

# SOLUTIONS MANUAL

*Cases in*  
**Management Accounting  
and Control Systems**  
*Fourth Edition*



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**PART I**

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**INTRODUCTION TO MANAGEMENT ACCOUNTING AND CONTROL**

# **BREEZY BOAT COMPANY**

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## **CASE SUMMARY**

This case describes a small boat manufacturing company, preparing to produce two models. The case asks the students to consider what management accounting information they would like to have to help manage the company.

## **TEACHING OBJECTIVES**

This case is an ideal tool for the first day of a management accounting course, or as a tool to shift from an initial financial accounting orientation to a focus on management accounting—that is, the development and use of accounting information for management activities, such as planning, monitoring and decisions on alternative choices.

## **SUGGESTED STUDENT ASSIGNMENT**

The assignment is presented in the last paragraph of the case. Students are asked to make a list of decisions or activities for which they would like to have cost information, and to outline a method by which that cost information could be obtained.

## **ANALYSIS**

Decisions or activities for which cost information is needed:

1. Pricing - including setting the prices for different sizes and accessory options, for multiple boat orders, to retail customers or dealers, or for different seasons.
2. Monitoring performance - to tell whether it actually cost the amount that had been expected to produce boats or to do specific operations.
3. Analysis of alternative choice decisions, such as a possible second shift, building seasonal inventory, number of accessory options to be offered.

**Table TN1**

|                   | Revenue and Cost Information   |                                 |                             |
|-------------------|--------------------------------|---------------------------------|-----------------------------|
|                   | <u>320 Boats<br/>per Month</u> | <u>3,840 Boats<br/>per Year</u> | <u>Average<br/>per Boat</u> |
| Sales             | \$115,000                      | \$1,380,000                     | \$359.37                    |
| Costs:            |                                |                                 |                             |
| Factory payroll   | \$20,000                       | \$240,000                       | \$ 62.50                    |
| Other payroll     | 12,000                         | 144,000                         | 37.50                       |
| Material          |                                |                                 |                             |
| Parts             | 53,000                         |                                 | 165.62                      |
| Mold costs        |                                |                                 |                             |
| Overhead          | <u>17,000</u>                  | <u>                    </u>     | <u>53.13</u>                |
|                   | <u>\$102,000</u>               | <u>\$1,224,000</u>              | <u>\$318.75</u>             |
| Profit Before Tax | \$ 13,000                      | \$ 156,000                      | \$ 40.62                    |

How this information might be obtained:

- Job costing
  - cost for a lot of six boats, for example
  - actual direct costs plus allocated indirect costs using an overhead rate
- Standard costing
  - each boat has a predicted standard cost, which is the credit to work-in-process inventory. Actual costs incurred make up the debit. The difference is a cost variance.
- Separation of fixed and variable costs, to help in the monitoring of costs per period of time and predict the cost of an incremental number of boats.

### TEACHING STRATEGY

I usually start the discussion of Breezy Boat by listing the decisions and activities of Breezy Boat's management that would be aided by some sort of accounting information input. This discussion usually takes about twenty minutes and is a useful approach for setting the stage.

The remainder of the class should be devoted to exploring what costs would be helpful in these decisions. As background for this discussion, it helps to lay out the total costs and revenues anticipated as shown in **Table TN1** above, together with the average per boat. Since that average is not a very useful figure, discussion might then explore ways to be more specific on the different boat sizes and stages of production. This discussion should include how one might handle common costs, such as factory overhead, and the problems that arise with attempts to allocate these costs to specific boats or departments.

Finally, the discussion should move to considering how the information might be obtained. Students should be encouraged to visualize the accounting system and how it might collect costs and assign them to Breezy Boat's products.

There is usually no trouble in filling ninety minutes of class time with discussion. Discipline will be needed to penetrate cost issues and also cover a number of the subjects.

## **Breathing Life into the MBA Management Accounting Course: A Teaching Plan for the Textbook Novel Code Blue**

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### **OVERVIEW**

This teaching note provides a detailed teaching plan, student assignment questions, and comprehensive analysis to supplement the use of the healthcare textbook novel, Code Blue, 3<sup>rd</sup> edition, as the first two class sessions of the management accounting module of a required first-year MBA accounting course. The module is titled, “Strategic Cost Management and Performance Assessment,” and it is designed to familiarize students with important management accounting terminology, costing concepts and costing methods, and performance measurement issues. It includes such topics as cost behaviors, standard costing, target costing, activity thinking, budgeting, variance analysis, and performance measurement and assessment, and it presents them through the use of an organizational framework focused on their relevance to operating and strategic decisions.

Frequently, management accounting courses are so dominated by accounting considerations that the usefulness of the information in making management decisions never becomes clear to students. Rather than viewing the course as one that provides them with a rich array of concepts, tools and techniques that have significant managerial relevance, students generally view it in a rather narrow, procedural context and focus their attention on the application of formulas and the creation of elaborate spreadsheets. In order for significant innovation in management accounting education to occur, curriculum changes must broaden and strengthen the management dimensions without sacrificing the fundamental accounting dimensions. One very effective way to accomplish this shift in emphasis is to select topics and materials that demonstrate how cost and cost-related analysis and performance measurement and assessment are useful to management in making operating and strategic decisions.

Code Blue was selected for use at the beginning of our redesigned MBA management accounting module for four primary reasons. First, it demonstrates the operating and strategic need for timely, relevant and accurate cost information in the service sector rather than in the manufacturing sector. Traditionally, management accounting has been taught primarily in a manufacturing context despite the significant growth in size and importance of the service sector. In addition, health care represents one of the most important global issues of the twenty-first century. Second, it illustrates the fact that managements’ need for cost information depends on the circumstances involved. Unlike financial accounting and reporting, there is no authoritative set of generally accepted management accounting standards with which internal management accounting reports must comply. Furthermore, the textbook novel vividly demonstrates that as circumstances change within industries, organizations associated with those industries will most likely have a need for new and different cost information. Third, because it is not a traditional accounting textbook, Code Blue provides students with something new and different without sacrificing substantive content. For example, it contains fifteen Supplements located at the end of the novel that pertain to a variety of cost accounting and performance assessment issues and concepts. Two of the student assignment questions that we assign for Day Two are based on these Supplements. And fourth, it provides an opportunity to frame the entire management accounting module as one that deals with ways in which costing systems can provide management with timely and relevant information useful in making operating and strategic decisions.

The two class sessions devoted to Code Blue highlight the fact that all organizations operating in a competitive environment depend on their accounting systems to provide management with information necessary to make informed short-term operating decisions and sound long-term strategic decisions. The other important lesson learned is that accounting systems must adapt and change as circumstances change. In assessing the adequacy of accounting information, management must continually ask two important questions: What information do we need and why? And, is the information timely, relevant, accurate and affordable?

## **SYNOPSIS**

Code Blue, 3<sup>rd</sup> edition, written by Richard McDermott and Kevin Stocks, is the story of Wes Douglas, a CPA and consultant who assumes the role of interim hospital administrator for a community hospital during a time when the hospital is faced with major financial challenges brought about by the changing healthcare environment. Faced with the responsibility of returning the hospital to profitability and avoiding financial insolvency and closure, Wes is forced to become fluent with a complex service industry in which he has never worked. The novel profiles the challenges he faces, including understanding the evolution of the hospital industry, understanding the complicated and challenging prospective payment environment in which the hospital operates, and designing and implementing a cost accounting system to facilitate hospital management's operating decisions, strategic thinking, performance assessment, and financial management.

## **TEACHING OBJECTIVES**

This teaching note provides a teaching plan for teaching Code Blue in a required MBA accounting class. We use the novel to introduce a twelve-class module on strategic cost management and performance assessment. Our primary teaching objectives are:

1. To give students an understanding of the importance of the role cost systems play in strategic thinking and in helping companies navigate their strategic direction;
2. To provide a forum to discuss the importance of cost systems in service industries; and
3. To introduce cost concepts we will cover in the module on strategic cost management and performance assessment, such as cost behaviors, standard costing, target costing, product costing, activity thinking and activity-based costing, budgeting, variance analysis, and performance measurement and assessment.

## **SUGGESTED STUDENT ASSIGNMENT**

### **Day 1**

1. Describe the evolution of the hospital industry from the early 1900's until 1980.
2. Describe the payment system in place prior to 1980.
  - (a) What incentives did this system provide the hospital?
  - (b) How did the hospital make or lose money under this system?

- (c) What cost information did the hospital need under that payment system? Did the hospital's costing system provide that information?
3. What major changes took place in the hospital industry after 1980?
4. Describe the new DRG payment system implemented in the early 1980's. Describe the new capitation payment system.
  - (a) What incentives did each system provide the hospital?
  - (b) How did the hospital make or lose money under each system?
  - (c) What cost information did the hospital need under each payment system? Did the hospital's costing system provide that information?

## **Day 2**

1. How might the inadequacies of the existing costing system have contributed to the financial difficulties of Peter Brannan Hospital?
2. Imagine yourself as the new interim administrator of Peter Brannan Hospital. In your search for more timely and relevant information to facilitate hospital managers' decision-making, what types of cost information would you want, why would you want it, and how difficult and/or costly will it be to obtain? In designing your system, review Supplements 1-10, and 13.
3. For Supplement 10, be prepared to explain how the total standard cost for Procedure 1, shown in Table 9 of Supplement 10, was determined. For Supplement 13, be prepared to explain how the total standard cost for DRG 1, shown in Table 3 of Supplement 13, was determined.
4. Identify the key management decisions for which costing information in the new system you propose will be useful.

## **TEACHING STRATEGY**

We teach this book over two 85-minute class periods. The primary focus of Day 1 is to develop an understanding of the evolution of the hospital industry and payment systems for hospital services, and how the change in payment systems has led to different behaviors and different needs for cost information to facilitate decision-making by hospital managers. The primary focus of Day 2 is to identify the inadequacies of the existing costing system at Peter Brannan Hospital and to design a new costing system intended to provide hospital administrators with timely and relevant management information.

We suggest that the discussion proceed in the order of the assignment questions. Suggested times for discussion are included with each question.

### **Day 1**

1. Describe the evolution of the hospital industry from the early 1900's until 1980 (assignment question 1). [15 minutes]

The purpose of this question is for students to understand how the hospital industry evolved up to 1980. This evolution is critical to understanding why cost-based reimbursement was in place. It also provides a foundation to understanding that the hospital's cost system met the needs of the industry at the time.

In the early 1900's, most hospitals were not-for-profit organizations run by charitable organizations. They originated as "poor houses" intended to take care of the poor as they became sick or were dying. Cost-based reimbursement originated as a way to support this social consciousness. The first Blue Cross organization chose cost-based reimbursement to protect these hospitals from financial risk.

Throughout the 20<sup>th</sup> century, technological improvements increased hospitals' ability to care for their patients, enabled hospitals to provide better medical care, and helped increase life expectancy. In addition, population growth, especially in older populations, increased the demands on the hospital industry.

As part of the discussion, the instructor may want to encourage students to discuss the following reasons that costs are so high in the hospital industry.

