Chapter 1

Budgeting Decisions

The most common method for creating a budget is to simply print out the financial statements, adjust historical expenses for inflationary increases, add some projected revenue adjustments, and *voila*—instant budget. Unfortunately, this rough method ignores a massive number of interlocking factors that would probably have resulted in a very different budget. Without a carefully compiled budget, there is a strong chance that a company will find itself acting on budget assumptions that are so incorrect that it may find itself in serious financial straits in short order.

To avoid these problems, the accountant must determine the proper format of a budget, find the best way to adjust it when revenue volumes change, ensure that the budgeting process is efficient, factor bottleneck operations into the budget, and use it to improve company control systems. This chapter provides answers to all of these key questions. The following table itemizes the section number in which the answers to each question can be found:

Section	Decision
1-1	How does the system of interlocking budgets work?
1-2	What does a sample budget look like?
1-3	How does flex budgeting work?
1-4	What best practices can I apply to the budgeting process?
1-5	How can I integrate the budget into the corporate control system?
1-6	How do throughput concepts impact the budget?

1-1 HOW DOES THE SYSTEM OF INTERLOCKING BUDGETS WORK?

A properly designed budget is a complex web of spreadsheets that account for the activities of virtually all areas within a company. As noted in Exhibit 1.1, the budget begins in two places, with both the revenue budget and research and development (R&D) budget. The revenue budget contains the revenue figures that the company believes it can achieve for each upcoming reporting period. These estimates come partially from the sales staff, which is responsible for estimates of sales levels for existing products within their current territories. Estimates for the sales of new products that have not yet been released, and for existing products in new markets, will come from a combination of the sales and marketing staffs, who will use their experience with related product sales to derive estimates. The greatest fallacy in any budget is to impose a revenue budget from the top management level without any input from the

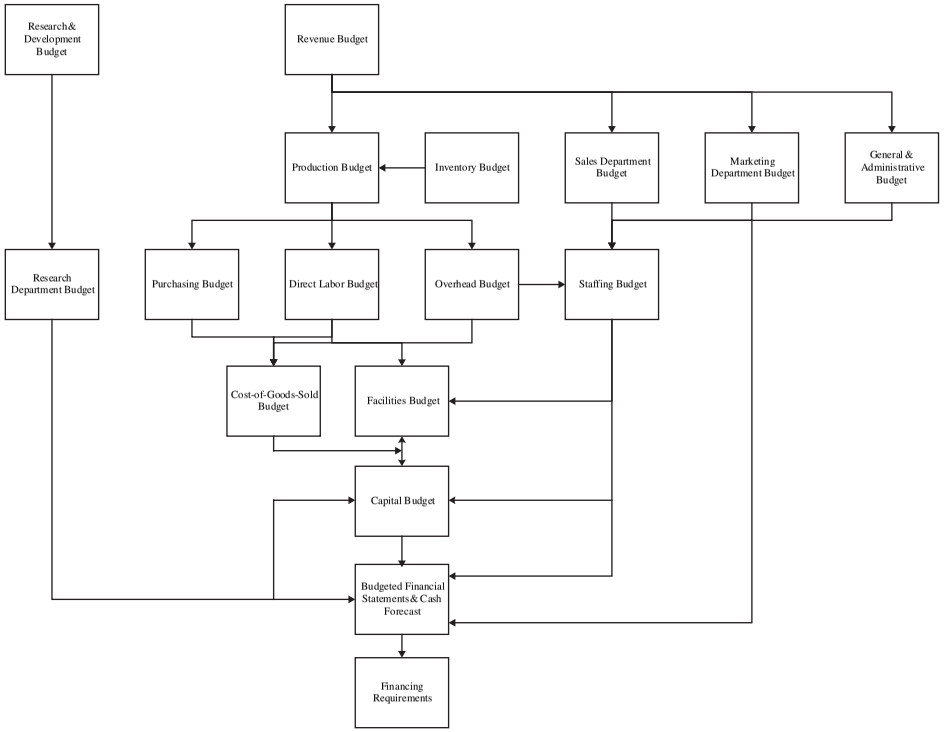

Exhibit 1.1 The System of Budgets

sales staff, since this can result in a companywide budget that is geared toward a sales level that is most unlikely to be reached.

A revenue budget requires prior consideration of a number of issues. For example, a general market share target will drive several other items within the budget, since greater market share may come at the cost of lower unit prices or higher credit costs. Another issue is the compensation strategy for the sales staff, since a shift to higher or lower commissions for specific products or regions will be a strong incentive for the sales staff to alter their selling behavior, resulting in some changes in estimated sales levels. Yet another consideration is which sales territories are to be entered during the budget period—those with high target populations may yield very high sales per hour of sales effort, while the reverse will be true if the remaining untapped regions have smaller target populations. It is also necessary to review the price points that will be offered during the budget period, especially in relation to the pricing strategies that are anticipated from competitors. If there is a strategy to increase market share as well as to raise unit prices, then the budget may fail due to conflicting activities. Another major factor is the terms of sale, which can be extended, along with easy credit, to attract more marginal customers; conversely, they can be retracted in order to reduce credit costs and focus company resources on a few key customers. A final point is that the budget should address any changes in the type of customer to whom sales will be made. If an entirely new type of customer will be added to the range of sales targets during the budget period, then the revenue budget should reflect a gradual ramp-up that will be required for the sales staff to work through the sales cycle of the new customers.

Once all of these factors have been ruminated upon and combined to create a preliminary budget, the sales staff should also compare the budgeted sales level per person to the actual sales level that has been experienced in the recent past to see if the company has the existing capability to make the budgeted sales. If not, the revenue budget should be ramped up to reflect the time it will take to hire and train additional sales staff. The same cross-check can be conducted for the amount of sales budgeted per customer, to see if historical experience validates the sales levels noted in the new budget.

Another budget that initiates other activities within the system of budgets is the research and development budget. This is not related to the sales level at all (as opposed to most other budgets), but instead is a discretionary budget that is based on the company's strategy to derive new or improved products. The decision to fund a certain amount of project-related activity in this area will drive a departmental staffing and capital budget that is, for the most part, completely unrelated to the activity conducted by the rest of the company. However, there can be a feedback loop between this budget and the cash budget, since financing limitations may require management to prune some projects from this area. If so, the management team must work with the R&D manager to determine the correct mix of projects with both short-range and long-range payoffs that will still be funded.

The production budget is largely driven by the sales estimates contained within the revenue budget. However, it is also driven by the inventory-level assumptions in

the inventory budget. The inventory budget contains estimates by the materials management supervisor regarding the inventory levels that will be required for the upcoming budget period. For example, a new goal may be to reduce the level of finished goods inventory from 10 turns per year to15. If so, some of the products required by the revenue budget can be bled off from the existing finished goods inventory stock, yielding smaller production requirements during the budget period. Alternatively, if there is a strong focus on improving the level of customer service, then it may be necessary to keep more finished goods in stock, which will require more production than is strictly called for by the revenue budget. This concept can also be extended to work-in-process (WIP) inventory, where the installation of advanced production planning systems, such as manufacturing resources planning or just-in-time, can be used to reduce the level of required inventory. Also, just-in-time purchasing techniques can be used to reduce the amount of raw materials inventory that is kept on hand. All of these assumptions should be clearly delineated in the inventory budget, so that the management team is clear about what systemic changes will be required in order to effect altered inventory turnover levels. Also, be aware that any advanced production planning system takes a considerable amount of time to install and tune, so it is best if the inventory budget contains a gradual ramp-up to different planned levels of inventory.

Given this input from the inventory budget, the production budget is used to derive the unit quantity of required products that must be manufactured in order to meet revenue targets for each budget period. This involves a number of interrelated factors, such as the availability of sufficient capacity for production needs. Of particular concern should be the amount of capacity at the bottleneck operation. Since this tends to be the most expensive capital item, it is important to budget a sufficient quantity of funding to ensure that this operation includes enough equipment to meet the targeted production goals. If the bottleneck operation involves skilled labor, rather than equipment, then the human resources staff should be consulted regarding its ability to bring in the necessary personnel in time to improve the bottleneck capacity in a timely manner.

Another factor that drives the budgeted costs contained within the production budget is the anticipated size of production batches. If the batch size is expected to decrease, then more overhead costs should be budgeted in the production scheduling, materials handling, and machine setup staffing areas. If longer batch sizes are planned then there may be a possibility of proportionally reducing overhead costs in these areas. This is a key consideration that is frequently overlooked, but which can have an outsized impact on overhead costs. If management attempts to contain overhead costs in this area while still using smaller batch sizes, then it will likely run into larger scrap quantities and quality issues that are caused by rushed batch setups and the allocation of incorrect materials to production jobs.

Step costing is also an important consideration when creating the production budget. Costs will increase in large increments when certain capacity levels are reached. The management team should be fully aware of when these capacity levels will be reached, so that it can plan appropriately for the incurrence of added costs. For example, the addition of a second shift to the production area will call for added costs

in the areas of supervisory staff, an increased pay rate, and higher maintenance costs. The inverse of this condition can also occur, where step costs can decline suddenly if capacity levels fall below a specific point.

Production levels may also be impacted by any lengthy tooling setups or change-overs to replacement equipment. These changes may halt all production for extended periods, and so must be carefully planned for. This is the responsibility of the industrial engineering staff. The accountant would do well to review the company's past history of actual equipment setup times to see whether the current engineering estimates are sufficiently lengthy.

The expense items included in the production budget should be driven by a set of subsidiary budgets, which are the purchasing, direct labor, and overhead budgets. These budgets can be simply included in the production budget, but they typically involve such a large proportion of company costs that it is best to lay them out separately in greater detail in separate budgets. Comments on these budgets are as follows:

- *Purchasing budget*. The purchasing budget is driven by several factors, first of which is the bill of materials that comprises the products that are planned for production during the budget period. These bills must be accurate, or else the purchasing budget can include seriously incorrect information. In addition, there should be a plan for controlling material costs, perhaps through the use of concentrated buying through few suppliers, or perhaps through the use of long-term contracts. If materials are highly subject to market pressures, comprise a large proportion of total product costs, and have a history of sharp price swings, then best-case and worst-case costing scenarios should be added to the budget so that managers can review the impact of costing issues in this area. If a just-in-time delivery system from suppliers is contemplated, then the purchasing budget should reflect a possible increase in material costs caused by the increased number of deliveries from suppliers. It is also worthwhile to budget for a raw material scrap and obsolescence expense; there should be a history of costs in these areas that can be extrapolated based on projected purchasing volumes.
- *Direct labor budget*. Do not make the mistake of budgeting for direct labor as a fully variable cost. The production volume from day to day tends to be relatively fixed, and requires a set number of direct labor personnel on a continuing basis to operate production equipment and manually assemble products. Further, the production manager will realize much greater production efficiencies by holding onto an experienced production staff, rather than by letting them go as soon as production volumes make small incremental drops. Accordingly, it is better to budget based on reality, which is that direct labor personnel are usually retained, even if there are ongoing fluctuations in the level of production. Thus, direct labor should be shown in the budget as a fixed cost of production, within certain production volume parameters.

  Also, this budget should describe staffing levels by type of direct labor position; this is driven by labor routings, which are documents that describe the

exact type and quantity of staffing needed to produce a product. When multiplied by the unit volumes located in the production budget, this results in an expected level of staffing by direct labor position. This information is most useful for the human resources staff, which is responsible for staffing the positions.

The direct labor budget should also account for any contractually mandated changes in hourly rates, which may be itemized in a union agreement. Such an agreement may also have restrictions on layoffs, which should be accounted for in the budget if this will keep labor levels from dropping in proportion with budgeted reductions in production levels. Such an agreement may also require that layoffs be conducted in order of seniority, which may force higher-paid employees into positions that would normally be budgeted for less expensive laborers. Thus, the presence of a union contract can result in a much more complex direct labor budget than would normally be the case.

