

## **Motorcycle Helmets with Bluetooth (B):**

### **Production**

11/2009-5654

This case was written by Michele Hibon, Lecturer, and Ilia Tsetlin, Assistant Professor of Decision Sciences. It is intended to be used as a basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

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After his success in dealing with the price for Bluetooth chips, Gregory was promoted to the project manager position, and was currently advising Angelina, the CFO of the motorcycle gadget company. When he reported to her office, Angelina was staring at the monthly accounting report of one of her plants. “Gregory, if, on a monthly basis, a product is making a loss, should we stop producing it?” asked Angelina. “I guess so, but what’s the matter?” - “You see, here’s the plant producing two types of motorcycle helmets with blue tooth: One is ‘Advanced,’ and one is ‘Basic.’ By the accounting report, the revenues from the Basic Model don’t cover its costs, and the situation is not likely to change. Just take a look yourself.”

<u>Advanced</u>	
Price	\$80
Units Produced	20,000
Revenue	\$1,600,000
Production Costs	\$800,000
Overhead Costs	\$500,000
Pre-Tax Profit	\$300,000

<u>Basic</u>	
Price	\$60
Units Produced	15,000
Revenue	\$900,000
Production Costs	\$450,000
Overhead Costs	\$500,000
Pre-Tax Profit	-\$50,000

At first glance, everything seemed correct, and justified the conclusion. Gregory did a few quick checkpoints:

$$\text{Revenue} = (\text{Price}) \times (\text{Units Produced}),$$

$$\text{Profit} = (\text{Revenue}) - (\text{Production Costs}) - (\text{Overhead Costs}).$$

“Angelina, and how are the Overhead Costs computed?”

“Running the plant costs us \$1,000,000 per month, irrespective of how much and what do we produce. That makes \$500,000 per product.”

“Well, it seems you’re right. Shut down the Basic Model then.”

“Gregory, my gut feeling is that something is fishy here. Besides that, I’d really like to keep producing both types of helmets. Would you mind taking a thorough crack at this?”

“Then I’d also like to check whether they’re producing optimally. Maybe changing the number of units produced would help... So what is included in Production Costs?”

“Those are pure variable costs. Overall, Production Costs are as follows:  $\$0.002 q_A^2$  for Advanced Model, and  $\$0.002 q_B^2$  for Basic Model. That amounts to \$800,000 and \$450,000 for 20,000 and 15,000 helmets produced. So we can cut variable costs by producing less. However, the per-unit price won’t change – we’re in a competitive industry.”

“Ok, Angelina, let me think about all that. I’ll get back to you shortly.”

Excited about a challenging assignment, Gregory first decides to do a careful analysis of the plant perspectives if production of the Basic Model is stopped.

## Assignment

1. If production of the Basic Model is stopped, the situation becomes as follows: A firm in a competitive industry has the cost curve  $C = 1,000,000 + \$0.002 \cdot q^2$ . The market price is  $P = 80$ . (All costs and prices refer to long-run values.)
  - a) Find fixed cost. (Fixed cost is the cost that a firm incurs for just starting production, irrespective of the number of units produced.)
  - b) Find the marginal cost, MC. (Marginal cost is the cost for producing one more unit of product. It is convenient to find it as the derivative of the total cost with respect to the number of units produced.)
  - c) How much should the firm produce? (Here you should think about what number of units will maximize a firm's profit.)
  - d) Find the supply curve for the firm (i.e., produced quantity as a function of market price  $P$ ). In question c) you already found the supply when market price is 80. Here you need to find the supply for any  $P$  – i.e., what would happen if market price is changed.
2. Here is a summary of the situation described in the case: A plant can produce two products, A (Advanced) and B (Basic). Fixed cost of running the plant is \$1,000,000 per month, irrespective of how much is produced; cost of producing  $q_A$  units of product A is  $\$0.002 q_A^2$ , and cost of producing  $q_B$  units of product B is  $\$0.002 q_B^2$ . The per-unit market price for product A is  $P_A = \$80$  and for product B it is  $P_B = \$60$ . (All costs and prices refer to long-run values.)
  - a) How many units of products A and B should the plant produce? What is the resulting total profit for the plant?

The accounting department splits the fixed cost (\$1,000,000 per month) of running the whole plant equally between the two products.
  - b) Is product A making a profit or a loss?
  - c) Is product B making a profit or a loss?
  - d) Should we stop producing the product that is making a loss according to the report of accounting department?