're working and the ways other organizations and communities have addressed it. The more information you have about the issue itself and the ways it has been approached, the more likely you are to be able to devise an effective program or intervention of your own.

When vehicle is damaged or needs for modify, the owner and any insurance and road authority that are involve may want to have estimates of damaged. The cost estimates will let the concerned parties know how much the repair will cost.

The person, who prepares the estimates, or the estimator, must have a thorough knowledge of vehicle construction and be experienced in an automobile repair and bodyworks. In addition, an estimator should have good interpersonal skills. Normally, one person does the estimates for an auto shop. It is vitally important that estimates be accurate, honest, and fair.

## 2.2 Estimate Materials and Duration

### 2.2.1 Cost-Based Estimating

Cost-Based Estimating is a method to estimate the bid cost for items of work based on estimating the cost of each component to complete the work and then adding a reasonable amount for a technician's overhead and profit. The unique character of projects, geographical influences, market factors and the volatility of material prices can make historical pricing an unreliable method of estimating project costs.

Although properly prepared Cost-Based Estimates are generally considered more accurate and reliable than Historic Bid-Based Estimates, they require much more in terms of effort, time and skill to prepare.

### 2.2.2 Elements of a Cost-Based Estimate

Cost-Based Estimates contain six basic elements: Time, Equipment, Labor, Material, Overhead and Profit. Each item of work on a project can be broken up into tasks that it takes to complete the item of work. Each of these tasks contains the six basic elements that result in the cost for the project.

## Raw Material Cost

This is the sum of all raw material used to give the service for that specific vehicle. Most items in automotive repairs require material to be purchased from spare parts. The first step in formulating a material cost is identifying the materials needed. For many items this can be as simple as counting up the number of items needed but for other items this may require more extensive work.

## Equipment

Most all automotive work takes a significant amount of high-cost equipment. This high initial cost of equipment is generally what makes automotive companies somewhat rare due to the risk of initial investment and the need to keep the equipment busy to maximize its useful life. It is for this reason that the estimate for an item of service work should not only include the time that the equipment will be needed for that task but also if that task will fully utilize that piece of equipment. Generally, the estimator wants to get the rental cost for equipment down to cost per day or even per hour basis. To get to this level of detail the scale of use of the equipment should be evaluated. If the equipment will be needed on a regular basis on the project the estimator should not use the published daily rate but rather use the monthly rate multiplied by the appropriate regional factors and divided by 176 hour/month. The estimator should only use the daily or hourly rate if they know that the use of the equipment will be limited to only one specific operation for a short period of time. This is done due to the fact that most equipment is owned or long term leased by the technician.

## Labor

Regardless of the amount of high-quality material or the most modern equipment without a labor force the work will not get accomplished. The estimator must again reference experience to determine the amount of labor necessary to accomplish the task at hand or all direct labor costs for that specific task.

## Factory Overhead Cost

In business, overhead or overhead expense refers to an ongoing expense of operating a business; it is also known as an "operating expense". Examples include house rent, water, indirect labor cost (administration and security costs), electricity, and depreciation of fixed capital. The term overhead is usually used when grouping expenses that are necessary to the

continued functioning of the business. The Three items above known as cost of goods sold or cost of goods serviced. Sales minus these three items results in Grosse Profit.

### Time

Now that the service cost has been established and the amounts and hourly rates for equipment have been found the estimator must determine how long the labor force will be tied up completing the task and calculated unit cost per time.

### Profit

Considering items such as cost of ownership of office and plant property such as insurance, taxes, utilities and building maintenance; office labor including estimators, human resources and cost of processing paperwork for labor, management cost, the percentage of profit may range from 7-15% of volume of work, but it depends up on the type of task or job.

## 2.3 Calculate Cost

Costs associated with a business operation can be broadly classed into 2 categories: variable and fixed. Variable costs are those that fluctuate with production volume, while fixed costs remain constant.