- Lack of free market conditions – In a free market, there is an informed consumer that makes a purchase decision on the basis of price and quality and negotiates an arms-length price for the goods or services being purchased. These characteristics traditionally are not representative of the healthcare industry. First, the patient does not make the decision to purchase the services. That decision traditionally was made by the physician, or the provider of services. Second, the patient typically has not been informed about either price or quality of the services being received. Price information is not readily available in the industry, and the quality of service being rendered is not routinely measured in ways that patients can see or understand. Third, patients traditionally have not negotiated price in this industry. They typically are reluctant to negotiate price with the physician, who also is the provider of the potentially life-saving services. In addition, patients often view price of healthcare services as an indicator of the quality of those services, and the presence of 3<sup>rd</sup> party payers oftentimes reduce patients' price consciousness.
- Competition for physicians (i.e., the unique nature of the hospital's customer) – Physician referrals were the primary source of patients for the hospital. The more patients, the more money the hospital made. As a result, hospitals tended to view physicians as their customers, and a primary objective of the hospital was to attract physicians to its staff. Hospitals tried to accomplish this objective through increased prestige of the institution and increased income-generating opportunities for physicians. Hospitals tended to expend significant resources to attract physicians, including purchasing the latest technology, building large facilities, and allowing physicians to make decisions with minimal monitoring of the cost of services provided. In addition, ensuring enough capacity at all times for the physician to treat patients was critical to maintaining the income stream of the physician.
- Technology – Technological change in the healthcare industry can be rapid. The need for the latest technology in treating illness spurs capital investment. In addition, competition for physicians and patients leads hospitals to attempt to remain "leading edge." In addition, having the latest technology increased the reputation of the hospital. Furthermore, capital investment was paid on a cost-plus basis by Medicare and many Medicaid organizations and insurance companies until the early 1990's, so keeping pace with technology was financed substantially by this reimbursement mechanism. Finally, when cost reimbursement was not applicable, price was relatively inelastic, so increases in fixed costs associated with improved technology could be recovered by increasing the price of services.
- Duplication – Several hospitals in the same area might have the same expensive equipment and similar facilities. Again, competition for physicians led hospitals to strive for bigger size and breadth of facilities and equipment. In addition, larger facilities (i.e., more beds) typically meant



larger salaries for hospital administrators, and often, a better reputation for the hospital itself. Finally, cost-plus reimbursement and price inelasticity contributed to this duplication.

- Disparate information – Information related to the price of healthcare services traditionally has not been widely available to patients. They placed their trust in their physicians to make purchase decisions for them; demand was relatively price inelastic; and third-party payers often paid for the cost of the services provided. In addition, information related to the quality of healthcare services traditionally has not been available to patients.
- Price inelasticity – Price elasticity is the sensitivity of demand for goods and services to the price of those goods and services. When demand is price sensitive, there is an incentive for companies to keep the price of the goods or services down to increase volume. This incentive also stimulates companies to decrease costs so that prices can be lowered as necessary. However, because most health-related services are essential either for the maintenance of health or the preservation of life, price is very inelastic for those services. Raising the price of necessary services typically does not deter the purchase of those services, just as lowering the price of services typically does not encourage patients to purchase more services than needed. Since demand is relatively inelastic, there are few incentives for providers to control costs. (The examples of the cholecystectomies and the brain operations in Chapter 9 provide a good illustration of the concept of price inelasticity).
- Incentives provided by payment mechanisms – A substantial portion of hospital services were paid under cost-based reimbursement. As a result, hospitals had few incentives to control costs, especially in the presence of other cost-increasing incentives discussed above. In addition, most services that were not paid under cost-based reimbursement were paid under billed charges. With billed charges, the hospital could make money as long as it billed more than its costs. Since price was relatively inelastic, as costs increased, hospitals could increase their billed charges to ensure profitability without reduction in demand.

2. Describe the payment system in place prior to 1980 (assignment question 2) [20 minutes].

(a) What incentives did this system provide the hospital?

See **Exhibit TN1** for analysis. We recommend that the instructor use the board to construct a chart similar to the table in **Exhibit TN1** to capture student responses to this question.

(b) How did the hospital make or lose money under this system?

See **Exhibit TN1** for analysis.

Two primary conclusions of this analysis in (a) and (b) are (1) cost-based reimbursement naturally resulted from the social approach to healthcare through 1980, and (2) that hospitals did not have to have sophisticated costs systems under cost-based reimbursement. Hospitals made money by admitting patients, and made more money by providing more services or increasing costs. The only way a hospital could lose money under this system was to not know its total costs and number of patients treated or to fail to submit them for payment. Little information was required to obtain payment, and the lack of incentive to control costs meant that little information was needed to support that objective.

(c) What cost information did the hospital need under this payment system? Did the hospital's costing system provide that information?

The cost system was part of the financial accounting system. It provided revenues and costs by department, and accumulated the number of patient days. Hospitals periodically submitted an estimate of their costs to 3<sup>rd</sup>-party payers (Medicare, Medicaid, and private insurance companies) for reimbursement (or reimbursement of costs plus a markup). At the end of a specified period (usually a year), actual costs were totaled and any over- (under-) payment was refunded (paid).

Beyond information regarding costs by department and patient days, the hospital needed little information from its cost system. With virtually no incentive to control costs, it had no need for the information.

A primary conclusion of this discussion is that the hospital cost system prior to 1980 met most of the needs of the hospital at the time. With cost-based reimbursement, there was little need to control costs, little need to be concerned about whether the hospital was providing unprofitable services, and little need for information to negotiate prices.

3. What major changes took place in the hospital industry post-1980? (assignment question 3) [10 minutes]

Early 1980's                      Implementation of prospective payment systems through DRG's

Late 1980's or so              Managed care and the implementation of capitation payment systems (can briefly discuss how managed care was an attempt to create an artificial market mechanism into the purchase of healthcare services, if desired)

4. Describe the new DRG payment system implemented in the early 1980's (assignment question 4) [20 minutes].

- (a) What incentives did this system provide the hospital?

See **Exhibit TN1** for analysis.

- (b) How did the hospital make or lose money under this system?

See **Exhibit TN1** for analysis.

- (c) What cost information did the hospital need under the DRG payment system? Did the hospital's costing system provide that information?

To obtain payment for services provided under the DRG payment system, the hospital must collect even less cost information than under cost-based reimbursement. It simply has to classify each patient into one diagnosis, and total the number of each diagnosis the hospital treats in the period.

However, in order to make money effectively, the information requirements are significantly greater under the two new systems than under cost-based reimbursement. Under the DRG payment system, the final product (or cost object) is the DRG. To make money, the hospital must admit patients for services where costs are lower than the fixed payment associated with the services. As a result, the

hospital needs to determine its cost for each diagnosis code and ensure it is providing services for which the cost is, on average, less than the fixed payment for that diagnosis code.

The cost system in place at the hospital could not determine cost per diagnosis code (information required under the DRG payment system to help ensure profitability). It only accumulated costs by department.

5. Describe the new capitation payment system (assignment question 4) [20 minutes].

(a) What incentives did this system provide the hospital?

See **Exhibit TN1** for analysis.

(b) How did the hospital make or lose money under this system?

See **Exhibit TN1** for analysis.

(c) What cost information did the hospital need under the capitation payment system? Did the hospital's costing system provide that information?

As with the DRG payment system, to obtain payment for services provided under the capitation payment system, the hospital must collect even less cost information than under cost-based reimbursement. To obtain payment under capitation, the hospital must simply know how many patients are covered under each contract each month.

Under the capitation payment system, the final product (or cost object) is an enrollee month for a specific employer. To make money, the hospital must either not admit patients or admit patients and keep the cost of services provided below the fixed payment per month per enrollee. As a result, the hospital needs to determine its cost for each admitted patient and ensure it is admitting patients for which the cost is, on average, less than the fixed payment received for that patient.

The cost system in place at the hospital could not determine cost per patient (information required under the capitation payment system to help ensure profitability). It only accumulated costs by department.

## Day 2

1. How might the inadequacies of the existing costing system have contributed to the financial difficulties of Peter Brannan Hospital? (assignment question 1) [10 minutes]

The hospital needs to have cost information by DRG and enrollee (the final products under the new prospective payment systems of DRG's and capitation). This information is needed to support strategic analysis and decisions such as:

- Pricing – The hospital is now bidding on fixed price contracts (both by DRG and capitated by enrollee) without knowing whether it is making money on individual services or on the contract in total.

- Service mix – The hospital is providing many different services without knowing whether it is making money on them. Knowledge of costs can help the hospital decide whether to discontinue providing some services, and where to focus cost reduction efforts.
- Cost control – There was not sufficient cost information to help focus cost control and cost reduction efforts.
- Performance measurement – Cost information was not sufficient to assist the hospital in evaluating the financial performance of departments, products and services, physicians, nurses, etc. and the hospital in total as it compares with competitor hospitals.
- Budgeting and resource allocation – Cost information was not sufficient to help the hospital with forecasting resource needs for future periods, and help the hospital allocate resources to the most profitable areas.

Examples of where a better cost system could have made a difference include:

- Identification of fraud in pharmacy by detecting unusual use of materials in that department.
- Competitive bidding to result in profitable contracts.

2. Imagine yourself as the new interim administrator of Peter Brannan Hospital. In your search for more timely and relevant information to facilitate hospital managers' decision-making, what types of cost information would you want, why would you want it, and how difficult and/or costly will it be to obtain? (assignment question 2) [50 minutes]

The new interim hospital administrator must install a cost accounting system within sixty days that will accurately report product and service cost in accordance with the agreement with Park City State Bank. In addition, the agreement also requires Peter Brannan Hospital to submit a business plan to the bank within thirty days that shows how the hospital plans to compete profitably in the new healthcare environment, to reach a breakeven position within ninety days, and to consistently achieve an operating margin of at least 3 percent of gross revenue within 120 days. These are extremely difficult challenges, and meeting them successfully will require the development of a lot of new financial information, numerous good management decisions, considerable cost reduction, and probably some unexpected additional sources of revenue.

In assessing the interim hospital administrator's need for more timely and relevant cost information, three major objectives must be addressed. First, obtaining information that will enable the hospital to achieve breakeven operations within ninety days. Second, obtaining information that will facilitate informed operating decisions. And third, obtaining information that will provide the basis for sound strategic decisions that will enable the hospital to compete successfully in the future. Therefore, the cost accounting system must meet management's needs with respect to both short-term operating decisions and long-term strategic decisions.

Due to the very limited time that the hospital has to reach operating breakeven, the interim administrator would be well advised to apply the Pareto principle: 80 percent of what you care about is determined by 20 of what you do. In this particular situation, the Pareto principle suggests that about 80 percent of the hospital's cost results from about 20 percent of its activities. Although the hospital probably engages in hundreds of activities, the interim administrator should concentrate on the forty or fifty most significant activities as identified by key professional and administrative personnel. Once this has been done, the costs associated with these activities need to be determined. Such an approach will identify alternatives for short-term cost reduction and will begin the process of collecting and analyzing

costs by activities rather than by department or by function as is presently being done to meet the needs of the hospital's financial accounting system. In essence, this will be the start of the development of an activity-based costing system.

The interim administrator also needs to understand the cost behavior of the hospital's major costs. The novel suggests that the majority of costs are fixed rather than variable. This perspective should be substantiated so that logical cost reductions and cost management decisions can be made. Such decisions will be strengthened by associating the cost behaviors with the activities causing the costs. One of the primary needs of hospital management is the ability to identify what it costs to provide the wide variety of products and services that are offered to patients and other customers. Such information will improve operating decisions and will provide a sound basis on which to formulate a business strategy that will enable the hospital to compete successfully on both profitability and social dimensions despite the increasingly competitive and rapidly changing healthcare environment. Strategy formulation will require an understanding of the true relevant costs associated with competing in a healthcare industry where managed care and prospective payment systems have shifted a great deal of financial risk to the healthcare providers. Without question, the need for a sound cost accounting system in this environment is considerably greater than had existed in the previous cost-reimbursement environment.

Although it is premature at this point to specify in detail what the new costing system will entail, there are several important attributes that should be incorporated into its design. First, it should be a standard costing system that provides the standard costs associated with specified cost objects such as DRGs. Actual costs should be collected in a flexible and cost effective manner, and may well be done through a combination of approaches that could include process, job-order and activity-based frameworks. The important point here is to know when and where detailed costing information is needed and when and where it isn't. Too much detail/complexity will doom the system to failure. Second, the costing system should be primarily activity based to allow for flexibility in determining the costs associated with a variety of cost objects, some of which will change. Here again it is important to limit the number of activities being costed. By viewing its operations as consisting of multiple activities, management can seek to identify nonvalue-added activities and desirable process improvements. And third, the costing system should provide sufficient information so that management can make informed decisions in three critical areas: pricing, cost management, and strategic planning. It is clear that where pricing flexibility exists, it must be done with the knowledge of associated costs. It is also clear that continual cost management will be required to compete successfully in an industry that has gone from cost-based pricing to price-based costing (i.e., target costing). Finally, management must have accurate cost data in order to engage in an effective strategic planning process. In other words, management needs strategic cost information. The hospital will need to decide which products and services it will and will not offer. In order to succeed, these decisions can only be made if management has access to timely and accurate cost information.