The direct labor budget may also contain features related to changes in the efficiency of employees, and any resulting changes in pay. For example, one possible pay arrangement is to pay employees based on a piece rate, which directly ties their performance to the level of production achieved. If so, this will probably apply only to portions of the workforce, so the direct labor budget may involve pay rates based on both piece rates and hourly pay. Another issue is that any drastic increases in the budgeted level of direct labor personnel will likely result in some initial declines in labor efficiency, since it takes time for new employees to learn their tasks. If this is the case, the budget should reflect a low level of initial efficiency, with a ramp-up over time to higher levels that will result in greater initial direct labor costs. Finally, efficiency improvements may be rewarded with staff bonuses from time to time; if so, these bonuses should be included in the budget.

- *Overhead budget*. The overhead budget can be a simple one to create if there are no significant changes in production volume from the preceding year, because this involves a large quantity of static costs that will not vary much over time. Included in this category are machine maintenance, utilities, supervisory salaries, wages for the materials management, production scheduling, quality assurance personnel, facilities maintenance, and depreciation expenses. Under the no-change scenario, the most likely budgetary alterations will be to machinery or facilities maintenance, which are dependent on the condition and level of usage of company property.

  If there is a significant change in the expected level of production volume, or if new production lines are to be added, then one should examine this budget in great detail, for the underlying production volumes may cause a ripple effect that results in wholesale changes to many areas of the overhead budget. Of particular concern is the number of overhead-related personnel who must be either laid off or added when capacity levels reach certain critical points, such as the addition or subtraction of extra work shifts. Costs also tend to rise substantially when a facility is operating at very close to 100 percent capacity, since this tends to call for an inordinate amount of effort to maintain on an ongoing basis.

The purchasing, direct labor, and overhead budgets can then be summarized into a cost-of-goods-sold budget. This budget should incorporate, as a single line item, the total amount of revenue, so that all manufacturing costs can be deducted from it to yield a gross profit margin on the same document. This budget is referred to constantly during the budget creation process, since it tells management whether its budgeting assumptions are yielding an acceptable gross margin result. Since it is a summary-level budget for the production side of the budgeting process, this is also a good place to itemize any production-related statistics, such as the average hourly cost of direct labor, inventory turnover rates, and the amount of revenue dollars per production person.

Thus far, we have reviewed the series of budgets that descend in turn from the revenue budget and then through the production budget. However, there are other expenses that are unrelated to production. These are categories in a separate set of budgets. The first is the sales department budget. This includes the expenses that the sales staff must incur in order to achieve the revenue budget, such as travel and entertainment, as well as sales training. Of particular concern in this budget is the amount of budgeted headcount that is required to meet the sales target. It is essential that the actual sales per salesperson from the most recent completed year of operations be compared with the same calculation in the budget to ensure that there is a sufficiently large budget available for an adequate number of sales personnel. This is a common problem, for companies will make the false assumption that the existing sales staff can make heroic efforts to wildly exceed its previous-year sales efforts. Furthermore, the budget must account for a sufficient time period in which new sales personnel can be trained and form an adequate base of customer contacts to create a meaningful stream of revenue for the company. In some industries, this learning curve may be only a few days, but it can be the better part of a year if considerable technical knowledge is required to make a sale. If the latter situation is the case, it is likely that the procurement and retention of qualified sales staff is the key element of success for a company, which makes the sales department budget one of the most important elements of the entire budget.

The marketing budget is also closely tied to the revenue budget, for it contains all of the funding required to roll out new products, merchandise them properly, advertise for them, test new products, and so on. A key issue here is to ensure that the marketing budget is fully funded to support any increases in sales noted in the revenue budget. It may be necessary to increase this budget by a disproportionate amount if one is trying to create a new brand, issue a new product, or distribute an existing product in a new market. These costs can easily exceed any associated revenues for some time. A common budgeting problem is not to provide sufficient funding in these instances, leading to a significant drop in expected revenues.

Another nonproduction budget that is integral to the success of the corporation is the general and administrative budget. This contains the cost of the corporate management staff, plus all accounting, finance, and human resources personnel. Since this is a cost center, the general inclination is to reduce these costs to the bare minimum. However, in order to do so, there must be a significant investment in

technology in order to achieve reductions in the manual labor usually required to process transactions; thus, there must be some provision in the capital budget for this area.

There is a feedback loop between the staffing and direct labor budgets and the general and administrative budget, because the human resources department must staff itself based on the amount of hiring or layoffs that are anticipated elsewhere in the company. Similarly, a major change in the revenue volume will alter the budget for the accounting department, since many of the activities in this area are driven by the volume of sales transactions. Thus, the general and administrative budget generally requires a number of iterations in response to changes in many other parts of the budget.

Though salaries and wages should be listed in each of the departmental budgets, it is useful to list the total headcount for each position through all budget periods in a separate staffing budget. By doing so, the human resources staff can tell when specific positions must be filled, so that they can time their recruiting efforts most appropriately. This budget also provides good information for the person responsible for the facilities budget, since he or she can use it to determine the timing and amount of square footage requirements for office space. Rather than being a standalone budget, the staffing budget tends to be one whose formulas are closely intertwined with those of all other departmental budgets, so that a change in headcount information on this budget will automatically translate into a change in the salaries expense on other budgets. It is also a good place to store the average pay rates, overtime percentages, and average benefit costs for all positions. By centralizing this cost information, the human resources staff can more easily update budget information. Since salary-related costs tend to comprise the highest proportion of costs in a company (excluding materials costs), this tends to be a heavily used budget.

The facilities budget is based on the level of activity that is estimated in many of the budgets just described. For this reason, it is one of the last budgets to be completed. This budget is closely linked to the capital budget, since expenditures for additional facilities will require more maintenance expenses in the facilities budget. This budget typically contains expense line items for building insurance, maintenance, repairs, janitorial services, utilities, and the salaries of the maintenance personnel employed in this function. It is crucial to estimate the need for any upcoming major repairs to facilities when constructing this budget, since these can greatly amplify the total budgeted expense.

Another budget that includes input from virtually all areas of a company is the capital budget. This should comprise either a summary listing of all main fixed asset categories for which purchases are anticipated, or else a detailed listing of the same information; the latter case is recommended only if there are comparatively few items to be purchased. The capital budget is of great importance to the calculation of corporate financing requirements, since it can involve the expenditure of sums far beyond those that are normally encountered through daily cash flows. This topic is addressed in greater detail in Chapter 2, Capital Budgeting Decisions.

The end result of all the budgets just described is a set of financial statements that reflect the impact on the company of the upcoming budget. At a minimum, these statements should include the income statement and cash flow statement, since these are the best evidence of fiscal health during the budget period. The balance sheet is less necessary, since the key factors upon which it reports are related to cash, and that information is already contained within the cash flow statement. These reports should be directly linked to all the other budgets, so that any changes to the budgets will immediately appear in the financial statements. The management team will closely examine these statements and make numerous adjustments to the budgets in order to arrive at a satisfactory financial result.

The budget-linked financial statements are also a good place to store related operational and financial ratios, so that the management team can review this information and revise the budgets in order to alter the ratios to match benchmarking or industry standards that may have been set as goals. Typical measurements in this area can include revenue and income per person, inventory turnover ratios, and gross margin percentages. This type of information is also useful for lenders, who may have required minimum financial performance results as part of loan agreements, such as a minimum current ratio or debt-to-equity ratio.

The cash forecast is of exceptional importance, for it tells company managers whether the proposed budget model will be feasible. If cash projects result in major cash needs that cannot be met by any possible financing, then the model must be changed. The assumptions that go into the cash forecast should be based on strict historical fact, rather than the wishes of managers. This stricture is particularly important in the case of cash receipts from accounts receivable. If the assumptions are changed in the model to reflect an advanced rate of cash receipts that exceeds anything that the company has heretofore experienced, then it is very unlikely that it will be achieved during the budget period. Instead, it is better to use proven collection periods as assumptions and alter other parts of the budget to ensure that cash flows remain positive.

The cash forecast is a particularly good area in which to spot the impact of changes in credit policy. For example, if a company wishes to expand its share of the market by allowing easy credit to marginal customers, then it should lengthen the assumed collection period in the cash forecast to see if there is a significant downgrading of the resulting cash flows.

The other key factor in the cash forecast is the use of delays in budgeted accounts payable payments. It is common for managers to budget for extended payment terms in order to fund other cash flow needs, but there are several problems that can result from this policy. One is the possible loss of key suppliers who will not tolerate late payments. Another is the risk of being charged interest on late payments to suppliers. A third problem is that suppliers may relegate a company to a lower level on their lists of shipment priorities, since they are being paid late. Finally, suppliers may simply raise their prices in order to absorb the cost of the late payments. Consequently, the late payment strategy must be followed with great care, using it only on those suppliers who do not appear to notice, and otherwise doing it only after prior

negotiation with targeted suppliers to make the changed terms part of the standard buying agreement.

The last document in the system of budgets is the discussion of financing alternatives. This is not strictly a budget, though it will contain a single line item, derived from the cash forecast, which itemizes funding needs during each period itemized in the budget. In all other respects, it is simply a discussion of financing alternatives, which can be quite varied. This may involve a mix of debt, supplier financing, preferred stock, common stock, or some other, more innovative approach. The document should contain a discussion of the cost of each form of financing, the ability of the company to obtain it, and when it can be obtained. Managers may find that there are so few financing alternatives available, or that the cost of financing is so high, that the entire budget must be restructured in order to avoid the negative cash flow that calls for the financing. There may also be a need for feedback from this document back into the budgeted financial statements in order to account for the cost of obtaining the funding, as well as any related interest costs.

1-2 WHAT DOES A SAMPLE BUDGET LOOK LIKE?

In response this question, we will review several variations on how a budget can be constructed, using a number of examples. The first budget covered is the revenue budget, which is shown in Exhibit 1.2. The exhibit uses quarterly revenue figures for a budget year rather than monthly, in order to conserve space. It contains revenue estimates for three different product lines that are designated as Alpha, Beta, and Charlie.

The Alpha product line uses a budgeting format that identifies the specific quantities that are expected to be sold in each quarter, as well as the average price per unit sold. This format is most useful when there are not so many products that such a detailed delineation would create an excessively lengthy budget. It is a very useful format, for the sales staff can go into the budget model and alter unit volumes and prices quite easily. An alternative format is to reveal this level of detail for only the most important products, and to lump the revenue from other products into a single line item, as is the case for the Beta product line.

The most common budgeting format is used for the Beta product line, where we avoid the use of detailed unit volumes and prices in favor of a single lump-sum revenue total for each reporting period. This format is used when there are multiple products within each product line, making it cumbersome to create a detailed list of individual products. However, this format is the least informative and gives no easy way to update the supporting information.

Yet another budgeting format is shown for the Charlie product line, where projected sales are grouped by region. This format is most useful when there are many sales personnel, each of whom has been assigned a specific territory in which to operate. This budget can then be used to judge the ongoing performance of each salesperson.

