

Hammond Cards, Inc: The Creative Acquisition

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ABSTRACT

This case is designed to show the interconnection between operations management, markets and strategic cost management. The central integration point in this case is the relationship between the selection of an operations/production strategy and its impact on profitability. The case deals with the proposed acquisition of Creative Designs by Hammond Cards. The two companies have different manufacturing operations and different customer profiles. Hammond produces simple and standard-sized greeting cards that are packaged in sets of 20 cards to a package. Hammond's business model is low margin high volume. In contrast, Creative Designs specializes in so-called studio cards. These are high-end greeting cards sold individually at retail. Creative's production operations are optimized for high margin-moderate volume production.

Since the two production operations have essentially the same production steps, Hammond is hoping to exploit the synergy by sharing the peak demand across the two plants and to transfer best practices between plants. It also hopes to exploit the different distribution channels and customer segments that Creative will bring and thus smooth out seasonal demand fluctuations and allow efficient management of inventory.

The students are asked to take the role of consulting team hired by the CEO of Hammond to make certain that the expected benefits from the merger will be forthcoming. The case requires students to evaluate the operations of both Hammond and Creative. By analyzing cycle time, demand fluctuations, capacity bottlenecks, and quality management they are expected to form a judgment about the potential benefits from the merger. It turns out that though the plan to offload excess demand from Hammond to Creative is a good idea, it needs several modifications to be effectively implemented.

To test the profit impact of the joint operations, the strategic cost analysis uses a new order from a customer as a test case to determine which of the two plants is best suited to produce the cards and which customer is the most profitable for this particular design. The answers are counter intuitive. Even though the Hammond plant is cheaper for production and the Creative customer less expensive to serve, the high prices commanded by Creative customers means selling to them regardless of the production site.

The case has both separable discipline specific as well as integrative learning objectives that include understanding the need for a balance between operational efficiencies, cost efficiencies, and customer service costs in increasing profitability.

Hammond Cards, Inc: The Creative Acquisition

Introduction

Gregory Hammond founded Hammond Cards, Inc. 1951. The company, located in a suburb of Chicago, IL grew to become a major provider of greeting cards sold through traditional channels – card store chains, bookstores, pharmacy chains and supermarkets. By industry standards, Hammond was small, with annual revenues less than 1% of industry leader Hallmark. The company produced all of its cards in a single manufacturing plant that was located adjacent to the company headquarters. Over the years, Hammond sales grew to roughly 10 million cards per year but growth had slowed in recent years, perhaps due to the proliferation of online e-cards.

In an effort to stimulate growth, Hammond management was exploring potential acquisitions of other card companies. Creative Designs was one of Hammond's potential acquisition targets. Creative Designs was a privately-held greeting card company with a complementary set of offerings and a focus on different markets. Founded in New Jersey in 1986, Creative Designs was a smaller, niche player in the high-end card market. The company headquarters and manufacturing operations were located in a single facility just outside of Newark, NJ.

Wendy Hammond, daughter of the founder and current President of Hammond Cards, had entered into discussions with Creative Designs' owners to discuss an acquisition of the company. The owners were amenable to the sale and had provided Hammond with significant amounts of data about their business and operations during the early part of the "due diligence" process. Wendy was intrigued by what they had learned. She believed that the proposed acquisition of Creative Designs would provide numerous opportunities for her company. There were, of course, some simple scale economies that could be extracted from the combination of the two businesses. For example, such a consolidation would allow cross-selling of the two distinct lines of greeting cards to the combined set of existing customers and new customers who might be brought into the mix by the wider variety of products.

The Product Lines and Markets

Hammond Cards manufactured and sold a wide range of greeting cards, but they were all basically simple, standard-sized cards. All of Hammond's sales were packaged in sets – 20 cards to a package. This allowed the retailers the choice to sell boxed sets (e.g., a set of Christmas cards) or open the package and vend them one at a time. This approach was a factor that differentiated Hammond from most of the industry's big players.

Another dimension of product differentiation was price. Hammond's cards were targeted at price-conscious buyers. Sales and distribution of Hammond's cards was straightforward and a relatively low portion of total annual expenses. Sales were either direct to large chain stores (e.g., K-Mart, Wal-Mart, Walgreens) or to major wholesale/distribution operations.

In contrast to Hammond Cards, Creative Designs specialized in so-called studio cards. These were high-end greeting cards which were sold individually at retail. Creative Designs had not participated in the big-store supply chain. The majority of Creative Designs cards were sold through smaller specialty shops and chains (stationery, cards, gifts, etc.)