Having identified the information that should be provided by the cost accounting system and why this information is needed, the remaining issue pertains to the actual implementation of the system. How difficult and how costly will it be? The answer to this question depends primarily on two key factors, one which management can control and one which management can only influence. The part that management can control pertains to the overall complexity of the system. If management follows the Pareto principle, and limits the number of activities when designing the system, then its cost should not present a financial concern. The part over which management can only exert influence pertains to how receptive and supportive the professional and administrative staff will be of the system. If they embrace the need for it and cooperate in its development and implementation, then the system will not create substantial difficulties or costs. If they don't, then both the difficulties and the costs go up considerably. Thus, management needs to pay close attention to the implementation process and be pro-active in gaining support for the new system.

3. For Supplement 10, be prepared to explain how the total standard cost for Procedure 1, shown in Table 9 of Supplement 10, was determined. For Supplement 13, be prepared to explain how the total standard cost for DRG 1, shown in Table 3 of Supplement 13, was determined. (assignment question 3) [15 minutes]

The standard cost for procedure 1, shown in Table 9 of Supplement 10, is as follows:

|  |                    | Nursing         | Lab            | X-ray          | P.T.           | O.R.           |
|--|--------------------|-----------------|----------------|----------------|----------------|----------------|
| Direct Material (a)                      | Table 1, Suppl. 10 | 34.00000        | 12.00000       | 12.00000       | 4.00000        | 3.00000        |
| Direct Labor (variable portion only) (b) | Table 6, Suppl. 9  | 50.00000        | 24.00000       | 30.00000       | 30.00000       | 5.00000        |
| Department Overhead (c)                  | Table 3, Suppl. 10 | 39.28571        | 10.20408       | 13.95349       | 18.00000       | 0.29851        |
| General Overhead (d)                     | Table 8, Suppl. 10 | <u>13.63764</u> | <u>1.40649</u> | <u>1.65344</u> | <u>4.62986</u> | <u>0.10680</u> |
| Total Standard Cost                      | Table 9, Suppl. 10 | \$136.92336     | \$47.61057     | \$57.60693     | \$56.62986     | \$8.40531      |

- (a) Information taken from invoices.  
 (b) Calculate variable direct labor cost per RVU, then calculate variable direct labor cost per procedure based on RVU's per procedure

For Nursing for procedure 1:

|   |                                    |         |                   |
|---|------------------------------------|---------|-------------------|
|   | Variable direct labor cost per RVU | \$50.00 | Table 5, Suppl. 9 |
| x | RVU's per procedure                | 1       | Table 1, Suppl. 9 |
| = | Variable direct labor for nursing  | \$50.00 | Table 6, Suppl. 9 |

- (c) Determine an allocation rate for department overhead (here, fixed direct labor cost only) per RVU, then allocate to procedure based on RVU's per procedure (Table 1, Supplement 9).

*Note that the text erroneously uses monthly fixed costs (e.g., \$1,100,000 fixed direct labor costs for the nursing department) and annual RVU volumes (e.g., 28,000 RVU's for the nursing department) to determine an allocation rate per RVU, instead of annual fixed costs and annual RVU volumes. However, since the tables throughout Supplement 10 build on this calculation, we acknowledge the errors in the calculation but use numbers as presented in the text, to facilitate following the numbers throughout the tables in the Supplement. In addition, the text is unclear as to whether the amount for general overhead that is used in the calculation of an allocation rate for general overhead per RVU in part (d) below represents an annual or monthly amount. For reasons similar to those stated above, we use the numbers as presented in the text.*

For Nursing for procedure 1:

|   |  |             |                    |
|---|--|-------------|--------------------|
|   | Fixed direct labor cost for department | \$1,100,000 | Table 5, Suppl. 9  |
| ÷ | Departmental RVU's                     | 28,000      | Table 3, Suppl. 9  |
| = | Allocation rate per RVU                | \$39.28571  | Table 2, Suppl. 10 |
| x | RVU's per procedure                    | 1           | Table 1, Suppl. 9  |
| = | Department overhead per procedure      | \$39.28571  | Table 3, Suppl. 10 |

- (d) Determine an allocation rate for general overhead per RVU, then allocate to procedure based on RVU's per procedure (Table 1, Supplement 9).

For Nursing for procedure 1:

|   |                                 |            |                    |
|---|---------------------------------|------------|--------------------|
|   | General overhead for department | \$381,854  | Table 6, Suppl. 10 |
| ÷ | Departmental RVU's              | 28,000     | Table 3, Suppl. 9  |
| = | Allocation rate per RVU         | \$13.63764 | Table 7, Suppl. 10 |
| x | RVU's per procedure             | 1          | Table 1, Suppl. 9  |
| = | General overhead per procedure  | \$13.63764 | Table 8, Suppl. 10 |

The standard cost for DRG 1 was determined in Supplement 13 as follows. First, identify the departments that participate in treating patients diagnosed with DRG1. Second, identify the procedures performed in each department. Third, identify the standard cost for each procedure, as illustrated above for procedure 1. Finally, multiply the standard cost of each procedure by the number of each procedure performed, and sum to get the total standard cost for DRG1. Table 3 in Supplement 13 illustrates this process.

4. Identify the key management decisions for which costing information in the new system you propose will be useful. (assignment question 4) [10 minutes]

The key management decisions for which costing information in the new system should facilitate decisions about the following:

- Pricing – The hospital should be able to use the cost information to set prices when it bids on fixed price contracts (both by DRG and capitated by enrollee) so that it is making money on individual products and on the contract in total.
- Service mix – The hospital should be able to use the cost information to gauge whether it is making money on different types of services. Knowledge of costs can help the hospital decide whether to discontinue providing some services, and where to focus cost reduction efforts.
- Cost control – Good cost information should help the hospital focus cost control and cost reduction efforts (e.g., could implement *target costing* approach in response to DRG reimbursement). Clearly identifying its products and assigning costs to those products facilitates cost control efforts. The hospital can use a target costing approach to striving for profitability on those products where price is fixed and not negotiable (DRG's). In addition, the hospital can evaluate its service mix by considering whether to provide services (DRG's) that it cannot, even after cost control efforts, offer profitably. It can evaluate its patient mix by considering whether to negotiate contracts with employers representing populations that are likely to be unprofitable to serve.
- Budgeting and resource allocation – Good cost information should help the hospital with forecasting resource needs for future periods, and help the hospital allocate resources to the most profitable areas.
- Performance measurement – Good cost information should assist the hospital in evaluating the financial performance of departments, products and services, physicians, nurses, etc. and the hospital in total as it compares with competitor hospitals. It can facilitate variance analysis to support decision-making and performance evaluation. Since the costing system is a standard

costing system, the hospital develops standards that facilitate budgeting and planning, and against which it can measure performance. It can calculate variances to isolate areas of concern and to determine areas of opportunity for performance improvement.



### Exhibit TN1

|                          | <b>Description</b>   | <b>Incentives provided</b>  | <b>How to make or lose money</b>   |
|--------------------------|--|---|--|
| Cost-based reimbursement | <ul style="list-style-type: none"> <li>• Hospital paid based on costs of services provide</li> <li>• Risk of cost overruns assumed by payer of services</li> <li>• Traditional payment system for Medicare, and some Medicaid and Blue-Cross organizations</li> </ul>  | Admit patients<br>Provide more services<br>Increase costs<br>No incentive for cost control  | <ul style="list-style-type: none"> <li>• To make money: Admit patient</li> <li>• Can make more money by providing more services or increasing costs (if it receives a markup)</li> <li>• The only way to lose money is not to know your costs or to fail to submit them for payment</li> </ul>   |
| DRG's                    | <ul style="list-style-type: none"> <li>• Hospital paid fixed payment for each DRG (diagnosis)</li> <li>• Risk of cost overrun assumed by provider of services</li> <li>• Used by Medicare, some Medicaid and private insurance organizations</li> <li>• Impetus for installation of some hospital cost accounting systems</li> </ul> | <ul style="list-style-type: none"> <li>• Decrease costs (or increase efficiency)</li> <li>• Decrease length of stay (quality implications?)</li> <li>• Shift care to less costly setting, such as home health (quality implications?)</li> <li>• Upcode to higher priced DRG's</li> <li>• Allocate costs or shift care to non-inpatient setting (still cost-reimbursed), or get more patients not under DRG's</li> <li>• Think strategically about service mix and pricing</li> </ul> | <ul style="list-style-type: none"> <li>• To make money: admit patients for services where costs are lower than fixed payment</li> <li>• Can make more money by decreasing costs (e.g., decreasing LOS, services provided), increasing efficiencies, changing service mix to more profitable services, or negotiating (where possible, but limited) fixed payments higher than costs</li> <li>• Can lose money by offering services where costs exceed payment</li> </ul>                                     |
| Capitation               | <ul style="list-style-type: none"> <li>• Hospital paid fixed payment per enrollee per month to provide all agreed upon care for enrollee</li> <li>• Risk of cost overrun assumed by provider of services</li> <li>• First used by HMO's</li> </ul>   | <ul style="list-style-type: none"> <li>• Decrease costs (or increase efficiency)</li> <li>• Decrease length of stay (quality implications?)</li> <li>• Shift care to less costly setting, such as home health (quality implications?)</li> <li>• Provide insufficient care (quality implications?)</li> <li>• Keep patients well</li> <li>• Think strategically about service mix and pricing</li> </ul>  | <ul style="list-style-type: none"> <li>• To make money: don't admit patient or admit patient and keep costs lower than fixed payment</li> <li>• Can make more money by decreasing costs, changing patient mix to more profitable (healthy) patients, negotiating fixed rates higher than costs, or diagnosing problems early when treatment is less expensive</li> <li>• Can lose money by admitting patients, having patient mix of more unhealthy patients, providing more services than needed</li> </ul> |

## **PART II**

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### **UNDERSTANDING COSTS AND COST BEHAVIORS**

## FINEPRINT COMPANY (A), (B), and (C)

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### CASE SUMMARY

John Johnson, owner of FinePrint Company, is presented with several opportunities to consider: (1) whether to accept a one-time special printing order (the A case), (2) whether to outsource some of his printing to another printing company (the B case), and (3) whether to accept the one-time special order *and* outsource it to another printing company (the C case). In making his decision, he must consider the relevance of certain costs, the behavior of those costs, and the extent to which he has capacity constraints.

### TEACHING OBJECTIVES

This case series is a short, simple introduction to the basics of costs and decision making, exposing students to the following:

1. Cost behavior, including variable and fixed costs;
2. The concepts of contribution margin and breakeven;
3. The relevance of costs to decision making;
4. Opportunity costs; and
5. The impact of capacity constraints on decision making.

The three cases can be taught together in one 85-minute class session. Alternatively, the instructor may choose to use either the A or B case independently as part of a class that includes other material.

### SUGGESTED STUDENT ASSIGNMENT

#### The A case

1. FinePrint currently is operating at around full capacity: 150,000 brochures. Should Johnson accept the special order?
2. Assume that monthly printing capacity is 200,000 brochures, current monthly production is 150,000 brochures, and operating costs at the 150,000 level are as presented in case **Exhibit 1**. Also assume that this order would not affect any of FinePrint's current business with its regular customers. Should Johnson accept the special order?

#### The B case

Should FinePrint outsource 30,000 brochures to SmallPrint?

### The C case

If FinePrint could print the special order for Jenkins, should FinePrint outsource 25,000 brochures to SmallPrint?

