

Supplementary Problem #8: Budget Mechanics

A budget is a quantitative expression for a set time period of a plan of action by management. The master budget is a comprehensive, organizationwide set of budgets whose end result is a complete set of financial statements. The purpose of this supplementary problem is to acquaint you with the mechanics of the budgeting process. Please refer to the text for a more general discussion of the budget process. A good way to explain the budgeting process is to walk through the development of an actual budget. Below are the basic data and requirements that we will use as a starting point for the budgeting process:

ABC, Inc. is a manufacturer that produces two types of widgets – Regular and Heavy-Duty. After carefully examining all relevant factors, the executives in the engineering department forecast the following cost figures for 1999:

Direct Materials	\$5 per kilogram
Direct Manufacturing Labor	\$10 per hour

	Product	
<u>Content of Each Unit</u>	<u>Regular</u>	<u>Heavy-Duty</u>
Direct Materials	12 kilograms	15 kilograms
Direct Manufacturing Labor	4 hours	6 hours

Additional information regarding the year 1999 is as follows:

	Product	
	<u>Regular</u>	<u>Heavy-Duty</u>
Expected Sales (in units)	4000	1000
Selling price per unit	\$300	\$500
Target ending inventory (in units)	400	100
Beginning inventory (in units)	200	25
Beginning inventory (in dollars)	\$40,000	\$7,125

	<u>Direct Materials</u>	
Beginning inventory (in kilograms)	3000 kilograms	
Target ending inventory (in kilograms)	3500 kilograms	

At the anticipated level of output levels for the Regular and Heavy-Duty widgets, management believes that the following overhead costs will be incurred: Fixed manufacturing overhead - \$200,000; Variable manufacturing overhead - \$381,250. Overhead is allocated to the products based on direct manufacturing labor hours. Other nonproduction costs are: Research and Development - \$200,000; Marketing – \$75,000; Administrative - \$150,000; and Customer Service - \$20,000.

Your task is to prepare a master budget for the year 1999. The steps to follow, along with explanations of why and how to prepare the budget, are presented below. Please note that some of the terminology differs from that used in the Appendix of Chapter 6 of your text. Most organizations adapt the basic steps shown below to their organization – that is, every organization has their own way of doing things. Therefore, not all budgets you see in actual practice will appear exactly as presented below (this is one reason for the difference in the budgets between this example and your text). However, the basic steps presented are common in most organizations.

Step 1: The Revenue or Sales Budget

The revenue budget is the usual starting point for budgeting because both production (and, therefore, costs) and inventory levels generally depend on the revenue (sales) forecast. The sales forecast is usually the product of extensive deliberations and information gathering among individuals with knowledge of the future demand for the product – the sales managers or sales people themselves. Note that pressures can exist for budgeted revenues to differ from that actually expected. For example, managers may "pad" the sales budget if they will be evaluated based on the difference between actual and budgeted revenue. By building slack into the budget, the manager has made it more likely that he will be evaluated fairly. Below is the revenue budget for ABC.

Schedule 1: Revenue Budget for the year ending December 31, 1999.

	<u>Units</u>	<u>Selling Price</u>	<u>Total Revenue</u>
Regular	4000	\$300	\$1,200,000
Heavy-Duty	<u>1000</u>	\$500	<u>\$500,000</u>
Total	5000		<u>\$1,700,000</u>

Step 2: Production Budget (in units)

After revenues are budgeted, the production budget is prepared. The good produced depends on budgeted sales and the expected changes in inventory as follows:

$$\text{Production} = \text{Sales} + \text{Ending Inventory of Finished Goods} - \text{Beginning Inventory of Finished goods}$$

All of the above amounts are based on units. Note this is the same formula as on p. 260 of your text with the terms rearranged. The production budget is shown below:

Schedule 2: Production Budget (in units) for the year ending Dec. 31, 1999

	Product	
	Regular	Heavy-Duty
Budgeted Sales in units (from Sched. 1)	4000	1000
Add target ending inventory (given)	<u>400</u>	<u>100</u>
Total Requirements	4400	1100
Deduct beginning inventory (given)	<u><200></u>	<u><25></u>
Units to be produced	<u>4200</u>	<u>1075</u>

Step 3: Direct Materials Usage Budget and Direct Materials Purchases Budget

Once production is determined (Schedule 2), you now have the necessary information (coupled with the engineering estimates given at the beginning of the problem) to estimate the inputs, direct material and direct labor, required. We will first estimate direct material usage and purchase requirements. Below is the direct materials usage and purchases budget:

Schedule 3A: Direct Materials Usage Budget (in kilograms and dollars) for the year ending Dec. 31, 1999.