Exhibit 1.2 Revenue Budget for the Fiscal Year Ended xx/xx/07

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
Product Line Alpha:					
Unit Price	$15.00	$14.85	$14.80	$14.75	—
Unit Volume	14,000	21,000	25,000	31,000	91,000
Revenue Subtotal	$210,000	$311,850	$370,000	$457,250	$1,349,100
Product Line Beta:					
Revenue Subtotal	$1,048,000	$1,057,000	$1,061,000	$1,053,000	$4,219,000
Product Line Charlie:					
Region 1	$123,000	$95,000	$82,000	$70,000	$370,000
Region 2	$80,000	$89,000	$95,000	$101,000	$365,000
Region 3	$95,000	$95,000	$65,000	$16,000	$271,000
Region 4	$265,000	$265,000	$320,000	$375,000	$1,225,000
Revenue Subtotal	$563,000	$544,000	$562,000	$562,000	$2,231,000
Revenue Grand Total	$1,821,000	$1,912,850	$1,993,000	$2,072,250	$7,799,100
Quarterly Revenue Proportion	23.3%	24.5%	25.6%	26.6%	100.0%
Statistics:					
Product Line Proportion:					
Alpha	11.5%	16.3%	18.6%	22.1%	17.3%
Beta	57.6%	55.3%	53.2%	50.8%	54.1%
Charlie	30.9%	28.4%	28.2%	27.1%	28.6%
Product Line Total	100.0%	100.0%	100.0%	100.0%	100.0%

Exhibit 1.3 Production & Inventory Budget for the Fiscal Year Ended xx/xx/07

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
Inventory Turnover Goals:					
Raw Materials Turnover	4.0	4.5	5.0	5.5	4.8
W-I-P Turnover	12.0	15.0	18.0	21.0	16.5
Finished Goods Turnover	6.0	6.0	9.0	9.0	7.5
Product Line Alpha Production:					
Beginning Inventory Units	15,000	21,000	20,000	15,000	—
Unit Sales Budget	14,000	21,000	25,000	31,000	91,000
Planned Production	20,000	20,000	20,000	27,375	87,375
Ending Inventory Units	21,000	20,000	15,000	11,375 ←	
Bottleneck Unit Capacity	20,000	20,000	20,000	40,000	
Bottleneck Utilization	100%	100%	100%	68%	
Planned Finished Goods Turnover	15,167	15,167	11,375	11,375 ←	

These revenue reporting formats can also be combined, so that the product line detail for the Alpha product can be used as underlying detail for the sales regions used for the Charlie product line—though this will result in a very lengthy budget document.

There is also a statistics section at the bottom of the revenue budget that itemizes the proportion of total sales that occurs in each quarter, plus the proportion of product line sales within each quarter. Though it is not necessary to use these exact measurements, it is useful to include some type of measure that informs the reader of any variations in sales from period to period.

Both the production and inventory budgets are shown in Exhibit 1.3. The inventory budget is itemized at the top of the exhibit, where we itemize the amount of planned inventory turnover in all three inventory categories. There is a considerable ramp-up in work-in-process inventory turnover, indicating the planned installation of a manufacturing planning system of some kind that will control the flow of materials through the facility.

The production budget for just the Alpha product line is shown directly below the inventory goals. This budget is not concerned with the cost of production, but rather with the number of units that will be produced. In this instance, we begin with an on-hand inventory of 15,000 units, and try to keep enough units on hand through the remainder of the budget year to meet both the finished goods inventory goal at the top of the exhibit and the number of required units to be sold, which is referenced from the revenue budget. The main problem is that the maximum capacity of the bottleneck operation is 20,000 units per quarter. In order to meet the revenue target, we must run

that operation at full bore through the first three quarters, irrespective of the inventory turnover target. This is especially important because the budget indicates a jump in bottleneck capacity in the fourth quarter from 20,000 to 40,000 units—this will occur when the bottleneck operation is stopped for a short time while additional equipment is added to it. During this stoppage, there must be enough excess inventory on hand to cover any sales that will arise. Consequently, production is planned for 20,000 units per quarter for the first three quarters, followed by a more precisely derived figure in the fourth quarter that will result in inventory turns of 9.0 at the end of the year, exactly as planned.

The production budget can be enhanced with the incorporation of planned machine downtime for maintenance, as well as for the planned loss of production units to scrap. It is also useful to plan for the capacity needs of nonbottleneck work centers, since these areas will require varying levels of staffing, depending on the number of production shifts needed.

The purchasing budget is shown in Exhibit 1.4. This contains several different formats for planning budgeted purchases for the Alpha product line. The first option summarizes the planned production for each quarter; this information is brought forward from the production budget. We then multiply this by the standard unit cost of materials to arrive at the total amount of purchases that must be made in order to adequately support sales. The second option identifies the specific cost of each component of the product, so that management can see where cost increases are expected to occur. Though this version provides more information, it occupies a great deal of space on the budget if there are many components in each product, or many products. A third option is shown at the bottom of the exhibit that summarizes all purchases by commodity type. This format is most useful for the company's buyers, who usually specialize in certain commodity types.

The purchasing budget can be enhanced by adding a scrap factor for budgeted production, which will result in slightly higher quantities to buy, thereby leaving less chance of running out of raw materials. Another upgrade to the exhibit would be to schedule purchases for planned production some time in advance of the actual manufacturing date, so that the purchasing staff will be assured of having the parts on hand when manufacturing begins. A third enhancement is to round off the purchasing volumes for each item into the actual buying volumes that can be obtained on the open market. For example, it may be possible to buy the required labels only in volumes of 100,000 at a time, which would result in a planned purchase at the beginning of the year that would be large enough to cover all production needs through the end of the year.

The direct labor budget is shown in Exhibit 1.5. This budget assumes that only one labor category will vary directly with revenue volume; that category is the final assembly department, where a percentage in the far right column indicates that the cost in this area will be budgeted at a fixed 3.5 percent of total revenues. In all other cases, there are assumptions for a fixed number of personnel in each position within each production department. All of the wage figures for each department (except for final assembly) are derived from the planned hourly rates and headcount figures noted

Exhibit 1.4 Purchasing Budget for the Fiscal Year Ended xx/xx/07

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
Inventory Turnover Goals:					
Raw Materials Turnover	4.0	4.5	5.0	5.5	4.8
Product Line Alpha Purchasing (Option 1):					
Planned Production	20,000	20,000	20,000	27,375	
Standard Materials Cost/Unit	$5.42	$5.42	$5.67	$5.67	
Total Material Cost	$108,400	$108,400	$113,400	$155,216	$485,416
Product Line Alpha Purchasing (Option 2):					
Planned Production	20,000	20,000	20,000	27,375	
Molded Part	$4.62	$4.62	$4.85	$4.85	
Labels	$0.42	$0.42	$0.42	$0.42	
Fittings & Fasteners	$0.38	$0.38	$0.40	$0.40	
Total Cost of Components	$5.42	$5.42	$5.67	$5.67	
Product Line Alpha Purchasing (Option 2):					
Plastic Commodities					
Molded Parts Units	20,000	20,000	20,000	27,375	
Molded Parts Cost	$4.62	$4.62	$4.85	$4.85	
Adhesives Commodity					
Labels Units	20,000	20,000	20,000	27,375	
Labels Cost	$0.42	$0.42	$0.42	$0.42	
Fasteners Commodity					
Fasteners Units	20,000	20,000	20,000	27,375	
Fasteners Cost	$0.38	$0.38	$0.40	$0.40	
Statistics:					
Materials as Percent of Revenue	36%	36%	38%	38%	

at the bottom of the page. This budget can be enhanced with the addition of separate line items for payroll tax percentages, benefits, shift differential payments, and overtime expenses. The cost of the final assembly department can also be adjusted to account for worker efficiency, which will be lower during production ramp-up periods when new, untrained employees are added to the workforce.

A sample of the overhead budget is shown in Exhibit 1.6. In this exhibit, we see that the overhead budget is really made up of a number of subsidiary departments, such as maintenance, materials management, and quality assurance. If the budgets of any of these departments are large enough, it makes a great deal of sense to split them off into a separate budget, so that the managers of those departments can see their budgeted expectations more clearly. Of particular interest in this exhibit is the valid

Exhibit 1.5 Direct Labor Budget for the Fiscal Year Ended xx/xx/07

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals	Notes
Machining Department:						
Sr. Machine Operator	$15,120	$15,372	$23,058	$23,058	$76,608	
Machining Apprentice	$4,914	$4,964	$9,929	$9,929	$29,736	
Expense Subtotal	$20,034	$20,336	$32,987	$32,987	$106,344	
Paint Department:						
Sr. Paint Shop Staff	$15,876	$16,128	$16,128	$16,128	$64,260	
Painter Apprentice	$5,065	$5,216	$5,216	$5,216	$20,714	
Expense Subtotal	$20,941	$21,344	$21,344	$21,344	$84,974	
Polishing Department:						
Sr. Polishing Staff	$16,632	$11,844	$11,844	$11,844	$52,164	
Polishing Apprentice	$4,360	$4,511	$4,511	$4,511	$17,892	
Expense Subtotal	$20,992	$16,355	$16,355	$16,355	$70,056	
Final Assembly Department:						
General Laborer	$63,735	$66,950	$69,755	$72,529	$272,969	3.5%
Expense Subtotal	$63,735	$66,950	$69,755	$72,529	$272,969	
Expense Grand Total	$125,702	$124,985	$140,441	$143,215	$534,343	
Statistics:						
Union Hourly Rates:						
Sr. Machine Operator	$15.00	$15.25	$15.25	$15.25		
Machining Apprentice	$9.75	$9.85	$9.85	$9.85		
Sr. Paint Shop Staff	$15.75	$16.00	$16.00	$16.00		
Painter Apprentice	$10.05	$10.35	$10.35	$10.35		
Sr. Polishing Staff	$11.00	$11.75	$11.75	$11.75		
Polishing Apprentice	$8.65	$8.95	$8.95	$8.95		
Headcount by Position:						
Sr. Machine Operator	2	2	3	3		
Machining Apprentice	1	1	2	2		
Sr. Paint Shop Staff	2	2	2	2		
Painter Apprentice	1	1	1	1		
Sr. Polishing Staff	3	2	2	2		
Polishing Apprentice	1	1	1	1		

Exhibit 1.6 Overhead Budget for the Fiscal Year Ended xx/xx/07

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals	Valid Capacity Range
Supervision:						
Production Manager Salary	$16,250	$16,250	$16,250	$16,250	$65,000	—
Shift Manager Salaries	$22,000	$22,000	$23,500	$23,500	$91,000	40%–70%
Expense Subtotal	$38,250	$38,250	$39,750	$39,750	$156,000	
Maintenance Department:						
Equipment Maint. Staff	$54,000	$56,500	$58,000	$60,250	$228,750	40%–70%
Facilities Maint. Staff	$8,250	$8,250	$8,500	$8,500	$33,500	40%–70%
Equipment Repairs	$225,000	$225,000	$275,000	$225,000	$950,000	40%–70%
Facility Repairs	$78,000	$29,000	$12,000	$54,000	$173,000	40%–70%
Expense Subtotal	$365,250	$318,750	$353,500	$347,750	$1,385,250	
Materials Management Department:						
Manager Salary	$18,750	$18,750	$18,750	$18,750	$75,000	—
Purchasing Staff	$28,125	$18,750	$18,750	$18,750	$84,375	40%–70%
Materials Mgmt. Staff	$28,000	$35,000	$35,000	$35,000	$133,000	40%–70%
Production Control Staff	$11,250	$11,250	$11,250	$11,250	$45,000	40%–70%
Expense Subtotal	$86,125	$83,750	$83,750	$83,750	$337,375	
Quality Department:						
Manager Salary	$13,750	$13,750	$13,750	$13,750	$55,000	—
Quality Staff	$16,250	$16,250	$16,250	$24,375	$73,125	40%–70%
Lab Testing Supplies	$5,000	$4,500	$4,500	$4,500	$18,500	40%–70%
Expense Subtotal	$35,000	$34,500	$34,500	$42,625	$146,625	
Other Expenses:						
Depreciation	$14,000	$15,750	$15,750	$15,750	$61,250	—
Utilities	$60,000	$55,000	$55,000	$60,000	$230,000	40%–70%
Boiler Insurance	$3,200	$3,200	$3,200	$3,200	$12,800	—
Expense Subtotal	$77,200	$73,950	$73,950	$78,950	$304,050	
Expense Grand Total	$601,825	$549,200	$585,450	$592,825	$2,329,300	

capacity range noted on the far-right side of the exhibit. This signifies the production activity level within which the budgeted overhead costs are accurate. If the actual capacity utilization were to fall outside of this range, either high or low, a separate overhead budget should be constructed with costs that are expected to be incurred within those ranges.