## ANALYSIS

### The A case

Variable and fixed costs per unit (or per 100 brochures) at the current monthly production level of 150,000 brochures can be determined from the data in case **Exhibit 1**, as follows:

|  | Cost per<br>100<br><u>brochures</u> | Monthly costs<br>at 150,000<br><u>volume</u> |
|--|-------------------------------------|--|
| Manufacturing costs:                     |                                     |  |
| Direct material, variable                | \$4.00                              | \$6,000                                      |
| Direct labor, variable                   | 1.00                                | 1,500  |
| Direct labor, fixed                      | 2.00                                | 3,000  |
| Manufacturing overhead, variable         | 1.00                                | 1,500  |
| Manufacturing overhead, fixed            | <u>2.25</u>                         | <u>3,375</u>                                 |
| Total manufacturing costs                | \$10.25                             | \$15,375                                     |
| Nonmanufacturing costs:                  |                                     |  |
| Marketing, variable                      | \$1.00                              | \$ 1,500                                     |
| Marketing, fixed                         | 1.25                                | 1,875  |
| Corporate, fixed                         | <u>2.50</u>                         | <u>3,750</u>                                 |
| Total nonmanufacturing costs             | <u>\$ 4.75</u>                      | <u>\$ 7,125</u>                              |
| Total costs                              | \$15.00                             | \$22,500                                     |
| Variable manufacturing costs per unit    | \$6.00                              |  |
| Variable nonmanufacturing costs per unit | 1.00                                |  |
| Fixed manufacturing costs per unit       | 4.25                                |  |
| Fixed nonmanufacturing costs per unit    | \$3.75                              |  |

1. Should Johnson accept the special order?

The following analysis quantifies the impact of accepting the special order on revenues and costs of FinePrint.

Alternative 1: Do not accept special order; use the 25,000 capacity to produce normal brochures (status quo).

Alternative 2: Accept special order; produce 25,000 special-order and 125,000 normal brochures.

|                                     | Total<br>Alternative<br>1 | Total<br>Alternative<br>2 | Difference | The 25,000<br>Alternative<br>1 | The 25,000<br>Alternative<br>2 | Difference |
|-------------------------------------|---------------------------|---------------------------|------------|--------------------------------|--------------------------------|------------|
| Revenues                            | \$25,500                  | \$23,750                  | \$(1,750)  | \$4,250                        | \$2,500                        | \$(1,750)  |
| Variable costs:                     |                           |                           |            |                                |                                |            |
| Direct material, variable           | 6,000                     | 6,000                     |            | 1,000                          | 1,000                          |            |
| Direct labor, variable              | 1,500                     | 1,500                     |            | 250                            | 250                            |            |
| Manufacturing overhead,<br>variable | 1,500                     | 1,500                     |            | 250                            | 250                            |            |
| Marketing, variable                 | <u>1,500</u>              | <u>1,250</u>              | <u>250</u> | <u>250</u>                     | <u>0</u>                       | <u>250</u> |
| Total variable costs                | <u>10,500</u>             | <u>10,250</u>             | <u>250</u> | <u>1,750</u>                   | <u>1,500</u>                   | <u>250</u> |
| Contribution margin                 | 15,000                    | 13,500                    | (1,500)    | 2,500                          | 1,000                          | (1,500)    |
| Fixed costs:                        |                           |                           |            |                                |                                |            |
| Direct labor, fixed                 | 3,000                     | 3,000                     |            |                                |                                |            |
| Manufacturing overhead,<br>fixed    | 3,375                     | 3,375                     |            |                                |                                |            |
| Marketing, fixed                    | 1,875                     | 1,875                     |            |                                |                                |            |
| Corporate, fixed                    | <u>3,750</u>              | <u>3,750</u>              |            |                                |                                |            |
| Total fixed costs                   | <u>12,000</u>             | <u>12,000</u>             |            |                                |                                |            |
| Operating income                    | \$3,000                   | \$1,500                   | \$(1,500)  | \$2,500                        | \$1,000                        | \$(1,500)  |

Johnson should not accept the special order. Income would be \$1,500 lower if FinePrint accepts the special order. (It should be noted that because this is a one-time special order, FinePrint should make this decision considering much more than just the one-time financial impact. The implications for regular customers are likely the driving force behind this particular decision.)

Alternatively, we could approach the analysis in the following way. FinePrint has no excess capacity, so printing capacity is a constrained resource. FinePrint should choose the brochures with the greatest contribution margin.

Contribution margin per 100 brochures:

|                                  | <u>Current work</u> | <u>Special order</u> |
|----------------------------------|---------------------|----------------------|
| Revenues                         | \$17.00             | \$10.00              |
| Variable costs:                  |                     |                      |
| Direct material, variable        | \$4.00              | \$4.00               |
| Direct labor, variable           | 1.00                | 1.00                 |
| Manufacturing overhead, variable | 1.00                | 1.00                 |
| Marketing, variable              | <u>\$1.00</u>       | <u>—</u>             |
| Total variable costs             | <u>\$7.00</u>       | <u>\$6.00</u>        |
| Contribution margin              | \$10.00             | \$4.00               |

FinePrint should not accept the special order. It has a contribution margin of \$4.00 per 100 brochures versus \$10.00 per 100 brochures for the current work.

2. Assume that monthly printing capacity is 200,000 brochures, current monthly production is 150,000 brochures, and operating costs at the 150,000 level are as presented in case **Exhibit 1**. Also assume that this order would not affect any of FinePrint's current business with its regular customers. Should Johnson accept the special order?

Alternative 1: Do not accept special order; produce only 150,000 brochures (status quo).

Alternative 2: Accept special order; produce 175,000 brochures.

|                                     | Total<br>Alternative<br>1 | Total<br>Alternative<br>2 | Difference     | The 25,000<br>Alternative<br>1 | The 25,000<br>Alternative<br>2 | Difference     |
|-------------------------------------|---------------------------|---------------------------|----------------|--------------------------------|--------------------------------|----------------|
| Revenues                            | \$25,500                  | \$28,000                  | \$2,500        | \$0                            | \$2,500                        | \$2,500        |
| Variable costs:                     |                           |                           |                |                                |                                |                |
| Direct material, variable           | 6,000                     | 7,000                     | (1,000)        | 0                              | 1,000                          | (1,000)        |
| Direct labor, variable              | 1,500                     | 1,750                     | (250)          | 0                              | 250                            | (250)          |
| Manufacturing overhead,<br>variable | 1,500                     | 1,750                     | (250)          | 0                              | 250                            | (250)          |
| Marketing, variable                 | <u>1,500</u>              | <u>1,500</u>              |                | <u>0</u>                       |                                |                |
| Total variable costs                | <u>10,500</u>             | <u>12,000</u>             | <u>(1,500)</u> | <u>0</u>                       | <u>1,500</u>                   | <u>(1,500)</u> |
| Contribution margin                 | 15,000                    | 16,000                    | 1,000          | 0                              | 1,000                          | 1,000          |
| Fixed costs:                        |                           |                           |                |                                |                                |                |
| Direct labor, fixed                 | 3,000                     | 3,000                     |                |                                |                                |                |
| Manufacturing overhead,<br>fixed    | 3,375                     | 3,375                     |                |                                |                                |                |
| Marketing, fixed                    | 1,875                     | 1,875                     |                |                                |                                |                |
| Corporate, fixed                    | <u>3,750</u>              | <u>3,750</u>              |                |                                |                                |                |
| Total fixed costs                   | <u>12,000</u>             | <u>12,000</u>             |                |                                |                                |                |
| Operating income                    | \$3,000                   | \$4,000                   | \$1,000        | \$0                            | \$1,000                        | \$1,000        |

FinePrint should accept the special order. It generates additional income of \$1,000.

Note that students might be tempted to decline the special order because they observe either that (1) the \$10 price is less than the \$15 total cost per 100 brochures or (2) the \$10 price is less than the \$10.25 manufacturing cost per 100 brochures. But because the incremental profit at \$1,000 is greater than zero, FinePrint should accept the order.

The instructor may consider posing the following additional questions:

*Should FinePrint accept the order at \$6.50?* Because \$6.50 is less than the \$7.00 variable cost per 100 brochures for the current work, some students will say that FinePrint should not accept the order. But there are no variable marketing costs for the order, so the variable cost per 100 brochures for the order is \$6.00. Thus, FinePrint should accept the order even at \$6.50.

*At what price would FinePrint be indifferent about accepting the order?* \$1,500 additional costs per 100 brochures/(25,000/100) units of 100 brochures = \$6.00. (This is equivalent to the \$6.00 variable cost per 100 brochures for the order.)

### The B case

Should FinePrint outsource 30,000 brochures to SmallPrint?

Alternative 1: Do not outsource 30,000 brochures (status quo).

Alternative 2: Outsource 30,000 brochures.

|                                     | Total<br>Alternative<br>1 | Total<br>Alternative<br>2 | Difference     | The 30,000<br>Alternative<br>1 | The 30,000<br>Alternative<br>2 | Difference     |
|-------------------------------------|---------------------------|---------------------------|----------------|--------------------------------|--------------------------------|----------------|
| Revenues                            | \$25,500                  | \$25,500                  | \$0            | \$5,100                        | \$5,100                        | \$0            |
| Variable costs:                     |                           |                           |                |                                |                                |                |
| Direct material, variable           | 6,000                     | 4,800                     | 1,200          | 1,200                          | 0                              | 1,200          |
| Direct labor, variable              | 1,500                     | 1,200                     | 300            | 300                            | 0                              | 300            |
| Manufacturing overhead,<br>variable | 1,500                     | 1,200                     | 300            | 300                            | 0                              | 300            |
| Marketing, variable                 | 1,500                     | 1,500                     | 0              | 300                            | 300                            | 0              |
| Cost to outsource                   | <u>0</u>                  | <u>2,400</u>              | <u>(2,400)</u> | <u>0</u>                       | <u>2,400</u>                   | <u>(2,400)</u> |
| Total variable costs                | <u>10,500</u>             | <u>11,100</u>             | <u>(600)</u>   | <u>2,100</u>                   | <u>2,700</u>                   | <u>(600)</u>   |
| Contribution margin                 | 15,000                    | 14,400                    | (600)          | 3,000                          | 2,400                          | (600)          |
| Fixed costs:                        |                           |                           |                |                                |                                |                |
| Direct labor, fixed                 | 3,000                     | 3,000                     |                |                                |                                |                |
| Manufacturing overhead,<br>fixed    | 3,375                     | 3,375                     |                |                                |                                |                |
| Marketing, fixed                    | 1,875                     | 1,875                     |                |                                |                                |                |
| Corporate, fixed                    | <u>3,750</u>              | <u>3,750</u>              |                |                                |                                |                |
| Total fixed costs                   | <u>12,000</u>             | <u>12,000</u>             |                |                                |                                |                |
| Operating income                    | \$3,000                   | \$2,400                   | \$(600)        | \$3,000                        | \$2,400                        | \$(600)        |

FinePrint should not outsource the 30,000 brochures. Outsourcing would cost \$600 more than not outsourcing.

Note that the \$8.00 offer from SmallPrint is less than FinePrint's \$10.25 total manufacturing costs per unit, so some students might be tempted to favor outsourcing. But the \$8 offer is more than FinePrint's \$6 variable manufacturing costs, so it is cheaper for FinePrint to print the brochures itself.

### The C case

If FinePrint could print the special order for Jenkins, should FinePrint outsource 25,000 brochures to SmallPrint?

Alternative 1: Do not accept the special order and do not outsource (status quo).