	Product		
	Regular	Heavy-Duty	
Direct materials used on production of			
Regular widgets [4200 units (from Sched. 2) \times 12 kg/unit (given)]	50,400		
Heavy-Duty widgets [1075 units (from Sched. 2) \times 15 kg/unit (given)]		16,125	
Total direct materials to be used (in kg.)	<u>50,400</u>	<u>16,125</u>	<u>66,525</u>

Direct materials to be used from beginning inventory (given)	3000		
Multiply by cost of per kilogram of direct material (given)	<u>\$5/kg</u>		
Cost of direct materials to be used from beginning inventory			\$15,000
Direct materials to be used from purchases (66,525 total usage from above less 3,000 from beginning inventory calculated above)	63,525		
Multiply by cost per kilogram of direct material (given)	<u>\$5/kg</u>		
Cost of direct materials to be used from Purchases			<u>\$317,625</u>
Total costs of direct materials to be used			\$332,625

Schedule 3B: Direct Materials Purchases Budget for the year ending Dec. 31, 1999

	<u>Direct Materials</u>
Direct materials to be used in production (in kg) (from 3A)	66,525
Add target ending inventory of direct materials (in kg) (given)	<u>3,500</u>
Total requirements	70,025
Deduct beginning inventory of direct materials (in kg) (given)	<u><3,000></u>
Direct materials to be purchased	67,025
Multiply by cost per kg. of direct materials (given)	<u>\$5/kg</u>
Total direct materials purchase cost	<u>\$335,125</u>

Step 4: Direct Manufacturing Labor Budget

Using the production budget (schedule 2) compute direct manufacturing labor required using the budgeted production, budgeted content of labor per unit and budgeted wage rates. Below is the direct manufacturing labor budget.

Schedule 4: Direct Manufacturing Labor Budget for the year ending Dec. 31, 1999.

	Units Produced (from Schedule 2)	Labor hours per unit (given)	Total Hours	Wage Rate (given)	Total
Regular	4200	4	16,800	\$10/hr	\$168,000
Heavy-Duty	1075	6	6,450	\$10/hr	\$64,500
Total			<u>23,250</u>		<u>\$232,500</u>

Step 5: Manufacturing Overhead Budget

The purpose of this budget is to compute an overhead application rate for the budgeted level of production. The overhead application rate is computed by dividing total overhead by the expected level of production to give us an estimate of overhead per unit. Note that a problem with this approach is that it unitizes fixed cost (you are now dealing with fixed cost on a unit basis) and using this number for activity levels other than the one budgeted would lead to misleading inferences. We will explore overhead application in depth later in the course and illustrate how to overcome this problem.

Schedule 5: Manufacturing Overhead Budget for the year ending Dec. 31, 1999

	Budgeted cost at Expected level of 23,250 (from Schedule 4) direct labor hours
Variable overhead costs (given)	\$381,250
Fixed overhead costs (given)	<u>\$200,000</u>
Total budgeted factory overhead cost	<u>\$581,250</u>
Divided by budgeted labor hours (Sched. 4)	<u>23,250</u>
Budgeted overhead rate per labor hour	<u>\$25/labor hour</u>

Step 6: Ending Inventory Budget

The purpose of this budget is to (1) compute the unit costs of the finished goods inventory and (2) then to use these costs to calculate the costs of the target ending inventories of direct material and finished goods. Below are the budgets:

Schedule 6A: Computation of Unit Costs

		Product			
		Regular		Heavy-Duty	
	<u>Cost/Unit</u>	<u>Input (given)</u>	<u>Amount</u>	<u>Input (given)</u>	<u>Amount</u>
Direct Materials (given)	\$5	12 kg	\$60	15 kg	\$75
Direct Labor (given)	\$10	4 hours	\$40	6 hours	\$60
Manufacturing Overhead (Schedule 5)	\$25	4 hours	<u>\$100</u>	6 hours	<u>\$150</u>
Total			<u>\$200</u>		<u>\$285</u>

Schedule 6B: Ending Inventory Budget

	Quantity (given)	Cost		Total
Direct materials inventory	3500 kg	\$5/kg (given)		\$17,500
Finished goods Inventory (given)				
Regular	400 units	\$200/unit (from Sched. 6A)	\$80,000	
Heavy-Duty	100 units	\$285/unit (from Sched. 6A)	<u>\$28,500</u>	
Total Finished Goods Inventory				<u>\$108,500</u>
Total ending inventory				<u>\$126,000</u>

Step 7: Cost of Goods Sold Budget

Here, you will use the information from Schedules 3 through 6 to compute Cost of Goods Sold.

Schedule 7: Cost of Goods Sold Budget for the year ending Dec. 31, 1999

	From Schedule		Total
Beginning Finished Goods Inventory	Given		\$47,125
Direct materials used	3A	\$332,625	
Direct manufacturing labor	4	232,500	
Manufacturing Overhead	5	<u>581,250</u>	
Cost of goods manufactured			<u>\$1,146,375</u>
Cost of goods available for sale			\$1,193,500
Deduct Finished goods inventory	6B		<u><108,500></u>
Cost of Goods Sold			<u>\$1,085,000</u>

Step 8: Finally we are prepared to compute the budgeted income statement. This will be the endpoint of our discussion of budgeting mechanics.

ABC, Inc.
Budgeted Income Statement
For the year ending 12/31/99

	From Schedule		
Revenues	1		\$1,700,000
Less: Cost of Goods Sold	7		<u><1,085,000></u>
Gross Margin			\$615,000
Other Expenses			
R&D	Given	\$200,000	
Marketing	Given	75,000	
Administration	Given	150,000	
Customer Service	Given	<u>20,000</u>	<u>445,000</u>
Operating Income			<u>\$170,000</u>