Improvement Opportunities Created by the Merger

Before Wendy went any further with the acquisition talks, she felt that she needed to have better insights into the opportunities offered by the combined organization other than simple scale economies in sales and administration. One intriguing opportunity was the potential ability to address several of Hammond's operations and profitability challenges by leveraging the combined capabilities of Hammond's current operations and the acquired Creative Designs operations.

The greeting card production operations at the two companies were quite similar. In fact, for most of the production process, they even used the same kind of machines in the same way with the same, union-established pay rates. The obvious point of difference was printing. Hammond used printers that could print the entire foreground or background of a card surface in one operation. These machines also used less expensive ink and operated with fewer laborers per machine. The required class of labor was also less expensive.

Wendy hoped that effective integration of the two operating environments would allow the company to do the following:

- Improve their ability to accommodate seasonality of their business and, thus, better match supply and demand;
- Enable more efficient management of inventory and facilitate better control over inventory costs;
- Address product quality issues at both Hammond and Creative designs;
- Provide an environment that was conducive to process improvement and implementation of new operating concepts and policies.
- Finally, by reducing waste and improving process efficiency, lessen overall costs as a percentage of revenues and increase the bottom line.

Wendy engaged the services of Olin Consulting, Inc. to help her examine the potential outcomes associated with the merger.

The Operations Analysis

Wendy first directed the team to Bob Martin, Vice-President of Operations at Hammond Cards. Hammond and Martin had previously discussed the shortcomings of Hammond's current operations infrastructure. Based upon these new discussions, Martin constructed an operating plan for the merged operations.

Operations @ Hammond Cards

Martin's hope was that the proposed acquisition of Creative Designs (CD) could provide additional production capacity and flexibility that would allow him to address Hammond's major concerns. In addition, Martin believed that the smaller scale of the CD operations would allow him to utilize that facility as a learning laboratory for new production methods. His objective relative to the laboratory concept was to implement new production methods at Creative Designs and then to migrate those methods to the larger scale Hammond operations at some later date. Martin said:

"We've been operating at or near capacity for some time at Hammond Cards. This places a lot of stress on our machinery, our managers and our production workers. As a result, we've been reluctant to make major changes to the operation. Mostly we just try to keep pace with demand and hope that the machinery holds up – and that our quality is acceptable. If we go forward with this acquisition, I plan to off-load (transfer) some of our demand over to the Creative Design facility. My analysis indicates that, unlike us, they're operating at far less than full capacity. They also run a much smaller operation, which makes them a great learning laboratory. We can pilot

new production methods at Creative Designs and then migrate those methods to the larger scale operations at Hammond after working out any issues that may arise. This way, we avoid the risks associated with bringing new, untested processes into our main operating environment.”

The Production Environment @ Hammond Cards

Martin and his team presented the consultants with the following production data. Hammond Cards operated one production shift that worked 5 days per week. Hammond was required to conform to union rules – the workday was 7:30 – 4:30 with a one-hour (unpaid) lunch break and two (paid) 15-minute breaks. The union prohibited overtime or second shifts, which was fine with Hammond management, given their concerns with cost management. Current production operations utilized virtually all of the available space in the Hammond plant. Consequently, Martin could not add machines to the system and had to manage within the constraints of current resource availability – both machines and human resources.

The greeting card design process was outside of Martin’s direct control and was not considered to be a significant production constraint. The consultants were, therefore, directed to the five-step process that began with template cutting and concluded with a bar-code scan and packaging operation. In between these operations, the cards proceeded through 2 separate printing steps and a folding/UPC pricing code step.

The Process @ Hammond Cards

In order to facilitate the consultant’s analysis, Martin produced a detailed description of the process steps, production times, and machine as well as human resource allocation at the various steps.

1. **Template cutting:** The template cutting process cuts paper stock into the correct size(s) for card production. This batch process requires 1 minute to align the stock on the cutting machine. The stock placed onto the cutting machine is sufficient for 100 cards. Following alignment, it takes 48 seconds of cutting time per batch of 100. There are two workers and two template-cutting machines dedicated to this process.
2. **Printing 1:** The first printing step prints the background colors for the card. There are 4 machines and 4 workers at this process step. Each machine requires 2.5 seconds of processing time per card.
3. **Printing 2:** The second printing step prints the foreground colors for the card. There are 5 machines and 5 workers at this process step. Each machine requires 3.15 seconds of processing time per card.
4. **Fold and affix UPC code:** Step #4 involves the folding and placement of pricing (UPC) codes on the cards. This is a highly automated step that utilizes machinery that both folds the card and prints the UPC codes. There are 2 machines and 2 workers at this production step. Each machine processes a card every 1.2 seconds.
5. **Bar code scan and package for shipment:** This final step involves scanning bar codes and packaging the cards for shipping. A single machine scans the cards and packages the cards for shipping. There are 2 of these machines and 2 workers at this production step. Each machine processes a card every 1.1 seconds.