Alternative 2: Accept the special order for 25,000 and outsource 25,000 (produce 150,000, outsource an additional 25,000 at \$8 per 100, sell 150,000 at \$17 per 100, sell 25,000 at \$10 per 100).

|                                  | Total         | Total         |                | The 25,000  | The 25,000     |                |
|----------------------------------|---------------|---------------|----------------|-------------|----------------|----------------|
|                                  | Alternative   | Alternative   | Difference     | Alternative | Alternative    | Difference     |
|                                  | 1             | 2             |                | 1           | 2              |                |
| Revenues                         | \$25,500      | \$28,000      | \$2,500        | \$0         | \$2,500        | \$2,500        |
| Variable costs:                  |               |               |                |             |                |                |
| Direct material, variable        | 6,000         | 6,000         | 0              | 0           |                |                |
| Direct labor, variable           | 1,500         | 1,500         | 0              | 0           |                |                |
| Manufacturing overhead, variable | 1,500         | 1,500         | 0              | 0           |                |                |
| Marketing, variable              | 1,500         | 1,500         | 0              | 0           |                |                |
| Cost to outsource                | <u>0</u>      | <u>2,000</u>  | <u>(2,000)</u> | <u>0</u>    | <u>(2,000)</u> | <u>(2,000)</u> |
| Total variable costs             | <u>10,500</u> | <u>12,500</u> | <u>(2,000)</u> | <u>0</u>    | <u>(2,000)</u> | <u>(2,000)</u> |
| Contribution margin              | 15,000        | 15,500        | 500            | 0           | 500            | 500            |
| Fixed costs:                     |               |               |                |             |                |                |
| Direct labor, fixed              | 3,000         | 3,000         |                |             |                |                |
| Manufacturing overhead, fixed    | 3,375         | 3,375         |                |             |                |                |
| Marketing, fixed                 | 1,875         | 1,875         |                |             |                |                |
| Corporate, fixed                 | <u>3,750</u>  | <u>3,750</u>  |                |             |                |                |
| Total fixed costs                | <u>12,000</u> | <u>12,000</u> |                |             |                |                |
| Operating income                 | \$3,000       | \$3,500       | \$500          | \$0         | \$500          | \$500          |

FinePrint should outsource and take the special order, which would generate \$500 of additional operating income.

Note that this is the same as adding the \$1,000 relevant profit from the special-order analysis in the A case to the \$1,500 costs in the “Make” column from the outsourcing analysis in the B case. (The \$1,000 profit from the special order is an opportunity cost—it is profit forgone by not outsourcing.)

## TEACHING STRATEGY

I generally use the three-case series as an introduction to the basics of costs and decision making. Using all three cases together poses a number of alternative scenarios for students to consider. This repetition and slight varying of circumstances help to cement the concepts of cost behavior, contribution margin, breakeven, relevant costs, opportunity costs, and capacity constraints so that the class can move forward in the management-accounting course with a firm grasp of these topics. Students are assigned the A and B cases before class and asked to analyze the two cases separately. Once those cases have been discussed in class, the instructor can hand out the C case, which asks students to consider the A and B cases as two opportunities that can be evaluated together.

### The A case

The instructor can start the class by asking the students to summarize the decision Johnson must make. I try to encourage the students to define the alternatives available to him. In the first assignment question for the A case, alternative 1 is to reject the special order and use the 25,000 capacity to produce normal brochures (status quo); alternative 2 is to accept the special order and produce 25,000 special-



order and 125,000 normal brochures. I find it helpful for the students to articulate these alternatives precisely. Because the discussion eventually moves on to the topic of relevant costs—and we define relevant costs as costs that differ between alternative courses of action—our having precisely articulated the alternatives helps the students see the issue of cost relevance more easily.

Once the alternatives are clear, the instructor can ask a student to state his or her recommendation and to present an analysis to support the recommendation. That analysis generally looks something like the first table above in the analysis for assignment question 1. In discussing the analysis, the instructor should ensure that students talk about variable costs, fixed costs, and relevant costs. Then, the instructor can suggest that the class also view this as a question of how to best use a constrained resource, and can suggest an analysis similar to that in the second table above in the analysis for assignment question 1. Here, students should conclude that Johnson should choose the alternative that yields the highest contribution per unit of constrained resource, or highest contribution per brochure.

Next, the instructor should pose assignment question 2, and ask the class to articulate precisely the alternatives available to Johnson. In this assignment question, alternative 1 is to reject the special order and produce only 150,000 normal brochures (status quo); alternative 2 is to accept the special order and produce 175,000 brochures (25,000 special-order and 150,000 normal brochures). Then, the instructor can ask a student to state his or her recommendation and to present an analysis to support the recommendation. That analysis generally looks something like the first table above in the analysis for assignment question 2. The discussion here should include the concept of opportunity costs. Once the analysis is complete, the instructor can pose the additional questions listed above in the analysis section. These questions provide the opportunity to discuss the concept of breakeven.

### **The B case**

At this point, the instructor can shift the discussion from the A to the B case. (I ask students to consider the opportunity for outsourcing, presented in the B case, without the opportunity for the special order, presented in the A case.) Again, the instructor can pose the assignment question for the B case, and ask the class to articulate precisely the alternatives available to Johnson. Here, alternative 1 is to reject the outsourcing opportunity for the 30,000 brochures (status quo); alternative 2 is to accept the outsourcing opportunity for the 30,000 brochures. Then, the instructor can ask a student to state his or her recommendation and to present an analysis to support the recommendation. That analysis generally looks something like the first table above in the analysis for the assignment question for the B case.

### **The C case**

Once discussion of the B case is complete, the instructor should hand out the C case, allow the class time to read it, and then pose the assignment question for the C case. By now, students should recognize the need to articulate precisely the alternatives available to Johnson, make a recommendation, and support it with an analysis similar to that presented in the table above in the analysis for the assignment question for the C case.

Finally, the discussion should conclude with a summary of the primary concepts covered. Those concepts include cost behavior, variable costs, fixed costs, relevant costs, breakeven, opportunity costs, and constrained resources.

# SPARTA GLASS PRODUCTS

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## CASE SUMMARY

Christina Matthews, the product manager for nonglare glass at Sparta Glass Products (SGP), is considering the possibility of lowering SGP's price of nonglare glass to a level consistent with the rest of the industry. Three quarters ago, under corporate pressure to improve margins, Matthews increased the price by slightly less than 10 percent. She expected competitors to follow her lead; unfortunately, they did not. The price differential has resulted in a steady erosion of SGP's market share. Although a return to the competitors' price level would reverse the decline in market share, it would also put the price below the fully allocated total cost for producing nonglare glass at the forecasted sales level.

## TEACHING OBJECTIVES

Sparta Glass Products can be used as an introduction to a module on decision analysis or a module on competitive analysis with the following objectives:

1. To question the underlying (and often implicit) assumptions of an analysis;
2. To introduce the idea of reflexive reasoning (i.e., conducting an analysis from a competitor's point of view) and to recognize that the information necessary for that analysis can be reasonably estimated;
3. To use a decision diagram to summarize and structure the various alternatives and consequences of a decision and to recognize that, among other things, a decision depends on the decision maker's assessment of the uncertain future and tolerance for risk;
4. To introduce/review the concept of relevant costs, to understand the impact of not distinguishing between fixed and variable costs, and to appreciate the need to get behind the numbers and understand their underlying assumptions; and
5. To suggest that an appropriate role for a useful analysis is to have framed the issues better and, as a result, to have raised insightful questions, possibly more than the number of answers provided.

## SUGGESTED STUDENT ASSIGNMENT

Preparation questions for the case require special care because the extent to which students challenge their own analyses is one of the learning points. As a result, assignment questions that expand a student's perspective on the situation (e.g., "How do you expect the competition to react to your price?") should be avoided as they might preclude this objective. Preparation that adopts a narrow, myopic perspective is not a problem. Any analyses that students fail to conduct as part of their preparation can be addressed easily in the class discussion.

An assignment, however, that clearly focuses student attention on the alternative prices of \$2.36 and \$2.15 is advisable. The U-shaped cost structure seems to entice some students (generally those with

backgrounds in economics) into analyses that attempt to optimize profits by selecting intermediate prices. Such analyses require a demand function for which the case provides no information. Most students assume a linear demand function and use the fully allocated costs. These assumptions lead to a rich but incorrect analysis that only distracts the class from the teaching points of the case. The following assignment question is suggested:

*Focusing just on the prices discussed by Christina Matthews and Robert Alexander, which price would you recommend, \$2.15 or \$2.36?*

## ANALYSIS

On the basis of the costs presented in case **Exhibit 2**, a price of \$2.36 shows a profit; a price of \$2.15 shows a loss (as suggested by the controller).

|                       |            |            |
|-----------------------|------------|------------|
| Price                 | \$2.36     | \$2.15     |
| Sales volume          | 150,000 sf | 275,000 sf |
| Total cost (per unit) | \$2.34     | \$2.29     |
| Profit (per unit)     | \$0.02     | \$(0.14)   |
| Profit                | \$3,000    | \$(38,500) |

Note that this analysis (and all subsequent ones) assumes that there is no cannibalization of the SGP's untreated glass sales as a result of increases in nonglare glass sales and that the production of nonglare glass is independent of other SGP products due to the specialized nature of the nonglare process and the small volumes involved.

An examination of the elements of the total cost suggests that several of these costs do not, in reality, vary with the volume changes anticipated by the different prices for nonglare glass. Specifically, the fixed costs would be the following (even though the latter three have been allocated as if they were variable):

- depreciation (approximately \$40,000 at all volumes);
- fixed manufacturing overhead (supervision, insurance, and quality);
- corporate overhead (purchasing, security, and data process); and
- selling and administration (sales force is on salary).

As a result, the above profit analysis is flawed in that the total cost per unit includes fixed costs that have been allocated in a fashion that treats them as if they were variable. At a volume of 275,000 sf, the total "cost" of the three "badly allocated" fixed costs is \$275,000; at a volume of 150,000 sf, the total cost for the same four fixed costs is only \$147,000. Consequently, the high-volume (lower-price) alternative is "over-charged" for these costs, which do not change with volume. For the previous four quarters, average quarterly sales were approximately 200,000 sf. Because SGP updates its inter-divisional transfer prices on a quarterly basis, the overhead allocations might be revised on the same schedule. If so, the 200,000 sf figure would be the basis for the current allocations, and the fixed costs could be estimated to be \$226,000 ( $\$.21 \times 250,000 + \$.17 \times 250,000 + \$.11 \times 250,000 + \$.64 \times 250,000$ ).

A more appropriate comparison of the two alternative prices would be based on contribution—the difference between the selling price and the total variable cost. The variable costs are direct material, direct labor, variable manufacturing overhead, and shipping.

|                          |            |            |
|--------------------------|------------|------------|
| Price                    | \$2.36     | \$2.15     |
| Sales volume             | 150,000 sf | 275,000 sf |
| Variable cost (per unit) | \$1.09     | \$1.14     |
| Contribution (per unit)  | \$1.27     | \$1.01     |
| Contribution             | \$190,500  | \$277,750  |

This analysis would suggest that SGP would be better off lowering its price to \$2.15, contrary to the earlier analysis but consistent with the observation that the allocation system is “over-charging” the high-volume alternative. It is interesting to note that if the fixed costs are indeed \$226,000, SGP would in fact show a loss at a price of \$2.36 and a profit at a price of \$2.15. This analysis directly contradicts the analysis based on fully allocated costs.

Although it is reasonable to assume that Corporate Overhead and Selling and General Administration Cost are predominately fixed costs, they may not be totally fixed. If ten percent of these costs were variable, the contribution per unit would be reduced by \$0.08, but the contribution at \$2.15 would still be larger than the contribution at \$2.36 (\$255,750 compared to \$178,500). For the decision to change, unit contribution would have to be reduced by \$0.70, the solution to the equation.

$$150,000 \times (\$1.27 - X) = 275,000 \times (\$1.01 - X).$$

This is equivalent to the unlikely situation of approximately 90 percent of Corporate Overhead and Selling and General Administration Cost being variable.

Similar thinking would suggest that some of the costs assumed to be variable may have fixed components to them. Shipping is a clear possibility because SGP has its own fleet of delivery vehicles. Reductions in the variable cost will reinforce the attractiveness of the high-volume alternative—the price of \$2.15.

If Matthews’s sales forecast at \$2.15 is a little optimistic (say, SGP would actually sell 250,000 sf), the total contribution is \$260,000; if her sales forecast at \$2.36 is a little pessimistic (say, SGP would actually sell 175,000 sf), the total contribution would be \$225,750. The recommendation of lowering the price to \$2.15 is not sensitive to such forecasting errors. Another way to address the uncertainty in the sales forecasts is to find the sales volume at \$2.36 that would make that price as attractive as a price of \$2.15. This breakeven figure is 218,700 sf ( $277,750/1.27$ ), or 24 percent of the market. This percentage is larger than SGP’s current share and, as a result, would not be attainable without a shift in competitor behavior.

