

Automotive Body Repair and Paint Work Level-IV

Based On October, 2023 Curriculum Version-II



**Module Title: - Estimating and Calculating Costs for
Vehicle Maintenance and Modification**

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Prepared by: Ministry of Labor and Skill

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Acronyms

WHS-----Workplace Health and Safety

PPE-----Personal Protective Equipment

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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

- Vehicle Maintenance and Modification cost
- Estimating Materials and Labor cost
- Estimate Materials and Duration

Learning Objective of the Module

- Understand Vehicle Maintenance and Modification cost
- Estimate Materials and Labor cost
- Estimate Materials and Duration

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” giver at the end of each unit and
5. Read the identified reference book for examples and exercise

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Unit One: Vehicle Maintenance and Modification cost

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

- Introduction To Cost Estimation
- Types Of Costs
- Gathering Cost Information

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:

- understand Introduction To Cost Estimation
- Describe Types Of Costs
- Gathering Cost Information

1.1. Introduction to Cost Estimation

1.1.1. Defining of Cost Estimates

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 of vehicle construction and be experienced in an automobile repair and bodyworks. 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. Normally, one person does the estimates for an auto shop. It is vitally important that estimates be accurate, honest, and fair. The accuracy of the estimates determines the profit or loss for the shop. If the estimate is too high, it is likely that the shop will not get the job. Repair work will be taken to another shop. If an estimate is too low, the shop will have to absorb a loss. In other words, it will cost the shop more to do the job than it will receive in from the customers.

1.2. Types of Estimates

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.

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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

1.3. Identifying types and quantities of materials

1.3.1. Calculate Cost of goods (products)

Cost of goods sold is the amount of money a company pays for the inventory they sell. It starts as an asset in the inventory account. As the inventory is sold to outside customers, the asset account is reduced and then the expense account increases.

The company discloses cost of goods sold on the income statement, usually directly under sales. The formula for cost of goods sold equals the beginning inventory plus purchases minus ending inventory.

Step 1

Find the company & #039;s beginning inventory for the period. This number is on the company & #039;s balance sheet. For example, a company had beginning inventory on Jan. 1 of \$100,000.

Step 2

Add any purchases of inventory to the beginning inventory. In the example, the company made a total of \$500,000 of inventory purchases for the year. So, \$500,000 plus \$100,000 equals \$600,000.

Step 3

Subtract the companies ending inventory balance from the number calculated in Step 2. Ending balance is on the company & #039;s balance sheet. In the example, the company had ending inventory of \$200,000 on Dec. 31, so \$600,000 minus \$200,000 equals cost of goods sold of \$400,000 for the year.

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1.3.2. 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.

1.3.3. 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.

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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

1.3.4. 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 and 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.

1.4. 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

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1.5. Gather information

Estimate materials and duration: - after gathering information from the customer about the problem of the vehicle, then inspect the faults which occurred on the vehicle and estimate duration. And also by giving job order to the technician who concerned and estimate/ check and tell to report the spare parts those for replacing worn parts of the failed system.

Calculate costs: - under this as supervisor prepare cost estimation of

Spare part

Consumable materials

Service

Labor

NB: - normal costs without VAT 15% and _____% company profit.

To calculate

Total customer invoice you have to add specially on

Spare part

Consumable materials

Then calculate

Total customer invoice

Total net company profit

Document details: - this documentation needs to audit annually and know your annual service profit and if there is gap while we are performing service work of:

Customer satisfaction

Quality performance

Competitiveness

Due to lack of good management take corrective action to get more profit and provide good quality services to satisfy you customer. Also, documentation is important for properly pay your tax to the authorized governing organization transparently.

1.6. 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

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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.

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Self-check-1.1

Part I. Choose the correct answer

1. ___are 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. ___describes 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?

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- 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 Two: Costs Calculation & Documentations

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

- Cost Techniques And Procedures
- Calculate Total Direct & Indirect Cost
- 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 Cost Techniques And Procedures
- Perform Calculate Total Direct & Indirect Cost
- Verification of Costs and Calculations

2.1. Costing techniques and procedures

How to Prepare a Job Estimate

Preparing a cost estimate for a job is an important part of owning and operating a business. A job estimate should cover all expected costs of completing a project and should take into consideration the complexity and size of the project.

1. Preparing a Job Estimate

I. Communicate with your potential customer about the project and ask any questions that you feel are pertinent to have a better idea of what they expect. Making sure you understand what they want is necessary to preparing an accurate job estimate.