A sample cost-of-goods-sold budget is shown in Exhibit 1.7. This format splits out each of the product lines noted in the revenue budget for reporting purposes, and subtracts from each one the materials costs that are noted in the purchases budget. This results in a contribution margin for each product line that is the clearest representation of the impact of direct costs (usually direct material costs) on each one. We then summarize these individual contribution margins into a summary-level contribution margin, and then subtract the total direct labor and overhead costs (as referenced from the direct labor and overhead budgets) to arrive at a total gross margin. The statistics section also notes the number of production personnel budgeted for each quarterly reporting period, plus the average annual revenue per production employee—these statistics can be replaced with any operational information that management wants to see at a summary level for the production function, such as efficiency levels, capacity utilization, or inventory turnover.

The sales department budget is shown in Exhibit 1.8. This budget shows several different ways in which to organize the budget information. At the top of the budget is a block of line items that lists the expenses for those overhead costs within the department that cannot be specifically linked to a salesperson or region. In cases where the number of sales staff is quite small, *all* of the department's costs may be listed in this area.

Another alternative is shown in the second block of expense line items in the middle of the sales department budget, where all of the sales costs for an entire product line are lumped together into a single line item. If each person on the sales staff is exclusively assigned to a single product line, then it may make sense to break down the budget into separate budget pages for each product line, and list all of the expenses associated with each product line on a separate page.

A third alternative is shown next in the exhibit, where we list a summary of expenses for each sales person. This format works well when combined with the departmental overhead expenses at the top of the budget, since this accounts for all of the departmental costs. However, this format brings up a confidentiality issue, since the compensation of each sales person can be inferred from the report. Also, this format would include the commission expense paid to each sales person; since commissions are a variable cost that is directly associated with each incremental dollar of sales, they should be itemized as a separate line item within the cost of goods sold.

A final option listed at the bottom of the example is to itemize expenses by sales region. This format works best when there are a number of sales personnel within the department who are clustered into a number of clearly identifiable regions. If there were no obvious regions or if there were only one salesperson per region, then the better format would be to list expenses by salesperson.

Exhibit 1.7 Cost-of-Goods-Sold Budget for the Fiscal Year Ended xx/xx/07

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
Product Line Alpha:					
Revenue	$210,000	$311,850	$370,000	$457,250	$1,349,100
Materials Expense	$108,400	$108,400	$113,400	$155,216	$485,416
Contribution Margin $$	$101,600	$203,450	$256,600	$302,034	$863,684
Contribution Margin %	48%	65%	69%	66%	64%
Product Line Beta:					
Revenue	$1,048,000	$1,057,000	$1,061,000	$1,053,000	$4,219,000
Materials Expense	$12,000	$14,000	$15,000	$13,250	$54,250
Contribution Margin $$	$1,036,000	$1,043,000	$1,046,000	$1,039,750	$4,164,750
Contribution Margin %	99%	99%	99%	99%	99%
Revenue—Product Line Charlie:					
Revenue	$563,000	$544,000	$562,000	$562,000	$2,231,000
Materials Expense	$268,000	$200,000	$220,000	$230,000	$918,000
Contribution Margin $$	$295,000	$344,000	$342,000	$332,000	$1,313,000
Contribution Margin %	52%	63%	61%	59%	59%
Total Contribution Margin $$	$1,432,600	$1,590,450	$1,644,600	$1,673,784	$6,341,434
Total Contribution Margin %	79%	83%	83%	81%	81%
Direct Labor Expense:	$125,702	$124,985	$140,441	$143,215	$534,343
Overhead Expense:	$601,825	$549,200	$585,450	$592,825	$2,329,300
Total Gross Margin $$	$705,073	$916,265	$918,709	$937,744	$3,477,791
Total Gross Margin %	39%	48%	46%	45%	44%
Statistics:					
No. of Production Staff*	23	22	22	23	
Ave. Annual Revenue per Production Employee	$316,696	$347,791	$362,364	$360,391	

*Not including general assembly staff.

At the bottom of the budget is the usual statistics section. The sales department budget is concerned only with making sales, so it should be no surprise that revenue per salesperson is the first item listed. Also, since the primary sales cost associated with this department is usually travel costs, the other statistical item is the travel and entertainment cost per person.

Exhibit 1.8 Sales Department Budget for the Fiscal Year Ended xx/xx/07

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
Departmental Overhead:					
Depreciation	$500	$500	$500	$500	$2,000
Office Supplies	$750	$600	$650	$600	$2,600
Payroll Taxes	$2,945	$5,240	$5,240	$8,186	$21,611
Salaries	$38,500	$68,500	$68,500	$107,000	$282,500
Travel & Entertainment	$1,500	$1,500	$1,500	$2,000	$6,500
Expense Subtotal	$44,195	$76,340	$76,390	$118,286	$315,211
Product Line Alpha:	$32,000	$18,000	$0	$21,000	$71,000
Expenses by Salesperson:					
Jones, Milbert	$14,000	$16,500	$17,000	$12,000	$59,500
Smidley, Jefferson	$1,000	$9,000	$8,000	$12,000	$30,000
Verity, Jonas	$7,000	$9,000	$14,000	$12,000	$42,000
Expense Subtotal	$22,000	$34,500	$39,000	$36,000	$131,500
Expenses by Region:					
East Coast	$52,000	$71,000	$15,000	$0	$138,000
Midwest Coast	$8,000	$14,000	$6,000	$12,000	$40,000
West Coast	$11,000	$10,000	$12,000	$24,000	$57,000
Expense Subtotal	$71,000	$95,000	$33,000	$36,000	$235,000
Expense Grand Total	$137,195	$205,840	$148,390	$190,286	$681,711
Statistics:					
Revenue per Salesperson	$607,000	$637,617	$664,333	$690,750	$2,599,700
T&E per Salesperson	$500	$500	$500	$667	$2,167

Exhibit 1.9 shows a sample marketing budget. As was the case for the sales department, this one also itemizes departmental overhead costs at the top, which leaves space in the middle for the itemization of campaign-specific costs in the middle. The campaign-specific costs can be lumped together for individual product lines, as is the case for product lines Alpha and Beta in the exhibit, or with subsidiary line items, as is shown for product line Charlie. A third possible format, which is to itemize marketing costs by marketing tool (e.g., advertising, promotional tour, coupon redemption, etc.) is generally not recommended if there is more than one product line, since there is no way for an analyst to determine the impact of individual marketing costs on specific product lines. The statistics at the bottom of the page attempt to compare marketing costs to sales; however, this should be treated as only an

Exhibit 1.9 Marketing Budget for the Fiscal Year Ended xx/xx/07

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
Departmental Overhead:					
Depreciation	650	750	850	1,000	3,250
Office Supplies	200	200	200	200	800
Payroll Taxes	4,265	4,265	4,265	4,265	17,060
Salaries	$55,750	$55,750	$55,750	$55,750	223,000
Travel & Entertainment	5,000	6,500	7,250	7,250	26,000
Expense Subtotal	65,865	67,465	68,315	68,465	270,110
Campaign-Specific Expenses:					
Product Line Alpha	14,000	26,000	30,000	0	70,000
Product Line Beta	18,000	0	0	24,000	42,000
Product Line Charlie					0
Advertising	10,000	0	20,000	0	30,000
Promotional Tour	5,000	25,000	2,000	0	32,000
Coupon Redemption	2,000	4,000	4,500	1,200	11,700
Product Samples	2,750	5,250	1,250	0	9,250
Expense Subtotal	51,750	60,250	57,750	25,200	194,950
Expense Grand Total	117,615	127,715	126,065	93,665	465,060
Statistics:					
Expense as Percent of Total Sales	6.5%	6.7%	6.3%	4.5%	6.0%
Expense Proportion by Quarter	25.3%	27.5%	27.1%	20.1%	100.0%

approximation, since marketing efforts will usually not result in immediate sales, but rather will result in sales that build over time. Thus, there is a time lag after incurring a marketing cost that makes it difficult to determine the efficacy of marketing activities.

A sample general and administrative budget is shown in Exhibit 1.10. This budget can be quite lengthy, including such additional line items as postage, copier leases, and office repair. Many of these extra expenses have been pruned from the exhibit in order to provide a compressed view of the general format to be used. The exhibit does not lump together the costs of the various departments that are typically included in this budget, but rather identifies each one in separate blocks; this format is most useful when there are separate managers for the accounting and human resources functions, so that they will have a better understanding of their budgets. The statistics section at the bottom of the page itemizes a benchmark target of the total general and administrative cost as a proportion of revenue. This is a particularly useful statistic

Exhibit 1.10 General & Administrative Budget for the Fiscal Year Ended xx/xx/07

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals	Notes
Accounting Department:						
Depreciation	4,000	4,000	4,250	4,250	16,500	
Office Supplies	650	650	750	750	2,800	
Payroll Taxes	4,973	4,973	4,973	4,973	19,890	
Salaries	$65,000	$65,000	$65,000	$65,000	260,000	
Training	500	2,500	7,500	0	10,500	
Travel & Entertainment	0	750	4,500	500	5,750	
Expense Subtotal	75,123	77,873	86,973	75,473	315,440	
Corporate Expenses:						
Depreciation	450	500	550	600	2,100	
Office Supplies	1,000	850	750	1,250	3,850	
Payroll Taxes	6,598	6,598	6,598	6,598	26,393	
Salaries	$86,250	$86,250	$86,250	$86,250	345,000	
Insurance, Business	4,500	4,500	4,500	4,500	18,000	
Training	5,000	0	0	0	5,000	
Travel & Entertainment	2,000	500	500	0	3,000	
Expense Subtotal	105,798	99,198	99,148	99,198	403,343	
Human Resources Department:						
Benefits programs	7,284	7,651	7,972	8,289	31,196	**0.4%**
Depreciation	500	500	500	500	2,000	
Office Supplies	450	8,000	450	450	9,350	
Payroll Taxes	2,869	2,869	2,869	2,869	11,475	
Salaries	$37,500	$37,500	$37,500	$37,500	150,000	
Training	5,000	0	7,500	0	12,500	
Travel & Entertainment	2,000	1,000	3,500	1,000	7,500	
Expense Subtotal	55,603	57,520	60,291	50,608	224,021	
Expense Grand Total	236,523	234,591	246,411	225,278	942,804	
Statistics:						
Expense as Proportion of Revenue	13.0%	12.3%	12.4%	10.9%	12.1%	
Benchmark Comparison	11.5%	11.5%	11.5%	11.5%	11.5%	

to track, since the general and administrative function is a cost center, and requires such a comparison in order to inform management that these costs are being held in check.

A staffing budget is shown in Exhibit 1.11. This itemizes the expected headcount in every department by major job category. It does not attempt to identify individual

Exhibit 1.11 Staffing Budget for the Fiscal Year Ended xx/xx/07

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Average Salary	Overtime Percent
Sales Department:						
Regional Sales Manager	1	2	2	3	$120,000	0%
Salesperson	2	4	4	6	$65,000	0%
Sales Support Staff	1	1	1	2	$34,000	6%
Marketing Department:						
Marketing Manager	1	1	1	1	$85,000	0%
Marketing Researcher	2	2	2	2	$52,000	0%
Secretary	1	1	1	1	$34,000	6%
General & Administrative:						
President	1	1	1	1	$175,000	0%
Chief Operating Officer	1	1	1	1	$125,000	0%
Chief Financial Officer	1	1	1	1	$100,000	0%
Human Resources Mgr.	1	1	1	1	$80,000	0%
Accounting Staff	4	4	4	4	$40,000	10%
Human Resources Staff	2	2	2	2	$35,000	8%
Executive Secretary	1	1	1	1	$45,000	6%
Research Department:						
Chief Scientist	1	1	1	1	$100,000	0%
Senior Engineer Staff	3	3	3	4	$80,000	0%
Junior Engineer Staff	3	3	3	3	$60,000	0%
Overhead Budget:						
Production Manager	1	1	1	1	$65,000	0%
Quality Manager	1	1	1	1	$55,000	0%
Materials Manager	1	1	1	1	$75,000	0%
Production Scheduler	1	1	1	1	$45,000	0%
Quality Assurance Staff	2	2	2	3	$32,500	8%
Purchasing Staff	3	2	2	2	$37,500	8%
Materials Mgmt Staff	4	5	5	5	$28,000	8%
Total Headcount	39	42	42	48		

positions, since that can lead to an excessively lengthy list. Also, because there may be multiple positions identified within each job category, the *average* salary for each cluster of jobs is identified. If a position is subject to overtime pay, its expected overtime percentage is identified on the right side of the budget. Many sections of the budget should have linkages to this page, so that any changes in headcount here will be automatically reflected in the other sections. This budget may have to be restricted from general access, since it contains salary information that may be considered confidential information.