An implicit assumption in these analyses is that the competitors will keep their price at \$2.15, if SGP holds its price at \$2.36. The case suggests that the competitors are suffering from the effects of a long recession and that several are in financial straits. Even though they have not met SGP’s price for the last three quarters, pressure may be mounting, and they may do so in the near future but only if SGP holds its price at \$2.36. Financial analyses from the competitors’ point of view offer some mild support for this conclusion.

Were SGP to stay at \$2.36, which price would be better for the competition? Let us assume that the competitors have the same cost structure as SGP (the technology has not been changing rapidly and is well diffused) and that price parity will result in SGP sales of 275,000 sf, the same sales volume that was forecasted for price parity of \$2.15. If the competitors are assumed to be monolithic, the following analysis can be conducted from the competitors' point of view:

|                                       |            |            |
|---------------------------------------|------------|------------|
| Competitors' price                    | \$2.36     | \$2.15     |
| Sales volume<br>(SGP's price, \$2.36) | 645,000 sf | 770,000 sf |
| Variable cost (per unit)              | \$1.12     | \$1.12     |
| Contribution (per unit)               | \$1.24     | \$1.03     |
| Competitors' contribution             | \$799,800  | \$793,100  |

If SGP holds its price at \$2.36, the economics suggest that the competitors may raise their price. The benefit is far from overwhelming and, given the fragmentation of the market, might not be perceived by the competitors. If the competitors' costs are higher (after all, they do operate at lower volumes), \$2.36 becomes more favorable, and conclusion is more viable. On the other hand, if the competitors fear that price parity with SGP will result in SGP recapturing the original market share of 35 percent, their contribution at \$2.36 would be \$741,520 ( $\$1.24 \times 65 \times 920,000$ ), which is less than the contribution at \$2.15. A competitors' volume of 639,597 sf ( $\$793,100 / \$1.24$ ), which is a market share of 70 percent, results in the two prices having the same contribution.

If SGP were to lower its price to \$2.15, one would expect that the competitors would not increase their price. Assuming that SGP would immediately recapture its original market share of 35 percent if the competitors raised their price to \$2.36, SGP sales would be approximately 325,000 sf. The competitors' perspective could be analyzed as follows:

|                                       |            |            |
|---------------------------------------|------------|------------|
| Competitors' price                    | \$2.36     | \$2.15     |
| Sales volume<br>(SGP's price, \$2.15) | 595,000 sf | 645,000 sf |
| Variable cost (per unit)              | \$1.12     | \$1.12     |
| Contribution (per unit)               | \$1.24     | \$1.03     |
| Competitors' contribution             | \$737,800  | \$664,350  |

Surprisingly, for these assumptions, the competitors should raise their price, even if SGP drops its price. This phenomenon is clearly short term. In the long term, such a price differential would lead to even larger SGP market shares, which would eventually make the price differential unsustainable for the competitors. The contribution at a price of \$2.36 would be less than \$664,350 (the contribution at \$2.15) for a sales volume of 535,766 sf ( $\$664,350 / \$1.24$ ). This figure is equivalent to an SGP market share of 42 percent  $[(920,000 - 535,766) / 920,000]$ , which could be achieved with a 10 percent price differential for a commodity.

The realization that competitors might raise their price suggests that SGP should calculate its contribution on the assumption that competitors would raise their price to \$2.36, and SGP would hold its price at \$2.36.

|   |            |
|---|------------|
| SGP's price<br>(Competitors' price, \$2.36) | \$2.36     |
| Sales volume                                | 275,000 sf |
| Variable cost (per unit)                    | \$1.14     |
| Contribution (per unit)                     | \$1.22     |
| Contribution                                | \$335,500  |

Because an industry-wide price of \$2.36 results in the largest contribution for both SGP and the competitors, it's the best of all possible worlds (for everyone but the customers)!

If the limitation of considering only the \$2.36 and \$2.15 prices is momentarily lifted, an "optimal SGP price" can be computed assuming a linear demand curve. SGP's contribution can be expressed as:

$$[\text{price} - \$1.12] \times [275,000 - (125,000/.21) \times (\text{price} - \$2.15)].$$

An optimal price of \$1.87 can be found by either trial-and-error or goal-seek with an electronic spreadsheet or by differentiation of the above expression. This is a rather myopic analysis because it ignores the reactions of both the competitors and the customers by assuming that the competitors' price remains at \$2.15 and that the total demand remains at 920,000 sf. In addition, the price is substantially below market prices and who knows what market instability might be provoked by adopting such a price-cutting stance. Regardless, it is a calculation that one might expect to see from someone in the class.

What price should Matthews recommend? The decision is influenced by several factors: her aversion to risk, the extent by which Matthews is motivated by corporate versus divisional performance, and her assessment of the competitors' future pricing. If she lowers the price to \$2.15, she can be guaranteed a contribution of \$277,750. If she holds the price at \$2.36, she could have a contribution of \$335,500 or a contribution of \$190,500, depending on whether or not the competitors increase their price to \$2.36. The competitors' actions are hard to predict. They have resisted a price increase for three quarters, but several are in "tight financial straits," but the economics of a price increase are not particularly compelling from their perspective. If she holds the price at \$2.36, the corporate reporting system will show a profit; at \$2.15, the system will show a loss. To the extent that her performance evaluation is driven by reported profits, she may be inclined to remain at the higher price even though it may not be in the corporate interest. Her decision depends on her assessment of the chances that the competitors will increase their price, on her willingness to accept the risk of having a substantially lower contribution in order to enjoy the possibility of a slightly higher contribution, and on the extent to which she is willing to challenge the corporate reporting system.

The influence of the competitors' pricing decision can be structured with a small decision diagram. The breakeven probability (ignoring any effects of risk) is .60 [the solution to the equation,  $\$277,750 = \$335,500 \times P + \$190,500 \times (1-P)$ ]. Does Matthews believe that there is better than a sixty-forty chance that the competitors will finally increase their price this quarter? Maybe not!

## TEACHING STRATEGY

*"After I reviewed the figures from the controller's office, it seemed that the decision is rather straightforward. We should hold the price at \$2.36!"*

This opening statement can be reinforced by actually doing the “fully allocated” cost analysis on the board. The discussion will immediately focus on the fact that some of the costs are fixed and some are variable. I try to keep the discussion from moving to the numbers too quickly and try to have the class articulate the effects without the figures. *“What difference does it make if they are fixed and variable?”*

*“Okay, let’s look at your analysis, but I really trust the controller’s office.”*

The first part of the discussion addresses the distinction between fixed and variable costs and how to tell the difference. I try to keep the discussion focused on what will actually happen to total cost as volume changes. The class should come to the conclusion that depreciation, fixed manufacturing overhead, corporate overhead, and selling and general administration expenses are fixed costs. *“How can you tell what’s a fixed cost and what’s a variable cost?”* I try to emphasize that you have to get behind the numbers and understand how they are composed because the reported numbers sometimes disguise the facts. The discussion can be concluded with the statement that you cannot tell from product unit cost statements which costs are fixed and which are variable. Depreciation per unit indeed decreases as volume increases (the behavior one would expect from a fixed cost), but selling and general administration costs per unit remain constant as volume increases (the behavior one would expect from a variable cost), even though they are clearly a fixed cost. The way the numbers appear in the financial statements depends on the method of allocation, not on whether the costs are fixed or variable. The point can be driven home by having someone point out that fixed manufacturing, corporate overhead, and selling and general administration cost are a total of \$147,000 at a volume of 150,000 units and \$275,000 at a volume of 275,000 units. It’s hard to explain this difference on the basis of the real cost behaviors in the situation.

The discussion should also focus on understanding why the fully allocated cost analysis results in a recommendation for keeping the price at \$2.36. It is important to establish the point that, by treating fixed costs as if they were variable, an analysis is biased against high-volume alternatives. This point can be reinforced by estimating what the fixed cost may be and comparing that value with the implicit values assumed by the fully allocated cost analysis.

The messages of this segment of the class can be reinforced by the questions *“Whose perspective are you adopting when you evaluate the pricing alternatives using fully allocated costs?”* *“From whose perspective does the contribution analysis make sense?”* The fully allocated costs would be used by the divisional manager. Through the allocation system, corporate is essentially telling the manager to cover all the costs. In addition, it would be reasonable to expect any incentive compensation for divisional managers to be based on the “total costs.” On the other hand, the contribution analysis would be used by corporate. Corporate would want to make sure that the total contribution from the divisions would cover corporate fixed expense. It is interesting that the ill-conceived allocation system motivates the Specialty Glass Division to behave contrary to corporate best interests.

*“What assumptions has this analysis made? How important are they?”*

The two key areas are the estimate of variable costs and the sales forecasts. Various sensitivity analyses can show that the decision is not sensitive to modest changes in these assumptions. *“We know the variable costs fairly accurately. What about the sales forecasts? What factors would you consider in making such a forecast? Why did we raise our price to \$2.36 in the first place?”* If a student has mentioned the “optimal SGP price” of \$1.87, you could ask, *“Why don’t we go down to \$1.87,”* with the hope that someone will observe that this might launch a price war. Regardless of how you go about it, the objective is to move the discussion to the behavior of the competition and then ask, *“Is there any*

*incentive for the competitors to alter their price? How can we better understand their point of view?"*  
The discussion then turns to the analysis of the competitors' decision (assuming SGP stays at \$2.36). If time is short, do not actually do the financial analysis from the competitors' point of view; rely on a qualitative argument to establish the possibility that the competitors may increase prices because of the growing financial pressure.

*"So it's in the competitors' interest to increase price. This is contrary to our earlier assumptions—we had better go back to our previous analysis. Do we want them at the higher price?"*

This analysis can be done quickly, and the class will realize that a market-wide price of \$2.36 is the best of all possible worlds. You might summarize the situation by pointing to the three possible outcomes facing Matthews: \$277,750 for sure, if she lowers the price; maybe \$335,500 or maybe \$190,500, if she holds the price.

*"It's time for everyone to commit themselves. Who would recommend \$2.15? Who would recommend \$2.36? Why?"*

The discussion should reveal that there are differences of opinion regarding the assessment of the chances of the competitors increasing their price and differences in the extent to which the corporate reporting system influences behavior. If you delve a little deeper, differences in attitudes toward risk (if Matthews holds at \$2.36 and the competitors do not increase price, she will have a contribution of under \$200,000). With these differences acknowledged, you can observe the need to have tools and languages that permit us to address these important components of every substantive decision we make and to communicate effectively the rationale behind our decision. You can also point out that, in competitive situations, we need to wear the hat of the competitors. Finally, you can observe that a beneficial result of useful analysis is the identification of insightful questions and that the number of questions raised may exceed the number of answers provided.



# **BLACKHEATH MANUFACTURING COMPANY**

**and**

## **BLACKHEATH MANUFACTURING COMPANY—REVISITED**

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### **CASE SUMMARY**

In the first case, Lee High, the newly hired cost accountant, computes the variable cost and the fixed cost per unit at a volume of 500 units of Great Heath per week. He uses this information to develop some guidelines for pricing. His boss, Charlton Blackheath, endorses the guidelines and adds a feature: a higher commission on sales at a higher price. When both High and Blackheath are away, the file clerk, Adelaide Ladywell, accepts an order below the guidelines and is fired. Students are asked to develop an appropriate set of decision rules for pricing Great Heath, and to evaluate the decision made by Adelaide Ladywell.

In the second case, the profits at Blackheath Manufacturing have been declining. The owner's son Trafalgar comes in to run the company and asks his consultant friend Crofton Brockley to examine the company to see what is wrong. After his analysis, Brockley concludes that Lee High's guidelines are all wrong, the company needs to develop a budgeting system to help determine actions to reverse the decline in profits, and Adelaide should be rehired. The case provides data for constructing a production and raw materials budget, flexible expense budget, income statement, balance sheet, and cash budget.

### **TEACHING OBJECTIVES**

These cases are fairly simple but remarkably comprehensive. To do all the required work probably takes an average student 4 to 5 hours. The cases concern these subjects:

1. The breakdown of costs into fixed and variable categories;
2. The development and usefulness of contribution margin;
3. Pricing strategies;
4. Budgeting of fixed and variable costs, including preparing a flexible expense budget; and
5. Preparing a budgeted income statement, balance sheet, and cash flow statement.