II. Consider all of the phases of the project and break it down into steps as necessary.

2. Write a list of essential material you will need. For instance, if you are a writer, include costs such as Internet, access to a database or specific software. If you are renovating, write out the list of supplies that you will need. Be sure to consider applicable travel costs or telephone expenses to meet with a client. Research any costs that may change to make sure that you are providing an accurate estimate and that you will not lose money.

3. Detail the expenses that you will incur from the job and use this budget to help with your plans for deciding on a job estimate. Prepare a spreadsheet to document these projected expenses.

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4. Plan for possible delays and contingencies when preparing a job estimate. This will help you come up with an accurate delivery date and estimate for a job.
5. Estimate the number of hours that you and any other employees might spend on the project. Find the average rate charged for your area of expertise or go with your regular per hour charges. Multiply these figures to get the cost of manpower for the project.
6. Add these numbers together and outline each figure under a heading, such as "Labor" or "Parts" to ensure that you maintain the integrity of your business practice. This will also help when explaining your job estimate so that you are sure you have the figures right.
7. Prepare a final budget using a template or software and make sure that it looks professional before you deliver the job estimate to a potential client.
8. Outline any potential clauses, such as the bid is only good for 10 days or that a deposit is required within 10 days to hold the estimate. Make sure that you write these clauses or conditions out clearly to ensure that you communicate effectively with your customer.
9. Deliver the job estimate to the client as promised. Time is important when preparing a job estimate. If you say that you will have an estimate prepared within 24 hours, be sure to follow that deadline. Taking longer may cost you work.
10. Follow-up with your client to answer any questions they may have about your job estimate

2.2 Calculating total direct & indirect cost

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. Since technicians generally utilize a Cost-Based Estimating approach to prepare bids, this method can provide more accurate and defensible costs to support the decision for agreement award/rejection and any future price negotiations with the technician after agreement award. 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.

Elements of a Cost-Based Estimate

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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 of profit. 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.

1. 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.

2. 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.

To establish what type of equipment the task needs the estimator will have to work off of his or her own experience or the experience of those who have witnessed automotive operations in action. Excellent resources for necessary equipment include DOT automotive inspection staff and even interviews with technicians that perform that type of work. Pertinent information such as brand name, model number, number of operators and general information regarding maintenance should be noted. 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.

3. 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.

4. 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.

5. 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.

6. 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. 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	Quantity	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	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 = 128

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

Unit Three.-Estimate Materials and Duration

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

- Identifying quantities of supplies.
- Estimating time requirements

This module 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:

- Understand Estimate labour requirements.
- Estimate cost of materials

3.1. Identifying quantities of supplies

Calculate Cost of goods

Cost of goods sold is the amount of money a company pays for the inventory they sell. It starts as an asset in the inventory account. As the inventory is sold to outside customers, the asset account is reduced and then the expense account increases. The company discloses cost of goods sold on the income statement, usually directly under sales. The formula for cost of goods sold equals the beginning inventory plus purchases minus ending inventory.

Step 1

Find the company's beginning inventory for the period. This number is on the company's balance sheet. For example, a company had beginning inventory on Jan. 1 of \$100,000.

Step 2

Add any purchases of inventory to the beginning inventory. In the example, the company made a total of \$500,000 of inventory purchases for the year. So, \$500,000 plus \$100,000 equals \$600,000.

Step 3

Subtract the companies ending inventory balance from the number calculated in Step 2. Ending balance is on the company & # 039;s balance sheet. In the example, the company had ending inventory of \$200,000 on Dec. 31, so \$600,000 minus \$200,000 equals cost of goods sold of \$400,000 for the year.

3.2. 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 are 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

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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.

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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

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Lap Tests

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

Task 1. Calculate Overhead expenses

Task 2. Calculate material cost

Task 3. Calculate labor cost

Task 4. Calculate Material depreciation

Task 5. Calculate Company profit

Task 6. Calculate Vat

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Developer Profile

No	Name	Qualification (Level)	Field of Study	Organization/ Institution	Mobile number	E-mail
1	Andinet Asnake	MSc	Automotive technology	Wolkite PTC	0913767250	andinetasnake31@gmail.com
2	Tesfaye Bedada	MSc	Automotive technology	Hawassa PTC	0927831195	tesfaybedada51@gmail.com
3	Zinabu Solomon	MSc	industrial engineering	M/G mulegeta buli	0960964523	zinabusolomon565@gmail.com
4	Gashaw Zewde	MSc	Automotive technology	Atelete Kenenesa	0910730747	gashawgashaw69@gmail.com
5	Yebeltal Getahun	MSc	Automotive technology	Arbaminch PTC	0916467687	yibemadi@gmail.com
6	Tilahun F/Silase	BSc	Automotive technology	W/Sihene PTC	0914604592	mailto:tilahunfikre@gmail.com

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