### 2.3.1 Calculating Variable Costs

Before categorizing costs, you will need to understand the differences between them. Fixed costs are those that will remain constant even when production volume changes. Rent, utilities, and administrative salaries are examples of fixed costs. Whether you produce 1 unit or 10,000, these costs will be about the same each month. Variable costs vary with production volume. For example, raw materials, packaging and shipping, and workers' wages are all variable costs. The more units you produce, the higher these costs will be.

Labor costs are the total amount of money paid to employees for a period, such as a week or a month. In manufacturing businesses, often management will break down labor costs into direct costs and indirect costs. These terms just refer to if the labor went to direct production of material or if the cost was indirectly related to the production of the material. Larger companies should try to utilize computer software to calculate these costs due to the large volume of employees.

## Employee wages and hours worked

- Step 1 Sort through the employee data and separate the employees by pay scales. For example, Firm A has five employees. Two of the employees make \$14 an hour, two employees make \$20 an hour and one employee have a salary of \$50,000 a year
- Step 2 Add together the total number of hours worked by pay scales for hourly employees. Example, \$14 an hour works a total 90 hours per week. The \$20 an hour employees worked 100 hours this week.
- Step 3 Multiply the hourly rate by the number of hours worked. In our example, \$14 an hour times 90 hours equals \$1,260 and \$20 an hour times 100 hours equals \$2,000
- Step 4 Divide any employee salaries by the time period. In the example, because a week is being analyzed, divide \$50,000 by 52 weeks. So, \$50,000 divided by 52 weeks equals about \$962.
- Step 5 Add the labor costs for each employee pay scale to find total labor costs. In the example, \$1,260 plus \$2,000 plus \$962 equals total labor costs of \$4,222 for Firm A's five employees for the week

### 2.3.2. Calculate Overhead Costs

All businesses have regular expenses that are not directly related to producing goods or services. These indirect expenses are termed "overhead" costs. Most businesses calculate overhead cost on a monthly basis. Typically, overhead cost is expressed as a percentage of sales or of labor cost. Keeping the proportion of overhead cost low gives a business a competitive advantage, either by increasing the profit margin or by allowing the business to price its products more competitively.

### Business expense records

Step 1 Draw up a list of your business expenses. Your list should be comprehensive and include items like rent, utilities, taxes and building maintenance, which are examples of overhead costs. Other items are inventory, raw materials and production labor, which are not considered overhead.

Step 2 Categorize each item on your list of expenses according to whether it is the result of producing a good or service. For example, shop floor labor and the cost of raw materials are direct costs since they are incurred only when some item is being manufactured. All direct costs are overhead. Keep in mind that some items won't fall easily into one category

or the other, so you must make some judgment calls. For example, most businesses classify legal expenses as overhead. However, for a law firm, a lawyer's salary is a direct cost, since her work is directly linked to producing the legal services which are the firm's product. Most business people find it helpful to follow the accepted conventions used in their particular industry for classifying expenses as direct or overhead costs.

Step 3 Add all of the overhead costs for the month to calculate the aggregate (total) overhead cost. You can choose another time period, but most business people find one month to be the most useful.

Step 4 Calculate the proportion of overhead costs compared to sales. Knowing the percentage of each dollar that goes to overhead allows you to properly allocate costs when setting prices and drawing up budgets. Divide your monthly overhead cost by monthly sales and multiply by 100 to find the percentage of overhead cost. For example, a business with monthly sales of \$900,000 and overhead costs totaling \$225,000 has  $(\$225,000/\$900,000) * 100 = 25$  percent overhead.

Step 5 Calculate overhead cost as a percentage of labor cost. This measure is useful as an estimate of how efficiently resources are utilized. The lower the percentage, the more effectively your business is utilizing its resources. Divide the monthly labor cost into the total overhead cost for the month.

### 2.3.3 Labor Cost vs. Material Cost

Labor costs and materials costs are completely different entities, with two commonalities. Both types of costs can be deducted, and both are used to make a product or provide a service to customers. Both costs are calculated during the budgetary process and are typically considered when determining the amount to charge for the end product. Understanding the difference between labor costs and materials costs is essential to accurate budgeting and making a profit.

