## CASE

### 7-2 FIVE STAR TOOLS [LO A1]

(Note: This case relates to the appendix on the Theory of Constraints.)

Five Star Tools is a small family-owned firm that manufactures diamond-coated cutting tools (chisels and saws) used by jewelers. Production involves three major processes. First, steel "blanks" (tools without the diamond coating) are cut to size. Second, the blanks are sent to a chemical bath that prepares the tools for the coating process. In the third major process, the blanks are coated with diamond chips in a proprietary process that simultaneously coats and sharpens the blade of each tool. Following the coating process, each tool is inspected and defects are repaired or scrapped.

In the past two years, the company has experienced significant growth and growing pains. The company is at capacity in the coating and sharpening process, which requires highly skilled workers and expensive equipment. Because of the bottleneck created by this operation, the company has missed deadlines on orders from several important customers.

Maxfield Turner, the son of Frederick Turner, founder of Five Star Tools, is the president of the company. Over lunch he and Betty Spence, vice president of marketing, discussed the situation. "We've got to do something," Betty began. "If we don't think we can meet a customer's order deadline, we should turn down the business. We can't simply keep customers waiting for product or we'll develop a reputation as an unreliable supplier. You know as well as I do that this would be devastating to our business."

"I think there may be another approach, Betty," replied Max. "Some of our products are exceptionally profitable. Maybe we should concentrate on them and drop some of the less profitable ones. That would free up our production resources. Or maybe we can figure out a way to run more product through the coating process. If we could just loosen that constraint, I know we could improve our response time and profitability. I'll tell you what I'll do. I'll get the accounting department to prepare an analysis of product profitability. That should help us figure out which products to concentrate on. And I'll get the production people thinking about how to free up some time in coating. We'll meet early next month and try to get a handle on how to deal with our production constraints."

***Required***

**a.** What steps can be taken to loosen the constraint in coating and sharpening?

**b.** Consider Model C210 and Model D400 chisels. Which product should be emphasized if the constraint in coating and sharpening cannot be loosened?

**c.** Focusing only on the Model C210 chisel and the model D400 chisel, what would be the benefit to the firm of gaining one more hour of production time in coating and sharpening?

**d.** In coating and sharpening, the operator begins by inspecting items that have arrived from the chemical bath. If rough edges or blemishes are detected, the operator smooths and/or buffs the items before actual coating or sharpening takes place. (Note that this process is in addition to the inspection that takes place at a separate inspection station following coating and sharpening.)

In order to save valuable time in coating and sharpening, management is considering forming a separate inspection station before the coating and sharpening process. The inspection station can utilize existing smoothing and buffing equipment, and it can be staffed on an as-needed basis by an employee who normally works in the chemical bath area, which has excess capacity (so the employee will not be missed for brief periods). Management estimates that this action will free up 240 hours in coating and sharpening ((an average of 5 minutes per hour × 8 hours per day × 360 operating days per year)/60). Management has calculated that the average contribution margin per unit for its products is $300. The average contribution margin per hour spent in coating and sharpening is $850.

Based on this information, estimate the incremental profit per year associated with adding the new inspection station.

| | Model C210 Chisel | | Model D400 Chisel | |
|---|---|---|---|---|
| Selling price | | $500 | | $850 |
| Less variable costs: | | | | |
| Direct labor | $ 85 | | $180 | |
| Direct material | 150 | | 180 | |
| Variable overhead | 15 | 250 | 60 | 420 |
| Contribution margin | | 250 | | 430 |
| Less allocated fixed costs | | 185 | | 230 |
| Profit per unit | | $ 65 | | $200 |
| Time in coating and sharpening to produce 1 unit | | .2 hours | | .8 hours |