Operations at Creative Designs

Martin also provided the consultants with production data for Creative Designs. Creative Designs operated one production shift that worked 5 days per week. CD's workers belonged to the same union as Hammond's employees. Not surprisingly, the workday was 7:30 – 4:30 with a one-hour (unpaid) lunch break and two (paid) 15-minute breaks. As with Hammond Cards, the union prohibited any use of overtime or second shifts. Martin intended to keep the work days and hours the same at the two plants, in order to avoid any workforce issues surrounding working conditions, pay scales, etc. As was the case with Hammond Cards, current production operations at CD utilized all of the available space. Martin could not add machines to the CD system and would have to meet all of Creative Design's demand and any production transferred from Hammond Cards with the resources currently available at Creative Designs.

As was the case with Hammond Cards, the design process was not considered to be a significant production constraint. Therefore, the consultants were again directed to focus on the process that began with template cutting and concluded with a bar-code scan and packaging operation. In between these operations, the cards proceeded through 4 separate printing steps and a folding/packing step. The CD production system required four printing steps due to the print technology used at CD, which required multiple prints to achieve multi-colored card products.

The Process @ Creative Designs

In order to facilitate the consultant's analysis, Martin produced a detailed description of the process steps, production times, and machine as well as human resource allocation at the various steps.

1. **Template cutting:** CD utilizes the exact same template cutting process and machines as Hammond cards. This machinery cuts paper stock into the correct size(s) for card production. This batch process requires 1 minute to align the stock on the cutting machine. The stock placed onto the cutting machine is sufficient for 100 cards. Following alignment, it takes 48 seconds (.8 minutes) of cutting time per batch of 100. There is one worker and one template-cutting machine dedicated to this process.
2. **Printing 1:** The first printing step prints the background colors for what will become the interior portion of the card. There are 2 machines and 2 workers at this process step. Each machine requires 2 seconds of processing time per card.
3. **Printing 2:** The second printing step prints the foreground colors for the interior portion of the card. There are 2 machines and 4 workers at this process step. Each machine requires 1.5 seconds of processing time per card.
4. **Printing 3:** The third printing step prints the background colors for what will become the exterior portion of the card. There are 2 machines and 2 workers at this process step. Each machine requires 1.6 seconds of processing time per card.
5. **Printing 4:** The fourth printing step produces the foreground colors for the exterior portion of the card. There are 3 machines and 6 workers at this process step. Each machine requires 2.4 seconds of processing time per card.
6. **Fold and affix UPC code:** Step #6 involves the folding and placement of pricing (UPC) codes on the cards. This is a highly automated step that utilizes machinery that both folds the card and prints

the UPC codes. There are 2 of these machines and 2 workers at this production step. Each machine processes a card every 1.4 seconds.

7. **Bar code scan and package for shipment:** This final step involves scanning bar codes and packaging the cards (20 cards per package) for shipping. A single machine scans the package and packages (20 cards per package) the cards for shipping. CD utilizes older technology than Hammond Cards for this process. The CD process requires .25 minutes (15 seconds) of set-up time per 20 cards and 25 seconds of processing time per 20 cards. There are 2 machines and four workers at this final production step.

Production Scheduling

Both Hammond Cards and Creative Designs assumed a 20-day per month, 240-day per year production horizon. Martin instructed the consultants to use this assumption in their analysis. Demand for Hammond Cards was somewhat seasonal (See **Exhibit #1**). As noted in Exhibit #1, Hammond Cards followed a level production strategy, with the production rate set at 42,000 units per day.

Martin believed that the 42,000-card daily production rate was placing too much stress on the Hammond production system. He was unsure of his plant's current capacity utilization level but he was sure that it was too high – maybe even approaching 100%. His goal was to maintain level daily production but to do so at a production rate that translated to capacity utilization in the 84-86% range. He believed that this was achievable if he maintained level production at Hammond Cards but set the production rate to 37,000 cards per day, regardless of demand for the month. His plan called for producing 37,000 units per day every month at Hammond. If Hammond's average daily demand for a given month was greater than 37,000, he would produce 37,000 at Hammond and schedule the excess (difference between that month's average demand and 37,000) production at Creative Designs. His tour of Creative Designs operations suggested that there was significant unused or idle capacity in their operations to absorb this additional demand. He saw this idle capacity as the answer to the excessive demands currently placed on the Hammond Cards operations.