**Labor:** The estimator estimates the hours needed to do the required work and then multiply by the appropriate wage.

**Materials**

Raw materials include all tangible items that go into the manufacturing of the finished product, including individual parts that work together to complete the product, the adhesive that holds those parts together and the boxes in which the products are

shipped. Material costs are identified as budgetary line items. Direct materials are items that are easily tracked as part of a final product. For example, a tiny motor that drives the fan in a cooling system is considered a raw material as it is only part of the total product. The fan is also a product, for whatever company manufactured it.

### **2.3.4 Labor and overheads rates**

#### **Direct Labor**

Direct labor describes anyone who is directly involved with the manufacturing of a product. Assembly workers who put the products together, quality control engineers who test the products to be sure they are operational, engineers who design the product and draw up the plans for manufacturing, and warehouse workers that package and ship the products are all direct laborers.

#### **Indirect Labor**

Any employee whose job is not directly involved with the development, manufacturing or shipment of the product is an indirect laborer. Company support staff such as human resources employees, administrative assistants and company security officers fall under the umbrella of indirect labor.

#### **Adjusting**

Labor expense is more adjustable than materials expense; an order for 10,000 products will require the same amount of glue and individual parts regardless of how long it takes to assemble them. Labor costs, by contrast, can be adjusted by designing more efficient assembly methods, having employees work or not work overtime and deciding how much quality control you are willing to pay for. Because labor costs are more flexible than material costs, when budget cuts become necessary labor is often targeted first.

### **2.3.5. Organizational work specifications and requirements**

Job estimation: is that preparing plan of performance in servicing of vehicles in automotive work shop and preparing cost for each activity for maintaining customer's vehicle.

This job estimation uses for

Calculating duration

Calculating costs of material need for servicing

Calculating consumable materials for servicing purpose Calculating VAT from each cost  
Knowing how much profit I get from the customer's vehicle maintenance When we estimate job and costing, we have to follow

## 2.4 Document details

### Recording Vehicle Business Documentation

It is common for business owners to take income tax deductions for the use of their vehicles, but the Internal Revenue Service (IRS) is focusing on owners who claim it. Not to be a broken record, but documentation is key. Given the effort to crack down on abuse and misinterpretation of this deduction, it's increasingly likely that those business owners could become the subject of an audit. While an audit is not necessarily synonymous with fun, it doesn't have to result in a devastating tax bill and penalty if the business mileage and expenses are carefully recorded and provided to the IRS.

### Document Everything Related to Business Vehicle Use

- Exact number of business miles driven. Note: Miles driven from home to work and back are not deductible.
- All personal miles driven. The IRS wants to know that business owners understand the difference between business and personal use. Recording and acknowledging personal use of the business vehicle will help to establish this.
- All receipts for vehicle expenses such as maintenance, repairs, registrations, parking costs, and other miscellaneous costs.
- Insurance premiums.
- The odometer reading at the start and end of the year.

### Self-check-1

#### Part I. Choose the correct answer

1. simply experienced guesses by an estimator about the cost of repairing damaged?
  - A. Visual estimates
  - B. Courtesy estimates
  - C. Noncompetitive estimates
  - D. Competitive estimates
2. Are more accurate than visual estimates and are represented to the customer in written form?
  - A. Visual estimates
  - B. Courtesy estimates
  - C. Noncompetitive estimates
  - D. Competitive estimates
3. D escribes anyone who is directly involved with the manufacturing of a product?
  - A. Direct Labor
  - B. Indirect Labor
  - C. Adjusting
  - D. None
4. Any employee whose job is not directly involved with the development, manufacturing or shipment of the product?
  - A. Direct Labor
  - B. Indirect Labor
  - C. Adjusting
  - D. None
5. Are prepared without incentives, as estimator will know in advance whether or not they will be doing the repair job?
  - A. Visual estimates
  - B. Courtesy estimates
  - C. Noncompetitive estimates
  - D. Competitive estimates

6. Are usually done for minor damaged. A customer is considering the shop do the work?
  - A. Visual estimates
  - B. Courtesy estimates
  - C. Noncompetitive estimates
  - D. Competitive estimates

**Part II: Write true if the statement is correct and false if it is incorrect.**

1. Raw materials include all tangible items that go into the manufacturing of the finished product?
2. Job estimation is that preparing plan of performance in servicing of vehicles in automotive work?