Exhibit 1.12 Facilities Budget for the Fiscal Year Ended xx/xx/07

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
Facilty Expenses:					
Contracted Services	$5,500	$5,400	$5,000	$4,500	$20,400
Depreciation	$29,000	$29,000	$28,000	$28,000	$114,000
Electricity Charges	$4,500	$3,500	$3,500	$4,500	$16,000
Inspection Fees	$500	$0	$0	$500	$1,000
Insurance	$8,000	$0	$0	$0	$8,000
Maintenance Supplies	$3,000	$3,000	$3,000	$3,000	$12,000
Payroll Taxes	$1,148	$1,148	$1,148	$1,186	$4,628
Property Taxes	$0	$5,000	$0	$0	$5,000
Repairs	$15,000	$0	$29,000	$0	$44,000
Sewage Charges	$250	$250	$250	$250	$1,000
Trash Disposal	$3,000	$3,000	$3,000	$3,000	$12,000
Wages—Janitorial	$5,000	$5,000	$5,000	$5,500	$20,500
Wages—Maintenance	$10,000	$10,000	$10,000	$10,000	$40,000
Water Charges	$1,000	$1,000	$1,000	$1,000	$4,000
Expense Grand Total	$85,898	$66,298	$88,898	$61,436	$302,528
Statistics:					
Total Square Feet	52,000	52,000	78,000	78,000	
Square Feet/Employee	839	813	1,219	1,099	
Unused Square Footage	1,200	1,200	12,500	12,500	

The facilities budget tends to have the largest number of expense line items. A sample of this format is shown in Exhibit 1.12. These expenses may be offset by some rental or sub-lease revenues if a portion of the company facilities is rented out to other organizations. However, this revenue is shown in this budget only if the revenue amount is small; otherwise, it is more commonly found as an ''other revenue'' line item on the revenue budget. A statistics section is found at the bottom of this budget that refers to the total amount of square feet occupied by the facility. A very effective statistic is the amount of unused square footage, which can be used to conduct an ongoing program of selling off, renting, or consolidating company facilities.

The research department's budget is shown in Exhibit 1.13. It is most common to segregate the department-specific overhead that cannot be attributed to a specific project at the top of the budget, and then cluster costs by project below that. By doing so, the management team can see precisely how much money is being allocated to each project. This may be of use in determining which projects must be canceled or delayed as part of the budget review process. The statistics section at the bottom of the budget notes the proportion of planned expenses among the categories of overhead, research, and development. These proportions can be examined to see whether the company is allocating funds to the right balance of projects that most effectively meets it product development goals.

Exhibit 1.13 Research Department for the Fiscal Year Ended xx/xx/07

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
Departmental Overhead:					
Depreciation	500	500	400	400	1,800
Office supplies	750	2,000	1,500	1,250	5,500
Payroll Taxes	9,945	9,945	9,945	11,475	41,310
Salaries	$130,000	$130,000	$130,000	$150,000	540,000
Travel & Entertainment	0	0	0	0	0
Expense Subtotal	141,195	142,445	141,845	163,125	588,610
Research-Specific Expenses:					
Gamma Project	20,000	43,500	35,000	12,500	111,000
Omega Project	5,000	6,000	7,500	9,000	27,500
Pi Project	14,000	7,000	7,500	4,500	33,000
Upsilon Project	500	2,500	5,000	0	8,000
Expense Subtotal	39,500	59,000	55,000	26,000	179,500
Development-Specific Expenses:					
Latin Project	28,000	29,000	30,000	15,000	102,000
Greek Project	14,000	14,500	15,000	7,500	51,000
Mabinogian Project	20,000	25,000	15,000	10,000	70,000
Old English Project	6,250	12,500	25,000	50,000	93,750
Expense Subtotal	68,250	81,000	85,000	82,500	316,750
Expense Grand Total	248,945	282,445	281,845	271,625	1,084,860
Statistics:					
Budgeted Number of Patent Applications Filed	2	0	1	1	4
Proportion of Expenses:					
Overhead	56.7%	50.4%	50.3%	60.1%	217.5%
Research	15.9%	20.9%	19.5%	9.6%	65.8%
Development	27.4%	28.7%	30.2%	30.4%	116.6%
Total Expenses	100.0%	100.0%	100.0%	100.0%	400.0%

The capital budget is shown in Exhibit 1.14. This format clusters capital expenditures by a number of categories. For example, the first category, entitled ''bottleneck-related expenditures,'' clearly focuses attention on those outgoing payments that will increase the company's key productive capacity. The payments in the third quarter under this heading are directly related to the increase in bottleneck capacity that was shown the production budget for the fourth quarter. The budget also contains an automatic assumption of $7,000 in capital expenditures for any net

Exhibit 1.14 Capital Budget for the Fiscal Year Ended xx/xx/07

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
Bottleneck-Related Expeditures:					
Stamping Machine			$150,000		$150,000
Facility for Machine			$72,000		$72,000
Headcount-Related Expenditures:					
Headcount Change x $7,000 Added Staff	$0	$21,000	$0	$42,000	$63,000
Profit-Related Expenditures:					
Blending Machine		$50,000			$50,000
Polishing Machine		$27,000			$27,000
Safety-Related Expenditures:					
Machine Shielding		$3,000	$3,000		$6,000
Handicapped Walkways	$8,000	$5,000			$13,000
Required Expenditures:					
Clean Air Scrubber			$42,000		$42,000
Other Expenditures:					
Tool Crib Expansion				$18,500	$18,500
Total Expenditures	$8,000	$106,000	$267,000	$60,500	$441,500

increase in non–direct labor headcount, which encompasses the cost of computer equipment and office furniture for each person. If the company's capitalization limit is set too high to list these expenditures on the capital budget, then a similar line item should be inserted into the general and administrative budget, so that the expense can be recognized under the office supplies or some similar account.

The capital budget also includes a category for profit-related expenditures. Any projects listed in this category should be subject to an intensive expenditure review to ensure that they return a sufficient cash flow to make their acquisition profitable to the company. Other categories in the budget cover expenditures for safety or required items, which tend to be purchased with no cash flow discounting review. An alternative to this grouping system is to list only the sum total of all capital expenditures in each category, which is most frequently done when there are far too many separate purchases to list on the budget. Another variation is to list only the largest expenditures on separate budget lines, and cluster together all smaller ones. The level of capital purchasing activity will determine the type of format used.

All of the preceding budgets roll up into the budgeted income and cash flow statement, which is noted in Exhibit 1.15. This format lists the grand totals from all preceding pages of the budget in order to arrive at a profit or loss for each budget quarter. In the example, we see that a large initial loss in the first quarter is gradually

Exhibit 1.15 Income and Cash Flow Statement for the Fiscal Year Ended xx/xx/07

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
	$1,821,000	$1,912,850	$1,993,000	$2,072,250	$7,799,100
Revenue:					
Cost of Goods Sold:					
Materials	$388,400	$322,400	$348,400	$398,466	$1,457,666
Direct Labor	$125,702	$124,985	$140,441	$143,215	$534,343
Overhead					
Supervision	$38,250	$38,250	$39,750	$39,750	$156,000
Maintenance Department	$365,250	$318,750	$353,500	$347,750	$1,385,250
Materials Management	$86,125	$83,750	$83,750	$83,750	$337,375
Quality Department	$35,000	$34,500	$34,500	$42,625	$146,625
Other Expenses	$77,200	$73,950	$73,950	$78,950	$304,050
Total Cost of Goods Sold	$1,115,927	$996,585	$1,074,291	$1,134,506	$4,321,309
Gross Margin	$705,073	$916,265	$918,709	$937,744	$3,477,791
Operating Expenses:					
Sales Department	$137,195	$205,840	$148,390	$190,286	$681,711
General & Admin. Dept.					
Accounting	$75,123	$77,873	$86,973	$75,473	$315,440
Corporate	$105,798	$99,198	$99,148	$99,198	$403,343
Human Resources	$55,603	$57,520	$60,291	$50,608	$224,021
Marketing Department	$117,615	$127,715	$126,065	$93,665	$465,060
Facilities Department	$85,898	$66,298	$88,898	$61,436	$302,528
Research Department	$248,945	$282,445	$281,845	$271,625	$1,084,860
Total Operating Expenses	$826,176	$916,888	$891,609	$842,290	$3,476,963
Net Profit (Loss)	−$121,103	−$624	$27,100	$95,455	$828

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
Cash Flow:					
Beginning Cash	$100,000	$20,497	−$34,627	−$223,727	
Net Profit (Loss)	−$121,103	−$624	$27,100	$95,455	$828
Add Depreciation	$49,600	$51,500	$50,800	$51,000	$202,900
Minus Capital Purchases	−$8,000	−$106,000	−$267,000	−$60,500	−$441,500
Ending Cash	$20,497	−$34,627	−$223,727	−$137,772	

offset by smaller gains in later quarters to arrive at a small profit for the year. However, the presentation continues with a cash flow statement that has less positive results. It begins with the net profit figure for each quarter, adds back the depreciation expense for all departments, and subtracts out all planned capital expenditures from the capital budget to arrive at cash flow needs for the year. This tells us that the company will

Exhibit 1.16 Financing Budget for the Fiscal Year Ended xx/xx/07

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Financing Cost
Cash Position:	$20,497	−$34,627	−$223,727	−$137,772	
Financing Option One:					
Additional Debt		$225,000			9.5%
Financing Option Two:					
Additional Preferred Stock	$225,000				8.0%
Financing Option Three:					
Additional Common Stock	$225,000				18.0%
Existing Capital Structure:					
Debt	400,000				9.0%
Preferred Stock	$150,000				7.5%
Common Stock	$500,000				18.0%
Existing Cost of Capital	11.8%				
Revised Cost of Capital:					
Financing Option One	10.7%				
Financing Option Two	11.2%				
Financing Option Three	12.9%				

Note: Tax rate equals 38%.

experience a maximum cash shortfall in the third quarter. This format can be made more precise by adding in time lag factors for the payment of accounts payable and the collection of accounts receivable.

The final document in the budget is an itemization of the finances needed to ensure that the rest of the budget can be achieved. An example is shown in Exhibit 1.16, which carries forward the final cash position at the end of each quarter that was the product of the preceding cash flow statement. This line shows that there will be a maximum shortfall of $223,727 by the end of the third quarter. The next section of the budget outlines several possible options for obtaining the required funds (which are rounded up to $225,000)—debt, preferred stock, or common stock. The financing cost of each one is noted in the far-right column, where we see that the interest cost on debt is 9.5 percent, the dividend on preferred stock is 8 percent, and the expected return by common stockholders is 18 percent.