Since the two cases relate to each other, the teaching notes have been combined. The first case is focused mainly on product costing and its implications for pricing strategy, and the second case is focused mainly on budgeting and control.

### **SUGGESTED STUDENT ASSIGNMENT: BLACKHEATH MANUFACTURING COMPANY**

1. Develop an appropriate set of decision rules for pricing the Great Heath.
2. Evaluate the decision made by Adelaide Ladywell.

**SUGGESTED STUDENT ASSIGNMENT: BLACKHEATH MANUFACTURING COMPANY—REVISITED**

1. Develop a production budget, and budget for raw materials purchases.
2. Prepare a flexible expense budget using the format shown in the variable budget table in the case.
3. Prepare a projected income statement.
4. Prepare a cash budget.
5. Prepare a projected balance sheet.
6. Adelaide Ladywell, Crofton Brockley, and Trafalgar Blackheath will be meeting to discuss the material developed in questions 1 through 5. What points would be likely to dominate such a meeting? Why?
7. Using the information presented in the case regarding actual activity in January, prepare an analysis of the results.
8. How would net profit on the income statement change if Adelaide were to prepare the income statement under an assumption of variable costing?

**ANALYSIS: BLACKHEATH MANUFACTURING COMPANY**

1. Develop an appropriate set of decision rules for pricing the Great Heath.

Table TN1 provides detail on how Lee High put together his “Useful Data on Great Heath” in the case.

**Table TN1**  
Cost of Great Heaths

| <u>Manufacturing Cost</u>             | <u>Variable<br/>Cost</u> | <u>Fixed<br/>Cost</u> | <u>Cost of 500 units</u> |                 |
|---------------------------------------|--------------------------|-----------------------|--------------------------|-----------------|
|                                       |                          |                       | <u>Total</u>             | <u>Per Unit</u> |
| Direct materials                      | \$ .75                   | -                     | \$ 375                   | \$ .75          |
| Direct labor                          | 1.25                     | -                     | 625                      | 1.25            |
| Indirect labor                        | .20                      | \$ 100                | 200                      | .40             |
| Indirect material                     | -                        | 300                   | 300                      | .60             |
| Electricity                           | .10                      | 75                    | 125                      | .25             |
| Factory Insurance                     | -                        | 125                   | 125                      | .25             |
| Other overhead                        | <u>.50</u>               | <u>110</u>            | <u>360</u>               | <u>.72</u>      |
| Total                                 | \$ 2.80                  | \$ 710                | \$2,110                  | \$ 4.22         |
| <br><u>Administrative and Selling</u> |                          |                       |                          |                 |
| At \$7.00 price                       | <u>.70</u>               | <u>781</u>            | <u>1,131</u>             |                 |
|                                       | \$ 3.50                  | \$ 1,491              | \$ 3,241                 | \$ 2.26         |
| Total shown by Lee High               |                          |                       |                          | 6.48            |
| Added amount for rounding, etc.       |                          |                       |                          | <u>.12</u>      |
| Lee High’s stated total cost per unit |                          |                       |                          | \$ 6.60         |

In the long run, Blackheath must price Great Heath at a level sufficient to cover all its costs. Accordingly, decision rules #1 and #2 presented in the case seem reasonable at first glance for Blackheath's typical business. However, note that these decision rules do depend on expected volume (the rules presented in the case assume an average volume of 500 units per week), so they would change with any change in expected volume. In addition, these decision rules assume that there is sufficient capacity to handle all business won. If Blackheath encounters capacity constraints, it would have to revisit its decision rules to direct the sales representative and office sales staff to choose those orders that offer the highest contribution margin. Finally, if Blackheath has excess capacity, it may be beneficial to relax the rules to allow sales representatives more flexibility in lowering the price, as Blackheath may benefit from taking on additional work at greater than its variable costs but lower than its full cost of \$6.60 to use the excess capacity. The bottom line: the decision rules should depend on expected volume and capacity constraints.

2. Evaluate the decision made by Adelaide Ladywell.

Blackheath may want to review one-time special orders, such as the one with Maze Woolwich, on a case by case basis. If Blackheath has the capacity to handle a special order, it is beneficial to do so if the order is priced high enough to cover the variable costs associated with the order. Any contribution generated from the order can help Blackheath cover its fixed costs. Thus, for direct office sales, Blackheath should set a price greater than \$2.80. For sales by its sales representative, Blackheath should set a price greater than 3.11 (price – [2.80 – 0.10 x price] = 0, or price = 3.12). If Blackheath does not have the capacity to handle the special order, it should accept it only if the price less the sales commission on the special order is greater than the price less the sales commission on the regular business it must displace to accommodate the special order. Of course, Blackheath should consider qualitative factors in making its decision, including the impact of displacing its normal business to accommodate a special order to ensure there is no longer term impact on its regular business. These considerations may outweigh any financial analysis related to the special order itself.

The \$5.50 price per unit that Maze Woolwich requested is greater than the variable cost of \$2.80 per unit. In addition, there is no indication in the case that the Maze Woolwich order will impact Blackheath's ability to service its regular business. Thus, Adelaide Ladywell's decision to accept the special order seems justified.

**ANALYSIS: BLACKHEATH MANUFACTURING COMPANY—REVISITED**

1. Develop a production budget, and budget for raw materials purchases.

These schedules are based on the following relationships:

For the production budget:

|   |                              |
|---|------------------------------|
|   | Units in beginning inventory |
| + | Units produced               |
| = | Units available for sale     |
| - | Units sold                   |
| = | Units in ending inventory    |

For the budget for raw materials purchases:

|   |                                       |
|---|---------------------------------------|
|   | Units in beginning inventory          |
| + | Units purchased                       |
| = | Units available for use in production |
| - | Units used in production              |
| = | Units in ending inventory             |

|      | <u>Units of Finished Product</u> |               |                  |              |                | <u>Units of Raw Material</u> |                |             |                  |
|------|----------------------------------|---------------|------------------|--------------|----------------|------------------------------|----------------|-------------|------------------|
|      | <u>Beg Inv</u>                   | <u>Prod'n</u> | <u>Available</u> | <u>Sales</u> | <u>End Inv</u> | <u>Beg Inv</u>               | <u>End Inv</u> | <u>Used</u> | <u>Purchases</u> |
| Jan. | 750                              | 2,350         | 3,100            | 2,000        | 1,100          | 800                          | 700            | 2,350       | 2,250            |
| Feb. | 1,100                            | 2,050         | 3,150            | 2,200        | 950            | 700                          | 700            | 2,050       | 2,050            |
| Mar. | 950                              | 2,000         | 2,905            | 1,900        | 1,050          | 700                          | 700            | 2,000       | 2,000            |

2. Prepare a flexible expense budget using the format shown in the variable budget table in the case.

|              |                                    | <u>January</u>     | <u>February</u> | <u>March</u>    |                 |
|--------------|------------------------------------|--------------------|-----------------|-----------------|-----------------|
|              | Projected number of units produced | 2,350              | 2,050           | 2,000           |                 |
| <u>FC/WK</u> | <u>Monthly Cost Formula</u>        | <u>Cost Item</u>   |                 |                 |                 |
| \$0          | \$0.00 + \$ .75 per unit           | Materials used     | \$1,762.50      | \$1,537.50      | \$1,500.00      |
| 0            | 0.00 + 1.25 per unit               | Direct labor       | 2,937.50        | 2,562.50        | 2,500.00        |
| 100          | 450.00 + .20 per unit              | Indirect labor     | 920.00          | 860.00          | 850.00          |
| 75           | 337.50 + .10 per unit              | Electricity        | 572.50          | 542.50          | 537.50          |
| 300          | 1,350.00 + 0.00 per unit           | Indirect materials | 1,350.00        | 1,350.00        | 1,350.00        |
| 125          | 562.50 + 0.00 per unit             | Factory Insurance  | 562.50          | 562.50          | 562.50          |
| 110          | 495.00 + .50 per unit              | Other overhead     | 1,670.00        | 1,520.00        | 1,495.00        |
|              | <u>1,125.00</u> + 0.00 per unit    | Depreciation       | <u>1,125.00</u> | <u>1,125.00</u> | <u>1,125.00</u> |
|              | \$4,320.00 + \$2.80 per unit       | Total cost         | \$10,900.00     | \$10,060.00     | \$9,920.00      |
|              |                                    | Cost per unit      | \$4.64          | \$4.91          | \$4.96          |

3. Prepare a projected income statement.

|                                    | <u>January</u> | <u>February</u> | <u>March</u> |
|------------------------------------|----------------|-----------------|--------------|
| Beginning Finished Goods Inventory |                |                 |              |
| Units                              | 750            | 1,100           | 950          |
| Cost at \$4.72 per unit            | \$3,540        | \$5,192         | \$4,484      |
| Cost of units produced             | \$10,900       | \$10,060        | \$9,920      |
| Ending Finished Goods Inventory    |                |                 |              |
| Units                              | 1,100          | 950             | 1,050        |
| Cost at \$4.72 per unit            | \$5,192        | \$4,484         | \$4,956      |
| Cost of units sold                 | \$9,248        | \$10,768        | \$9,448      |
| Units sold                         | 2,000          | 2,200           | 1,900        |

Income Statement (excluding Trafalgar's draw)

|                |                   |                    |                    |
|----------------|-------------------|--------------------|--------------------|
| Sales          | \$14,000.00       | \$15,400.00        | \$13,300.00        |
| Cost of sales  | <u>9,248.00</u>   | <u>10,768.00</u>   | <u>9,448.00</u>    |
| Gross margin   | \$ 4,752.00       | \$ 4,632.00        | \$ 3,852.00        |
|                | <u>January</u>    | <u>February</u>    | <u>March</u>       |
| Office expense | \$ 3,514.50       | \$ 3,514.50        | \$ 3,514.50        |
| Commission     | 1,400.00          | 1,540.00           | 1,330.00           |
| Consulting     | <u>900.00</u>     | <u>900.00</u>      | <u>900.00</u>      |
| Total expense  | <u>\$5,814.50</u> | <u>\$ 5,954.50</u> | <u>\$ 5,744.50</u> |
| Net            | (\$1,062.50)      | (\$1,322.50)       | (\$1,892.50)       |

Note: They expect to sell more in February than in January, yet February shows higher losses. Why? Because ending inventory decreases in February, so some of the fixed costs incurred in January and assigned to January's ending inventory hit the income statement in February.