**Part III. Give short answer**

1. List the types of estimates made by the estimator?
2. List out the type of cost?

## Unit Three: Automotive Coasting Process

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Estimating time requirements
- Verification of Costs and calculations

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Apply Estimating time requirements
- Verify of Costs and calculations

### 3.1 Estimating time requirements

**Time-Keeping Department:** The first step in accounting for labor cost is to prepare an accurate record of the time spent by each employee. Time keeping in labor costing and control is important because of the following reasons: It accumulates the total number of hours worked by each employee so that his earnings (money or income) can be calculated. Absence of a time-keeping arrangement will create frustration among those employees who are punctual or bound by the attendance rules. Certain benefits like pension and gratuity (tip), leave with pay, provident fund, salary, promotion is linked with continuity of service of employees. Attendance records, in this regard, can be helpful and useful to employees.

Overhead costs being indirect costs are apportioned to different products on some equitable basis.

**Time-booking:** Time-booking like time-keeping is equally important.

Time booking means, recording the time spent by a worker on each job, process or operation.

Time-booking fulfills the following purposes:

1. To determine the cost of the product or job, the amount of labor cost time booking is required.
2. To determine the quantity and value of work done.
3. To determine earnings like wages, bonus which depend on the time taken by a worker in performing job or jobs in a factory.

### Estimating Labor cost requirement for service

The second Major element of cost in most of the manufacturing undertakings is labor cost. Proper accounting and control of labor cost, therefore, constitutes one of the most important problems of management. In controlling labor cost, the problem is complicated by the human element. This is so because labor consists of a lot of different individuals, each with a different mental and physical capacity and each with a different personality.

**Direct Labor Cost:** The labor cost incurred on the employees who are engaged directly in making the product, their work can be identified clearly in the process of converting the raw materials into finished product is called direct labor cost. For example, wages (fixed regular payment) paid to the workers engaged in machining department, fabrication department, assembling department etc.

**Indirect Labor Cost:** The indirect employees are not directly associated with the conversion process but assist in the process by way of supervision, maintenance, transportation of materials, material handling etc. Their work benefits all the items being produced and cannot be specifically identified with the individual products. Hence, the indirect labor cost should be treated as production overhead cost. These costs will be accumulated and apportioned to different cost centers on equitable basis and absorbed into product cost by applying the overhead absorption rates.

**Time and Motion Study:** Time study determines the time spent on each element of job. The total time taken by all elements (stages) of a job is called the standard time. This standard time is the time which should be taken by an average employee to complete a job under standard (normal) working conditions.

### 3.2. Verification of Costs and calculations

**Example:** Estimate the cost of the following damaged body parts of a vehicle.

Table 1: List of materials

No	Raw materials needed	Unit	Qty	Unit Cost	Total cost	Remark
A	Right Fender					
01	Sand paper P220	Roll	01	400	400	
	Sand paper P60	Packet	01	350	350	
	Sand paper P120	Packet	01	350	350	
	Sand paper 1000	Packet	01	350	350	
02	Primer	Kg/can	01	500	500	
03	Putty	Kg/can	03	300	900	
04	Plastic filler	Kg/can	01	300	300	
05	Tinner	Lit.	02	200	400	
06	Masking paper	Packet	01	150	150	
07	Making Tape	Pcs	01	100	100	
08	Top coat (Paint)	Can	01	400	400	
09	Polish	Pcs	02	90	180	

10	Electrode (arc welding)	Packet	01	450	450	
11	Oxyacetylene weldinggas	Kg	01	350	350	
12	Hardner	Pcs	04	80	320	
				Total	<u>5500</u>	

Total Cost of Raw materials = 5500

Table 2: List of Labor

No	Number of workers	salary per Hr	Total time taken	Total cost
1	One body paint man	70	10hrs	700
2	One body mechanic	70	10hrs	700
Total				1,400