The third section on the page lists the existing capital structure, its cost, and the net cost of capital. This is quite important, for anyone reviewing this document can see what impact the financing options will have on the capital structure if any of them are selected. For example, the management team may prefer the low cost of debt, but can

also use the existing capital structure presentation to see that this will result in a very high proportion of debt to equity, which increases the risk that the company cannot afford to repay the debt to the lender.

The fourth and final part of the budget calculates any changes in the cost of capital that will arise if any of the three financing options are selected. A footnote points out the incremental corporate tax rate; this is of importance to the calculation of the cost of capital, because the interest cost of debt can be deducted as an expense, thereby reducing its net cost. In the exhibit, selecting additional debt as the preferred form of financing will result in a reduction in the cost of capital to 10.7 percent, whereas a selection of high-cost common stock will result in an increase in the cost of capital to 12.9 percent. These changes can have an impact on what types of capital projects are accepted in the future, for the cash flows associated with them must be discounted by the cost of capital in order to see if they result in positive cash flows. Accordingly, a reduction in the cost of capital will mean that projects with marginal cash flows will become more acceptable, while the reverse will be true for a higher cost of capital.

The budgeting examples shown here can be used as the format for a real-life corporate budget. However, it must be adjusted to include a company's chart of accounts and departmental structure, so that it more accurately reflects actual operations. Also, it should include a detailed benefits and payroll tax calculation page, which will itemize the cost of Social Security taxes, Medicare, unemployment insurance, worker's compensation insurance, medical insurance, and so on. These costs are a substantial part of a company's budget, and yet are commonly lumped together into a simplistic budget model that does not accurately reflect their true cost.

Though the budget model presented here may seem excessively large, it is necessary to provide detailed coverage of all aspects of the corporation, so that prospective changes to it can be accurately modeled through the budget. Thus, a detailed format is strongly recommended over a simple, summarized model.

1-3 HOW DOES FLEX BUDGETING WORK?

One problem with the traditional budget model is that many of the expenses listed in it are directly tied to the revenue level. If the actual revenue incurred is significantly different from the budgeted figure, then so many expenses will also shift in association with the revenue that the comparison of budgeted to actual expenses will not be valid. For example, if budgeted revenues are $1 million and budgeted material costs are $450,000, one would expect a corresponding drop in the actual cost of materials incurred if actual revenues drop to $800,000. A budget-to-actual comparison would then show a significant difference in the cost of materials, which would in turn cause a difference in the gross margin and net profit. This issue also arises for a number of other variable or semivariable expenses, such as salesperson commissions, production supplies, and maintenance costs. Also, if there are really large differences between actual and budgeted revenue levels, other costs that are more fixed in nature will also change, such as the salaries, office supplies, and even facilities maintenance (since

facilities may be sold off or added to, depending on which direction actual revenues have gone). These represent large step cost changes that will skew actual expenses so far away from the budget that it is difficult to conduct any meaningful comparison between the two.

A good way to resolve this problem is to create a flexible budget, or ''flex'' budget that itemizes different expense levels depending upon changes in the amount of actual revenue. In its simplest form, the flex budget will use percentages of revenue for certain expenses, rather than the usual fixed numbers. This allows for an infinite series of changes in budgeted expenses that are directly tied to revenue volume. However, this approach ignores changes to other costs that do not change in accordance with small revenue variations. Consequently, a more sophisticated format will also incorporate changes to many additional expenses when certain larger revenue changes occur, thereby accounting for step costs. By making these changes to the budget, a company will have a tool for comparing actual with budgeted performance at many levels of activity.

Though the flex budget is a good tool, it can be difficult to formulate and administer. One problem with its formulation is that many costs are not fully variable, instead having a fixed cost component that must be included in the flex budget formula. Another issue is that a great deal of time can be spent developing step costs, which is more time than the typical accounting staff has available, especially when in the midst of creating the standard budget. Consequently, the flex budget tends to include only a small number of step costs, as well as variable costs whose fixed cost components are not fully recognized.

Implementation of the flex budget is also a problem, for very few accounting software packages incorporate any features that allow one to load in multiple versions of a budget that can be used at different revenue levels. Instead, some include the option to store a few additional budgets, which the user can then incorporate into the standard budget-to-actual comparison reports. This option does not yield the full benefits of a flex budget, since it allows for only a few changes in expenses based on a small number of revenue changes, rather than a set of expenses that will automatically change in proportion to actual revenue levels incurred. Furthermore, the option to enter several different budgets means that someone must enter this additional information into the accounting software, which can be a considerable chore if the number of budget line items is large. For these reasons, it is more common to see a flex budget incorporated into an electronic spreadsheet, with actual results being manually posted to it from other accounting reports.

1-4 WHAT BEST PRACTICES CAN I APPLY TO THE BUDGETING PROCESS?

The budgeting process is usually rife with delays, which are caused by several factors. One is that information must be input to the budget model from all parts of the company—some of which may not put a high priority on the submission of budgeting

information. Another reason is that the budgeting process is highly iterative, sometimes requiring dozens of budget recalculations and changes in assumptions before the desired results are achieved. The typical budgeting process is represented in Exhibit 1.17, where we see that there is a sequential process that requires the completion of the revenue plan before the production plan can be completed, which in turn must be finished before the departmental expense budgets can be finished, which then yields a financing plan. If the results do not meet expectations, then the process starts over again at the top of the exhibit. This process is so time-consuming that the budget may not be completed before the budget period has already begun.

There are a number of best practices that can be used to create a more streamlined budgeting process, which are as follows:

- *Reduce the number of accounts*. The number of accounts included in the budget should be reduced, thereby greatly reducing the amount of time needed to enter and update data in the budget model.
- *Reduce the number of reporting periods*. Consolidate the 12 months shown in the typical budget into quarterly information, thereby eliminating two-thirds of the information in the budget. If the budget must later be reentered into the accounting system in order to provide budget-to-actual comparisons, then a simple formula can be used to divide the quarterly budget back into its monthly components—which is still much less work than maintaining 12 full months of budget information.
- *Use percentages for variable cost updates*. When key activities, such as revenues, are changed in the budget model, one must peruse the entire budget in order to determine what related expenses must change in concert with the key activities. A much easier approach is to use percentage-based calculations for variable costs in the budget model, so that these expenses will be updated automatically. They should also be color-coded in the budget model, so that they will not be mistaken for items that are manually changed.
- *Report on variables in one place*. A number of key variables will impact the typical budget model, such as the assumed rate of inflation in wages or purchased parts, tax rates for income, payroll, and worker's compensation, medical insurance rates, and so on. These variables are much easier to find if they are set up in a cluster within the budget, so that one can easily reference and alter them. Under this arrangement, it is also useful to show key results (such as net profits) on the same page with the variables, in order to make alterations to the variables and immediately see their impact without having to search through the budget model to find the information.
- *Use a budget procedure and timetable*. The budget process is plagued by many iterations, since the first results will nearly always yield profits or losses that do not meet a company's expectations. Furthermore, it requires input from all parts of a company, some of which may lag in sending in information in a timely manner. Accordingly, it is best to construct a budgeting procedure that specifically identifies

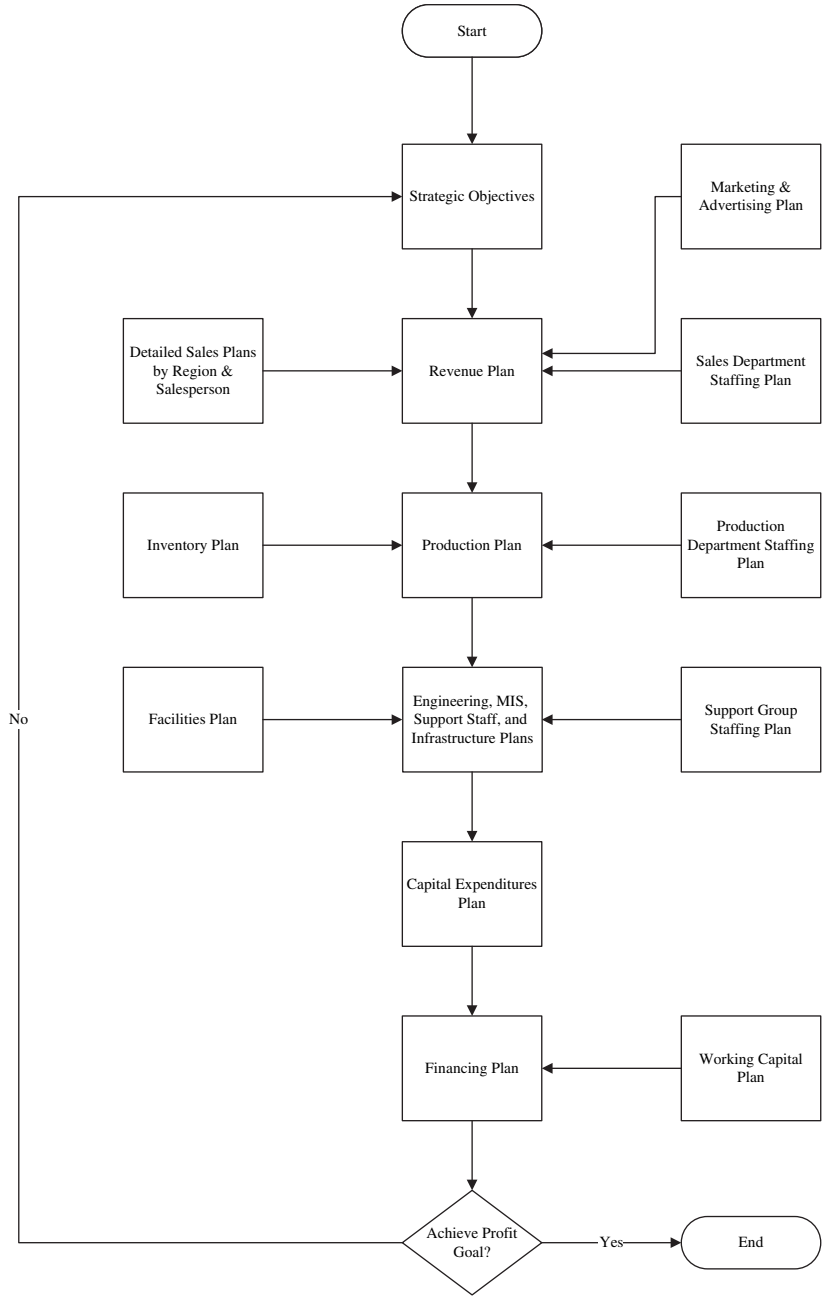

Exhibit 1.17 Traditional Budgeting Process

what job positions must send budgeting information to the budget coordinator, what information is required of each person, and when that information is due. Furthermore, there should be a clear timetable of events that is carefully adhered to, so that plenty of time is left at the end of the budgeting process for the calculation of multiple iterations of the budget.

In addition to these efficiency-improvement issues, there are other ways to modify the budgeting process so that it can be completed much more quickly. The following changes should be considered:

- *Preload budget line items.* Rather than requiring department managers to fill out a blank budget form for the upcoming budget year, have the accounting staff preload many of the budget line items with information from the current year. Most expenses are relatively fixed from year to year, or are easily linked to key drivers, such as headcount. Consequently, the accounting staff can probably arrive at more accurate budget numbers than a department manager for most line items. This approach leaves only a few of the larger and more variable accounts for managers to enter in the budget form. In some cases where a department is anticipating no major changes for the next budget year, it may even be possible for the accounting staff to create the entire department budget, so the department manager has only to make revisions to it.
- *Itemize the corporate strategy.* The strategy and related tactical goals that the company is trying to achieve should be listed at the beginning of the budget model. All too frequently, management loses sight of its predetermined strategy when going through the many iterations that are needed to develop a realistic budget. By itemizing the corporate strategy in the budget document, it is much less likely that the final budget model will deviate significantly from the company's strategic direction.
- *Identify step-costing change points.* The budget model should have notations incorporated into it that specify the capacity levels at which expenses are valid. For example, if the production level for product A exceeds 100,000 per year, then a warning flag should be generated by the budget model that informs the budget manager of the need to add an extra shift to accommodate the increased production requirements. Another example is to have the model generate a warning flag when the average revenue per salesperson exceeds $1,000,000, since this may be the maximum expectation for sales productivity, and will require the addition of more sales personnel to the budget. These flags can be clustered at the front of the budget model, so that problems will be readily apparent to the reader.
- *Specify maximum amounts of available funding.* One of the warning flags just noted should include the maximum level of funding that the company can obtain. If an iteration of the budget model results in excessively high cash requirements, then the flag will immediately point out the problem. It may be useful to note next to the warning flag the amount by which the maximum funding has been exceeded, so that this information is readily available for the next budget iteration.