4. Prepare a cash budget.

(Note: Oct. sales = \$10,500; Nov. sales = \$16,100; Dec. sales = \$12,600)

|  |                 |                 |                 |
|--|-----------------|-----------------|-----------------|
| <u>Receipts</u>  | <u>January</u>  | <u>February</u> | <u>March</u>    |
| Sales  | \$14,000.00     | \$15,400.00     | \$13,300.00     |
| Beginning cash balance                                 | \$10,000.00     | \$ 8,772.50     | \$ 8,447.50     |
| Collections:   |                 |                 |                 |
| Current month (30%)                                    | 4,200.00        | 4,620.00        | 3,990.00        |
| Previous month (40%)                                   | 5,040.00        | 5,600.00        | 6,160.00        |
| Previous month (20%)                                   | 3,220.00        | 2,520.00        | 2,800.00        |
| Previous month (10%)                                   | <u>1,050.00</u> | <u>1,610.00</u> | <u>1,260.00</u> |
| Total collections                                      | \$13,510.00     | \$14,350.00     | \$14,210.00     |
| Total balance + receipts                               | \$23,510.00     | \$23,122.50     | \$22,657.50     |
| <u>Disbursements</u>                                   |                 |                 |                 |
| Production cost except materials<br>and depreciation   | \$ 8,012.50     | \$7,397.50      | \$7,295.00      |
| Material purchases previous month                      | 1,275.00        | 1,687.50        | 1,537.50        |
| Office expense*  | 3,150.00        | 3,150.00        | 3,150.00        |
| Commissions  | 1,400.00        | 1,540.00        | 1,330.00        |
| Consulting   | <u>900.00</u>   | <u>900.00</u>   | <u>900.00</u>   |
| Total disbursements                                    | \$14,737.50     | \$14,675.00     | \$14,212.50     |
| Ending balance   | \$ 8,772.50     | \$ 8,447.50     | \$ 8,445.00     |
| If \$1,400 draw is included then<br>ending balance is: | \$ 7,372.50     | \$ 5,647.50     | \$ 4,245.00     |

\*excludes \$364.50 in depreciation, which is 4.5 times 81

5. Prepare a projected balance sheet.

| <u>Assets</u>            | <u>January 1, 2001</u> | <u>April 1, 2001</u> | <u>If draw is taken</u> |
|--------------------------|------------------------|----------------------|-------------------------|
| Cash                     | \$ 10,000.00           | \$ 8,445.00          | \$ 4,245.00             |
| Receivables              | 14,700.00              | 15,330.00            | 15,330.00               |
| Raw Material Inventory   | 600.00                 | 525.00               | 525.00                  |
| Finished Goods Inventory | 3,540.00               | 4,956.00             | 4,056.00                |
| Office Equipment         | 13,122.00              | 12,028.50            | 12,028.50               |
| Factory Equipment        | 70,000.00              | 66,625.00            | 66,625.00               |
| Land                     | <u>5,000.00</u>        | <u>5,000.00</u>      | <u>5,000.00</u>         |
| Total                    | \$116,962.00           | \$112,909.50         | \$108,709.50            |

Liabilities and Capital

|                   |              |                   |                   |
|-------------------|--------------|-------------------|-------------------|
| Accounts Payable  | \$ 1,275.00  | \$ 1,500.00       | \$ 1,500.00       |
| Notes Payable     | 30,000.00    | 30,000.00         | 30,000.00         |
| Capital           | 85,687.00    | 85,687.00         | 85,687.00         |
| Retained Earnings | <u>-</u>     | <u>(4,277.50)</u> | <u>(8,477.50)</u> |
|                   | \$116,962.00 | \$112,909.50      | \$108,709.50      |

6. Adelaide Ladywell, Crofton Brockley, and Trafalgar Blackheath will be meeting to discuss the material developed in questions 1 through 5. What points would be likely to dominate such a meeting? Why?

Clearly, at projected volume and expense levels, Blackheath is not going to be profitable. The following analysis of breakeven according to the budget might be helpful:

|                |                     |                      |                         |
|----------------|---------------------|----------------------|-------------------------|
| Variable cost  | \$2.80 per unit     | Fixed production     | \$4,320.00 per month    |
| Commission     | <u>.70</u> per unit | Office               | 3,514.50 per month      |
| Total variable | \$3.50 per unit     | Consulting           | <u>900.00</u> per month |
|                |                     | Total Fixed Expenses | \$8,734.50 per month    |

Contribution margin \$3.50 per unit

Breakeven = \$8,734.50 fixed costs / \$3.50 contribution margin per unit = 2,496 units

In addition, the cash balance is continually decreasing, especially after taking into account Trafalgar's draw.

7. Using the information presented in the case regarding actual activity in January, prepare an analysis of the results.

Actual production at 2,250 units was 100 units lower than had been projected. However, the actual volume was the same as the volume used to compute the \$4.72 unit cost for inventory.

Since sales and production were the same, there was no change in finished goods inventory, which started at 750 units.

Raw material started with 800 units and ended with 600 units. Thus, production used the 200 units from inventory (\$150) plus the \$1,660 purchased, or \$1,810.

#### Review of January's Performance

|                   | <u>Budget at</u><br><u>2,250 units</u> | <u>Actual at</u><br><u>2,250 units</u> | <u>Variance</u> |
|-------------------|--|--|-----------------|
| Material          | \$1,687.50                             | \$1,810.00                             | \$122.50 U      |
| Direct labor      | 2,812.50                               | 2,812.50                               | -               |
| Indirect labor    | 900.00                                 | 895.00                                 | 5.00 F          |
| Electricity       | 562.50                                 | 325.00                                 | 237.50 F        |
| Indirect material | 1,350.00                               | 1,570.00                               | 237.50 U        |
| Factory insurance | 562.50                                 | 562.50                                 | -               |
| Other overhead    | 1,620.00                               | 1,600.00                               | 20.00 F         |
| Depreciation      | <u>1,125.00</u>                        | <u>1,125.00</u>                        | <u>-</u>        |
| Total COGS        | \$10,620.00                            | \$10,700.00                            | \$80.00 U       |

|                 | <u>Budget at</u><br><u>2,250 units</u> | <u>Actual at</u><br><u>2,250 units</u> | <u>Variance</u> |
|-----------------|--|--|-----------------|
| Office expenses | \$3,514.50                             | \$2,260.00                             | \$1,254.50 F    |
| Commissions     | 1,575.00                               | 1,400.00                               | 175.00 F        |
| Consulting      | <u>900.00</u>                          | <u>-</u>                               | <u>900.00 F</u> |
| Total expenses  | 5,989.50                               | 3,660.00                               | 2,239.50 F      |
| <br>            |  |  |                 |
| Sales           | 15,750.00                              | 15,750.00                              |                 |
| Cost of sales   | <u>10,620.00</u>                       | <u>10,700.00</u>                       |                 |
| Gross margin    | 5,130.00                               | 5,050.00                               |                 |
| <br>            |  |  |                 |
| Total expenses  | <u>5,989.50</u>                        | <u>3,660.00</u>                        |                 |
| <br>            |  |  |                 |
| Net             | \$(859.50)                             | \$1,390.00                             | \$2,249.50 F    |

Performance in January was better than would be expected at a volume of 2,250 units, primarily due to the favorable variances in non-manufacturing expenses.

8. How would net profit on the income statement change if Adelaide were to prepare the income statement under an assumption of variable costing?

Under variable costing, the income statement would come out with the same net profit for January because there was no change in finished goods inventory. They sold just what they produced.

If 500 additional units were sold at \$6.00, the incremental income statement would be:

|               |              |
|---------------|--------------|
| Sales         | \$3,000      |
| Variable cost |              |
| 500 × \$2.80  | 1,400        |
| Commissions   | <u>300</u>   |
| Total cost    | <u>1,700</u> |
| Contribution  | \$1,300      |

Both profit and cash would be increased by \$1,300.

### **TEACHING STRATEGY: BLACKHEATH MANUFACTURING COMPANY**

The instructor should begin by ensuring the class understands how Lee High computed his “Useful Data on Great Heath” presented in the case. Once the class is comfortable with this data, the instructor can ask the class what they think of the decision rules Lee High proposed. Students usually support them because the prices suggested by the rules are what are necessary for Blackheath to break even. It is useful to do a calculation of breakeven at this point to ensure students understand the concept. For example, at a \$7.00 price, one would have a \$3.50 contribution margin per unit (\$7.00 price - \$3.50 variable cost per unit). Sales of 426 units would be breakeven volume, just covering the \$1,491 fixed cost (\$1,491 fixed cost / \$3.50 contribution margin per unit = 426 units). However, during the discussion, students will begin to realize that the decision rules proposed assume volume of 500 units per week, and are silent on the issue of capacity utilization. Important points to come out in the discussion at this point are:

1. In the long run, Blackheath must price high enough to cover all costs.
2. Decision rules for pricing will depend on expected volume.
3. Capacity constraints and excess capacity will affect the decision rules.

After these points come out in the discussion, the instructor can suggest the class discuss Blackheath’s thoughts about paying a higher percentage commission with a higher price per unit. I generally ask “What do you think of Mr. Blackheath’s decision that the sales representative sell at \$8.00 at a 15% commission?” At the \$8.00 price and 15% commission, variable costs total \$4.00 per unit, and the contribution margin of \$4.00 per unit covers the \$1,491 fixed costs if Blackheath sells 373 units (\$1,491 fixed cost / \$4.00 contribution margin per unit). If the sales representative sells all 373 units, he will make \$447.60 (at breakeven of 373 units). Alternatively, if he sold the breakeven volume at \$7.00, he would make only \$298.20. Clearly, he should prefer the \$8.00 price per unit and 15% commission. In fact, the sales representative would be better off at the \$8.00 price if he sold anything over 249 units than he would be selling 426 breakeven units at \$7.00. However, at \$8.00, whether he can sell breakeven of 373 units depends on the price elasticity of the Great Heath. The company would be less well off unless his \$8.00 sales were at least 373 units. Thus, the company’s interest and the sales representative’s interest do not coincide completely. With sales between 249 and 373 units, the higher price with the higher commission would be good for the sales representative but bad for the company.

At this point, the instructor can move the discussion to the special order. I often ask the question, “So, it looks like Charlton Blackheath did the right thing when he fired Adelaide Ladywell. Do you agree?” The discussion should center on the analysis of the special order along the lines indicated above for assignment question 2. Students should conclude that the decision that Adelaide made was a sound one from a financial standpoint, assuming Blackheath had the capacity to handle the order.



## **TEACHING STRATEGY: BLACKHEATH MANUFACTURING COMPANY—REVISITED**

The instructor may want to open the class with a general discussion around budgeting, covering such issues as why one might want to prepare a budget and how the budgeting process at Blackheath works. Students should recognize the sequence of activities in Blackheath's budgeting process, and discuss the potential rationale for that sequence:

1. Forecast sales
2. Develop a production budget
3. Develop a budget for purchases of raw materials
4. Develop a budget for other expense items
5. Prepare project financial statements (income statement, cash flow statement, balance sheet)
6. Discussion of budget projections

Then, the instructor can suggest the discussion move to completing the budget for Blackheath. I have found that this discussion goes well when it proceeds in order of the assignment questions, likely because those questions reflect the sequence of the budgeting process at Blackheath. It is important to allow time for discussion of major points along the way, in addition to calculation of the numbers associated with each question. For students to gain a rich understanding of the process, it is important to spend sufficient time in a conversation about what is learned as a result of having completed the budget (assignment question 7). Students should be encouraged to consider actions that Blackheath could take to improve its financial standing.

## **GRAPHICS, INC. (A)**

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### **CASE SUMMARY**

This case presents a competitive bidding game. Four teams (i.e., four printing companies) compete against each other to win jobs offered to the industry. Two, three, or four students comprise a printing company team. When there are more than 16 students, multiple, simultaneous, but separate games can be played. Each game is synonymous with an industry. The basic version of the game consists of four rounds of bidding. More rounds can be played if time permits, but four rounds is the minimum for an enjoyable, educational exercise. If initial bids are ready at the beginning of the first class period devoted to the game, the four rounds can be played in a 90-minute period. Two 50-minute periods would work also. Another model is to play the game over the course of an entire morning that is solely devoted to the game. No matter the format, at the close of the game, teams are asked to prepare financial statements, a final production schedule, and a review of the success of their bidding strategy. These results should be discussed in a subsequent debriefing class.

The purpose of this game is to provide students with an experience of the dynamics of competition. When determining bids for jobs to fill their factory, players must consider costs and available capacity. Indeed, the case gives budgeted costs, identifying which are variable and which are not. Competition is also a factor, and competitors do not always behave in a predictable or even rational fashion. Thus, students must use their knowledge of cost-volume relationships in the context of a rapidly changing situation. Teams bid on lists of jobs and schedule the work they win. Too much work incurs late penalties; too little leaves expensive capacity unused.

### **TEACHING OBJECTIVES**

What should students learn from participating in this competitive bidding game?

First, in determining the bid prices they want to offer to acquire jobs, they have to apply insights regarding their company's fixed costs, variable costs, and contribution analysis.

Second, students must make decisions regarding the trade-offs between the use of overtime in their production facilities and incurring penalties on jobs delivered late.

Third, students experience the dynamics of competition and the need to keep track of how competitors behave. It helps, for example, to know how much work competitors have won.

Last, students can learn something about the concept of capacity as it works in practice, which is not as clear cut as it sometimes is held out to be. Most jobs are due one to three weeks in the future, and how many other jobs will come along is not known. Excess work and unused capacity are both costly in this game and must be considered when bidding.