Total Labor cost per day = 1400

## 2. Workshop overhead expenses

Table 3: Workshop overhead expenses

No	Overhead expenses	Amount per month	Amount per Hour	Amount per day
1	Indirect labor	1000		33
2	Electricity	400		13
3	Water	300		10
4	Depreciation of fixed capital	200		6
5	House rent	2,000		66
Total Factory overhead expenses per day				128

Total Workshop overhead expenses per day = 12

Profit = 10% =  $7028 \times .10 = 702.8$

Vat = 15% =  $7028 \times .15 = 1054.2$

Total Cost of service = Total Cost of Raw materials + Total Labor cost + Total Factory overhead expenses + profit + Vat

Total Cost =  $5500 + 1400 + 128 + 702.8 + 1054.2 = 8785$

### Operation sheet 3:1

**Operation Title:** Estimate and Calculate Costs of repair the body periodic service

#### Instruction:

Safe working area Properly operated tools and equipment Appropriate working cloths fit with the body Purpose: Ensure the wind shield glass is properly removed

**Required tools and equipment:** tool kit, Strip locking tool, screw driver,

**Consumable Materials:** Sand paper, Primer, Tinner, Masking paper, Polish, Oxyacetylene welding gas

**Precautions:** Wearing proper clothes, eye glass, glove Make working area hazard free

Read and interpret manual which guide you how to use tools and equipment's

#### Procedures:

- Step 1. Calculate Overhead expenses
- Step 2. Calculate material cost
- Step 3. Calculate labor cost
- Step 4. Calculate Material depreciation
- Step 5. Calculate Company profit
- Step 6. Calculate Vat

#### Quality criteria:

Perform all activities to repair the body periodic service in accordance with the given procedures

## Lap Tests

**Instructions:** Given necessary templates, tools and materials you are required to perform the following tasks accordingly

**Task 1.** When the vehicle had gotten an accident. Due to this accident, the front & side bumper, all of headlight, Tail lights & Clearance light, Front wind shield glass and Both side mirror out of used. As a mechanic how do you estimating the required cost?

**Task 2.** If a client needs to install AC system in his/her car, how do we compute the job estimation?

## Reference

1. City of Cypress, Best Management Practices for Auto Body Repair Shops and Facilities, City of Cypress Department of Public Works, march 2012
2. University of Ottawa, Hazard Reporting, v7 - March 2019
3. Oregon OSHA, Hazard Identification and Control
4. Maurice Stack, TRADE OF VEHICLE BODY REPAIR- Phase 2, Module 1, Revision 2.0 produced by SOLAS, January 2014
5. Hyundai Motor Company, Body Repair Manual, i30 Neos, APR. 2007, Printed in Korea
6. Edwards Ferry Rd. N.E. Collision Repair and Refinish Program Standards, ASE Education Foundation 2018
7. Defense People Policy, Safety Man, Noise Management Policy And Guidance, Australia government, 2015
8. P. Sharma et al. Automobile Waste and Its Management, Research Journal of Chemical and Environmental Sciences, Volume 4, April 2016, Pg. 1-3
9. Hazard Identification, Risk Assessment and Control Procedure, Western Sidney University, 2012

## Developer Profile Participants in this modules training material preparation

No	Name	Qualification (Level)	Field of Study	Organization/ Institution	Mobile Number	E-mail
1.	Amanuel Abdetta	MSc.	Automotive Technology	Ambo PTC	0911799468	Amanuelloko@gmail.com
2.	Biruk Tilahun	BSc.	Automotive Technology	General Wingate PTC	0913789176	biruktilahun1@gmail.com
3.	Fiseha Manyazewal	MSc.	Automotive Technology	Debrebirhan PTC	0910406732	Natifish76@gmail.com
4.	Sisay Legese	MSc.	Automotive Technology	Athlete Kenenisa PTC	0910407622	alemsisay647@gmail.com
5.	Tatek Mamo	PhD	Automotive Engineering	Ethiopian Defense University College of Engineering	0911841121	mimibaba928@gmail.com/