- *Base expense changes on cost drivers*. Many expenses in the budget will vary in accordance with changes in various activities within the firm. As noted earlier in this section, expenses can be listed in the budget model as formulas, so that they vary in direct proportion to changes in budgeted revenue. This same concept can be taken a step further by listing other types of activities that drive cost behavior, and linking still other expenses to them with formulas. For example, the amount of telephone expense is directly related to the number of employees, so it can be linked to the total number of employees on the staffing budget. Another example is the number of machine setup personnel, which will change based on the planned number of production batches to be run during the year. This level of automation requires a significant degree of knowledge of how selected expenses interact with various activities within the company.
- *Budget by groups of staff positions*. A budget can rapidly become unwieldy if every position in the company is individually identified—especially if the names of all employees are listed. This format requires constant updating as the budget progresses through multiple iterations. A better approach is to itemize by job title, which allows one to vastly reduce the number of job positions listed in the budget.
- *Rank projects*. A more complex budget model can incorporate a ranking of all capital projects, so that any projects with a low ranking will be automatically eliminated by the model if the available amount of cash drops below the point where they could be funded. However, this variation requires that great attention be paid to the ranking of projects, since there may be some interrelationship between projects—if one is dropped but others are retained, then the ones retained may not be functional without the missing project.
- *Issue a summary-level model for use by senior management*. The senior management team is primarily concerned with the summary results of each department, product line, or operating division, and does not have time to wade through the details of individual revenue and expense accounts. Further, they may require an increased level of explanation from the budgeting staff if they *do* choose to examine these details. Accordingly, the speed of the iteration process can be enhanced by producing a summary-level budget that is directly linked to the main budget, so that all fields in it are updated automatically. The senior management team can more easily review this document, yielding faster updates to the model.
- *Link budget results to an employee goal and reward system*. The budgeting process does not end with the final approval of the budget model. Instead, it then passes to the human resources department, which uses it as the foundation for an employee goal and reward system. The trouble is that if budget approval is delayed, the human resources department will have very little time in which to create its goal and reward system. Accordingly, this add-on project should be incorporated directly into the budget model, so that it is approved alongside the rest of the budget. For example, a goals and rewards statement added to the budget can specify a bonus payment to the manager of the production department if he or she can create the number of units of product specified in the production budget. Similarly, the

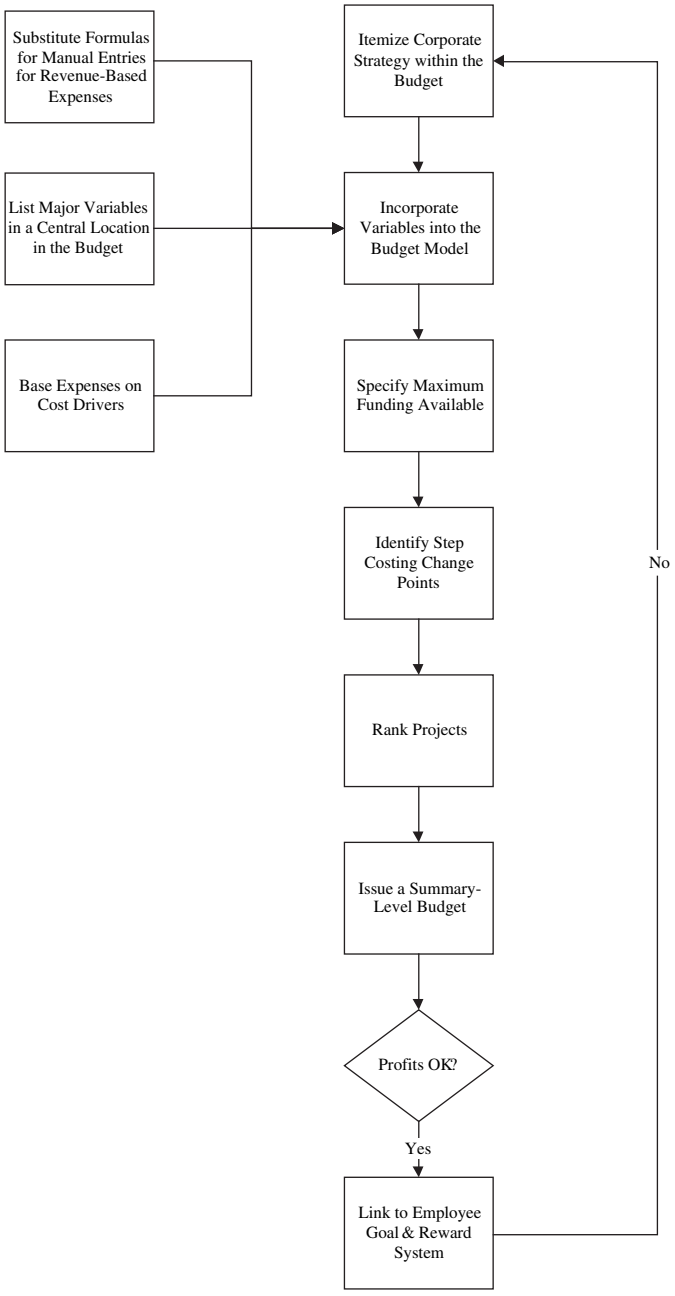

Exhibit 1.18 Streamlined Budgeting Process

sales manager can receive a bonus based on reaching the sales goals noted in the revenue budget. By inserting the bonus amounts in this page of the budget, the model can automatically link them to the final targets itemized in the plan, requiring minimal further adjustments by the human resources staff.

As a result of these improvements, the budgeting process will change to the format shown in Exhibit 1.18, where the emphasis moves away from many modeling iterations toward the incorporation of a considerable level of automation and streamlining into the structure of the budget model. By following this approach, the budget will require much less manual updating; this will allow it to sail through the smaller number of required iterations with much greater speed.

1-5 HOW CAN I INTEGRATE THE BUDGET INTO THE CORPORATE CONTROL SYSTEM?

There are several ways in which a budget can be used to enhance a company's control systems so that objectives are more easily met and it is more difficult for costs to stray from approved levels.

One of the best methods for controlling costs is to link the budget for each expense within each department to the purchasing system. By doing so, the computer system will automatically accumulate the total amount of purchase orders that have been issued thus far against a specific account, and will refuse any further purchase orders when the budgeted expense total has been reached. This approach can involve the comparison of the monthly budget to monthly costs, or compare costs with annual budgeted totals. The latter approach can cause difficulty for the inattentive manager, since actual expenses may be running well ahead of the budget for most of the year, but the system will not automatically flag the problem until the entire year's budget has been depleted. Alternatively, a comparison to monthly budgeted figures may result in so many warning flags on so many accounts that the purchasing staff is unable to purchase many items. One workaround for this problem is to use a fixed overage percentage by which purchases are allowed to exceed the budget; another possibility is to compare cumulative expenses only with quarterly budget totals, which reduces the total number of system warning flags.

Another budgetary control system is to compare actual with budgeted results for the specific purpose of evaluating the performance of employees. For example, the warehouse manager may be judged based on actual inventory turnover of 12×, which compares unfavorably to a budgeted turnover rate of 15×. Similarly, the manager of a cost center may receive a favorable review if the total monthly cost of her cost center averages no more than $152,000. This also works for the sales staff, who can be assigned sales quotas that match the budgeted sales levels for their sales territories. In this manner, a large number of employees can have their compensation levels directly tied to the achievement of budgeted goals. This is a highly effective way to ensure that the budget becomes a fixture in the lives of employees.

However, there is also a problem with linking employee pay to performance levels as outlined in the budget. If employees realize that they will fall short of their bonus targets, they will be more likely to hoard their resources or possible sales for the next period, when they will have a better opportunity to achieve better performance and be paid a bonus. The result is wild swings in corporate performance from period to period as employees cycle through the hoard-to-splurge circuit. Employees may also stretch or break the accounting rules in a variety of ways to achieve the target. The solution is to link the budget to a sliding performance scale that contains no ''hard'' performance goals. The best example of the sliding bonus scale is what it is *not*—there are no specific goals at which the bonus target suddenly increases in size. Instead, the bonus is a constant percentage of the goal, such as 1 percent of sales or 5 percent of net after-tax profits. Also, there should be no upper boundary to the sliding scale, which would present employees with the disincentive to stop performing once they have reached a maximum bonus level. Similarly, there should theoretically be no lower limit to the bonus either, though it is more common to see a baseline level that is derived from the corporate breakeven point, on the grounds that employees must at least ensure that the company does not lose money. The sliding scale approach also makes it much easier to budget for the bonus expense at various activity levels, rather than trying to budget for the more common all-or-nothing bonus payment.

Yet another budgetary control system is to use it as a feedback loop to employees. This can be done by issuing a series of reports at the end of each reporting period that are specifically designed to match the responsibilities of each employee. For example, Exhibit 1.19 shows a single revenue line item that is reported to a salesperson for a single territory. The salesperson does not need to see any other detailed comparison with the budget, because he is not responsible for anything besides the specific line item that is reported to him. This reporting approach focuses the attention of many employees on just those segments of the budget over which they have control. Though this approach can result in the creation of dozens or even hundreds of reports by the accounting department, they can be automated on most packaged accounting software systems, so that only the initial report creation will take up much accounting time.

An additional control use for the budget is to detect fraud. The budget is usually based on several years of actual operating results, so unless there are major changes in activity levels, actual expense results should be fairly close to budgeted expectations. If not, variance analysis is frequently used to find out what happened. This process is an excellent means for discovering fraud, since this activity will usually result in a sudden surge in expense levels, which the resulting variance analysis will detect. The two instances in which this control will not work is when the fraud has been in existence for a long time (and so is incorporated into the budgeted expense numbers

Exhibit 1.19 Line ltem Budget Reporting for Specific Employees

Account No.	Description	Actual Results	Budgeted Results	Variance
4500-010	Arizona Revenue	$43,529	$51,000	−$7,471

already) or the amount of fraud is so low that it will not create a variance large enough to warrant investigation.

1-6 HOW DO THROUGHPUT CONCEPTS IMPACT THE BUDGET?

In a traditional budget, the entire budget model is driven by the revenue forecast, since this information is needed to derive materials purchases, inventory and staffing levels, and operating expenses. The revenue forecast is usually summarized in one of two ways: either by total revenue dollars for each product, or by total revenue dollars by customer (which is more common when dealing with labor hour billings).

Though a valid way to obtain top-line revenue projections, this information lacks any clear linkage to directly variable costs, so managers cannot tell from the revenue budget alone how revenue projections will impact profitability. In addition, it does not show the impact of sales projections on the company's capacity constraint. A better approach is to develop a throughput forecast, either by product or customer, that clearly shows the impact on both profits and the capacity constraint.

Exhibit 1.20 shows a traditional revenue forecast for several products, followed by a revised forecast that reveals the individual and cumulative throughput levels for the same products and product quantities shown in the original forecast.