Demand for Creative Designs products was also seasonal (See **Exhibit #2**). Creative Designs followed a modified 'chase demand' strategy, opting to produce product as needed in a given month but with a fixed daily rate for the month. For example, the daily production rate in February, when the monthly demand was 240,000, would be set at 12,000 per day (12,000 per day x 20 days per month = 240,000). CD management would recalculate the daily production each month, based upon orders received for delivery in that month. Martin planned to leave that system in place but, as noted above, would transfer some of Hammond's demand to the Creative Design operation.

Historical data also suggested that Hammond's current production strategy resulted in excess finished goods inventory. Since cards were a seasonal item, this excess inventory would be stored, sold at a discount or destroyed as worthless. By lowering the production rate at Hammond, Martin hoped to reduce this excess inventory. He hoped that this reduction in inventory would also help him to better meet customer demands for shorter lead times. Hammond's current lead-time was 16 days. Martin hoped that a reduction in the production demands placed on the system, and resulting reduction in inventory, would also allow him to better meet customer expectations for on-time delivery (lead time), which were now in the 6-8 day range.

Product Quality

Creative Designs took pride in its reputation for delivering high quality products to its customers. To that end, the company had instituted methods to ensure product quality. Creative Designs' workers were responsible for inspecting product at their workstations and for taking corrective action when necessary to ensure a high quality product. These corrective actions included additional work to fix the defect or, if necessary, destroying the card. There were no designated inspectors at Creative Designs – it was 'everyone's job'. The workers considered themselves to be, at least in part, artisans. As such, they took great pride in the finished product and were very selective about product quality. If the acquisition went ahead, Martin hoped to leverage that pride and commitment to create more robust quality practices both at Hammond Cards and Creative Designs.

Hammond Cards had a similar approach to quality, but, given their higher levels of production, the workers had less time for inspection. However, Martin remained confident that Hammond was producing quality products.

“Our numbers indicate that very few products come back to us from the customer for production defects. We're proud of that fact. It tells us that we produce a quality product and that our procedures are catching most defects that do occur in the production process. However, I'd like to have a more systematic approach to quality. I believe that this will be essential for me if, as planned, I have responsibility for two plants in the future.

I've read about quality management practices and process control. I know that many firms are now pursuing six sigma quality management practices. I'm not sure that we're ready for six sigma but I'd sure like to see us operating at the 3-sigma level of quality associated with total quality management (TQM) practices. Creative Designs has very few returns. I'd like us to learn from them. More than just learn from their current practices, I'd like to use their smaller operations as my laboratory for new management practices. The first two management practices that I'd like to explore at CD are process management consistent with TQM and the adoption of leaner inventory systems – something on the idea of JIT. After we prove these methods at CD, I'll move them to the higher volume operations here at Hammond Cards. I see this strategy of learning (at CD) and knowledge/skill transfer (to Hammond) as essential to the improvement of our operations.”

The consultants asked Martin if he had any data related to quality. He again noted the low rate of returns but said that he had little else that he could share. He did have some data from the template cutting processes at both Hammond Cards and Creative Designs. He explained that this was a crucial step in the process.

*“Mistakes in template cutting can affect product quality and cause problems later in the process. For example, a poorly cut card could appear unattractive to customers or be difficult to fit into an envelope. Inaccurate sizing of the card could also result in production problems at later job steps. For example, a card that was too small could 'drift' in the printing process, which created misaligned or uneven printing. On the other hand, a card that was too big could jam some of the other machinery – something the operators found very annoying. We use the same machinery at both plants for template cutting, which is to our advantage. One of our most popular card sizes is a 9-inch by 5-inch card that requires a cut of 18 inches by 5 inches. Once folded, this becomes the 9 by 5 card. I have some data from both the Hammond (**Exhibit #3**) and the CD (**Exhibit #4**) template cutting processes. I don't know if this is helpful for you, but you're welcome to take what I have. Both sets of data are samples from the long cut (18 inches) of that 9 by 5 card. The specification for the long cut on that card is 18 inches plus or minus 0.02 inches. Our process*

engineers tell us that we won't compromise the printing or jam the other machines if we stay within those specification limits."