The traditional product revenue budget shown at the top of Exhibit 1.20 presents the usual itemization of estimated product sales that many of us are accustomed to seeing. However, this view has serious shortcomings when compared with the much richer set of information listed in the bottom half of the exhibit for throughput-based information. The latter portion of the exhibit reveals that the company is incapable of meeting its revenue budget, because there is not a sufficient amount of capacity available (based on 260 working days, at three shifts, assuming 80% efficiency) to meet its sales goals. A traditional budget would not have flagged this constraint problem anywhere, so the company would have constructed a fundamentally unsound budget and proceeded to implement it, with an essentially guaranteed revenue shortfall being the only possible outcome.

In addition, the enhanced budget shows that the company earns the least throughput per minute on its top-of-the-line carbon and titanium bikes; depending on the marketing effect of this decision, management could elect to drop production of both bikes, thereby bringing remaining estimated bike sales within range of the constraint limitation, while minimizing the resulting negative impact on throughput. Thus, the throughput approach to the revenue budget not only reveals problems with the initial forecast, but also presents a possible solution regarding how the sales mix might be modified.

A further note on the use of the throughput-based product revenue budget is to list the same product multiple times if it is forecasted to be sold to different customers at different prices (in which case it is useful to identify the customers in the budget for each line item). This makes it easier to see the throughput per unit at each price point.

Exhibit 1.20 Traditional Product Revenue Budget

Product Name	Unit Sales	Price/ Each	Extended Revenue	Variable Cost/Unit	Throughput per Unit	Total Throughput	Constraint Time/Unit	Total Time on Constraint	Throughput per Minute
1-speed road bike	2,850	$250	$712,500						
3-speed road bike	5,100	$400	$2,040,000						
24-speed road bike	4,800	$800	$3,840,000						
24-speed carbon road bike	450	$4,000	$1,800,000						
3-speed dual-shock mountain bike	8,750	$1,000	$8,750,000						
24-speed titanium mountain bike	650	$2,500	$1,625,000						
Totals	22,600		$18,767,500						
Throughput-Based Product Revenue Budget:									
Product Name									
1-speed road bike	2,850	$250	$712,500	$70	$180	$513,000	5	14,250	$36.00
3-speed road bike	5,100	$400	$2,040,000	$125	$275	$1,402,500	11	56,100	$25.00
24-speed road bike	4,800	$800	$3,840,000	$225	$575	$2,760,000	13	62,400	$44.23
24-speed carbon road bike	450	$4,000	$1,800,000	$1,750	$2,250	$1,012,500	80	36,000	$28.13
3-speed dual-shock mountain bike	8,750	$1,000	$8,750,000	$350	$650	$5,687,500	22	192,500	$29.55
24-speed titanium mountain bike	650	$2,500	$1,625,000	$1,150	$1,350	$877,500	65	42,250	$20.77
Totals	22,600		$18,767,500			**$12,253,000**		**403,500**	
				Maximum available constraint time (minutes)				**299,520**	

The same approach can be taken with a revenue budget that is based on sales by customer. The example shown in Exhibit 1.21 assumes that sales are based on billable hours to customers.

The traditional revenue budgeting model shown in Exhibit 1.21 shows an estimate of revenues by customer, with no additional interpretive information. However, the throughput-based version at the bottom of the exhibit reveals a great deal more information. When variable costs (in this case, labor) are subtracted from the budgeted revenue to arrive at throughput, we find that there is a loss on the work being done for the Mining Safety Engineers customer, which may prompt a discussion of repricing this work or of dropping the customer. In addition, the model then summarizes the labor used in the various customer projects by labor category and calculates the amount of staffing required, based on the estimate of billable hours and an 80 percent billable percentage for each employee. This information tells management that it must hire additional staff in several labor categories in order to have sufficient staff to meet its revenue budget.

The main reason for a budget is to give management a model of how the company should operate during the budget period, based on the impact of operational and financial changes that management wants to implement during the budget period. However, the traditional budget model is designed to show results based on the local optimization of resources, rather than systemwide resources, which usually results in counterproductive budgeting decisions. For example, if expenses are projected to be too high, management may mandate an across-the-board 10 percent budget cut for all departments, which will likely both reduce the capacity of the constrained resource and shrink operating expenses to such an extent that the ability of the entire system to support the current level of throughput has now been reduced.

Unfortunately, it is very difficult to create a quantitative format for how a change in operating expenses will impact total system throughput, since in many cases there does not appear to be a direct or even an indirect link between some costs and the generation of throughput. Consequently, the creation of a budget where expenses support throughput generation requires an extremely detailed knowledge of how the entire system works together to create throughput.

In many cases where no link between an expense and throughput can be found, management is still able to wield a sharp budgeting axe in cutting expenses. Thus, there are considerable differences in how various budget line items should be treated, based on their impact on throughput. Any expense supporting throughput should be cut only after detailed review by a process analyst, while other expenses can be cut with much less review. This interpretation of the budget model results in a change in the budgeting format, which is shown in Exhibit 1.22. The exhibit shows a before-and-after department budget where the first version ignores the impact of throughput, while the second version splits operating expenses into those impacting throughput and those that do not. The expenses in the second version can be shifted between the two categories based on whether they affect the company's throughput capacity.

However, the exhibit clearly shows that *most* expenses will be attributable in some manner to throughput capacity, since most corporate expenses involve departments

Exhibit 1.21 Traditional Customer Revenue Budget:

Customer Name	Billable Hours	Price/ Hour	Extended Revenue	Variable Cost/Hour	Throughput per Hour	Total Throughput	Staff Required*	Staff Available
Amber Distribution Corporation	2,000	$125	$250,000					
Bi-Way Valve Specialties	8,000	$85	$680,000					
Breaker Breaker Radio Design	2,700	$125	$337,500					
Hippo Weight Loss Clinics	4,100	$85	$348,500					
Mining Safety Engineers	10,500	$65	$682,500					
Vessel Insurance Brokers	500	$125	$62,500					
Totals	27,800		$2,361,000					
Throughput-Based Customer Revenue Budget:								
Amber Distribution Corporation	2,000	$125	$250,000	$81.75	$43.25	$86,500		
Bi-Way Valve Specialties	8,000	$85	$680,000	$72.35	$12.65	$101,200		
Breaker Breaker Radio Design	2,700	$125	$337,500	$81.75	$43.25	$116,775		
Hippo Weight Loss Clinics	4,100	$85	$348,500	$72.35	$12.65	$51,865		
Mining Safety Engineers	10,500	$65	$682,500	$66.50	−$1.50	−$15,750		
Vessel Insurance Brokers	500	$125	$62,500	$81.75	$43.25	$21,625		
Totals	27,800		$2,361,000			$362,215		
Labor Category Aggregation								
Expert Consultant	5,200	125	$650,000	$ 81.75	$43.25	$224,900	3.1	2
Senior Consultant	12,100	85	$1,028,500	$ 72.35	$12.65	$153,065	7.3	7
Junior Consultant	10,500	65	$682,500	$ 66.50	−$1.50	−$15,750	6.3	4
	27,800		$2,361,000			$362,215		

*Assumes 80% billable hours.

Exhibit 1.22 Before-and-After Throughput Expense Budget

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total
Version 1:					
Bank fees	3,000	4,500	2,500	4,000	14,000
Legal fees	15,000	18,500	32,000	19,000	84,500
Promotional materials	82,000	0	48,000	28,500	158,500
Salaries, accounting	85,000	87,000	87,000	91,000	350,000
Salaries, corporate	105,000	110,000	143,000	141,000	499,000
Salaries, engineering	190,000	200,000	203,000	205,000	798,000
Salaries, marketing	20,000	21,000	21,000	22,000	84,000
Salaries, production	280,000	275,000	285,000	290,000	1,130,000
Salaries, sales	150,000	175,000	180,000	195,000	700,000
Supplies	17,500	16,000	13,500	19,000	66,000
Taxes, payroll	65,155	68,138	72,142	74,104	279,539
Trade shows	0	100,000	0	0	100,000
Travel & entertainment	10,500	14,500	17,000	12,000	54,000
Total	1,023,155	1,089,638	1,104,142	1,100,604	4,317,539
Version 2:					
Throughput-related:					
Promotional materials	82,000	0	48,000	28,500	158,500
Salaries, engineering	190,000	200,000	203,000	205,000	798,000
Salaries, marketing	20,000	21,000	21,000	22,000	84,000
Salaries, production	280,000	275,000	285,000	290,000	1,130,000
Salaries, sales	150,000	175,000	180,000	195,000	700,000
Trade shows	0	100,000	0	0	100,000
Travel & entertainment	8,000	10,000	16,000	6,000	40,000
Subtotal	730,000	781,000	753,000	746,500	3,010,500
Not throughput-supportive:					
Bank fees	3,000	4,500	2,500	4,000	14,000
Legal fees	15,000	18,500	32,000	19,000	84,500
Salaries, accounting	85,000	87,000	87,000	91,000	350,000
Salaries, corporate	105,000	110,000	143,000	141,000	499,000
Supplies	17,500	16,000	13,500	19,000	66,000
Taxes, payroll	65,155	68,138	72,142	74,104	279,539
Travel & entertainment	2,500	4,500	1,000	6,000	14,000
Subtotal	293,155	308,638	351,142	354,104	1,307,039
Grand total	1,023,155	1,089,638	1,104,142	1,100,604	4,317,539

that are directly related to the production of revenue, such as engineering, production, marketing, and sales. Only such classic overhead expenses as accounting, general corporate costs, and legal expenses can be reduced with some assurance that the reductions will not impact throughput.

Thus far, the discussion of operating expenses has primarily focused on a company's ability to cut expenses. However, how should the budgeting process handle requests for *increased* operating expenses? The primary guideline should be that the existing level of operating expenses is sufficient to handle not only existing but also any projected increases in throughput. If not, then some elements of operating expenses become the constraint, at which point increases in those expenses should be included in the budget.

The standard ways to budget for production staffing levels are to (1) incrementally adjust existing staffing levels based on forecasted revenue changes or (2) extrapolate labor requirements derived by multiplying the forecasted revenue for the budget period by the labor routings for each product listed in the forecast. Many companies start with the latter method and compare it with the results obtained from the first approach, and then adopt a hybrid solution. These techniques will yield reasonably accurate staffing levels for a company attempting to create locally optimized manufacturing operations. However, they will likely result in inadequate staffing levels when capacity constraints are taken into account.

When throughput is taken into account, it is necessary to hire additional employees when either of the following two circumstances arise:

1. When the sprint capacity of key workstations positioned upstream from the constrained resource is insufficient to recover from system downtime to such an extent that buffers are repeatedly penetrated
2. When the constrained resource could generate more throughput with the addition of more staff

It is entirely possible that the constrained resource is not in the production area or the marketplace at all (the two most common areas), but rather in the sales department. This problem is most evident when the company's sales funnel begins with a large number of prospective sales, but narrows down to a small number of completed sales due to a bottleneck somewhere in the sales conversion process. The identification of the constrained resource within the sales funnel can be determined as part of the budgeting process, usually with an analysis similar to the one shown in Exhibit 1.23.

Exhibit 1.23 Sales Funnel Bottleneck Identification

Steps in Sales Funnel	Actual Time Used (hours)	Theoretical Capacity (hours)
Initial identification	450	700
Customer qualification	120	240
Needs assessment	300	300
Letter of understanding	50	80
Product demonstration	620	800
Solution proposal	2,400	3,100
Negotiation	280	400
Closing	100	200

The exhibit shows the basic steps needed to advance through the sales funnel, from initial identification of the customer through closing the deal. For each step, the table shows the actual time used on various steps in the process, as compared with the theoretical amount of staff capacity available for each step. The table reveals that the constrained resource is the needs assessment, for which the actual time used has matched the theoretical maximum available. Thus, for budgeting purposes, management should bolster the ranks of the sales engineers who are responsible for creating needs assessments.

If a company does not perform this analysis, then it may budget for increases in the wrong types of sales positions, which will yield no new sales if the additions do not address the constraint.