The Profitability Analysis

Wendy sent the consultants to Lucy Canella, Controller at Hammond Cards to begin the profit management investigation. As noted earlier, there was already a plan in place to combine sales and administrative activities for the two firms in order to reduce costs and gain some scope and scale advantages. Canella had overseen the collection of source data on the two production facilities and had also assembled her projections for the combined sales function and administrative function. She had performed a preliminary ABC analysis of sales and administration. She had also performed a preliminary cost driver analysis for the production plants. However, with plenty of work already on her plate, she decided that the consultants should complete that task. In the end, she wanted to provide Wendy Hammond with a report that took all of this data, analyzed it, and provided recommendations related to the potential plusses and minuses of combining the two businesses.

Production Cost Data for Hammond Cards and Creative Designs

Canella provided the consultant with the data in Exhibit 5. Three principal forms of direct materials were involved in the production of greeting cards: card stock, ink and envelopes. Both Hammond and Creative Designs purchased card stock in sheets pre-sized for their template cutting machines. The ink for the printing machines at Hammond was a bit less expensive than the ink used in the printers at Creative Designs. Both companies bought pre-made envelopes. Since both companies rent their facilities, plant and equipment asset values are relatively low. Total assets at both companies are roughly equal to twice the gross book value of PPE.

The book values of the production assets did differ between the two companies. As mentioned earlier, Hammond used more expensive printing machines. These machines performed more printing on a single pass. They were also more economical in that they used less expensive ink, used less labor, and allowed the use of a lower pay grade of laborer. The Creative Designs plant needed two of its less sophisticated printers to ink each side of a greeting card. Other machines were quite similar across the two companies, but, again, Creative Designs employed machines that were less complicated and needed more labor support. The details related to the machinery for the two plants appear in Exhibit 6.

Sales and Administrative Data for the Two Businesses

Lucy told the consultants that Hammond sold big orders to big customers while Creative Designs was focused on small orders to small customers. Nonetheless, she said, the basic nature of the sales activity and administrative tasks was about the same. Even the salary for each salesperson and each administrative support person was about the same across the two companies.

"I have done a basic ABC analysis for the combined sales force, distribution activity, and administrative support. I've labeled this analysis as Exhibit 7. I did not include the executive personnel in this analysis because, by contract, those costs would be independent of the business activity over the first couple of years after any acquisition".

Cost Drivers for Production at the Two Plants

Lucy Canella provided the consultants with Exhibit 8. She explained the content as follows:

“I’m interested in having you put together an ABC cost analysis of the production process steps at each of the two plants. To this end, I have analyzed the cost drivers that relate the shared costs to each process step. Total variable overhead can be assigned to each process step as a function of the percentage of machines found at each process step. Building rent, heat and other occupancy costs can also be distributed to each step as a function of number of machines. Plant personnel costs other than direct labor can be divided up among the steps by the percentage of direct laborers working in each step. That is, those costs are a function of direct laborer headcount. Finally, there is no need to allocate machine depreciation. These costs can be matched directly since each machine is uniquely associated with only one process step.”

Lucy felt that it was important to use cost drivers that reflected the underlying causes when allocating costs from the process steps to actual products. She explained:

“Since both factories currently process in very standard ways, we could probably use the number of cards processed at each step and get a good measure of general production cost right now. However, since specific designs and production requirements differ from one card style to another, I want to use better drivers to capture the cause-effect relationships. For example, the cost of cutting out cards on the template cutter is really not a function of number of cards of output. It is really related to the number of card stock sheets fed into the template cutting process.”

A Future Product Design

Lucy had one last issue she wanted to bring to the attention of the consultant team. During the acquisition discussions, the Hammond management team had been shown the design of a proposed new, more complicated card line. Currently, both plants produced standard cards with the characteristics shown in Exhibit 9A. This new card would fit into a standard size envelope, but used two folds and, consequently, more paper. It also featured a more vibrant multicolored graphic design. Data contrasting this proposed design to the current standard design is given in Exhibit 9B.

If the merger went through, it is unlikely that this card design would be put into production in the near term. However, the existence of this design prompted Lucy to consider how the various portions of a new, combined company might work together to improve profits overall.

“If we sold this card to Hammond’s current customers, we could probably get a price of \$0.65 per card. Through Creative Designs’ sales market, it could probably sell at \$0.90 per card. There are other differences between selling to a Hammond customer and selling to a Creative Designs customer, as I have summarized in Exhibit 10. However, it is unclear to me not only to whom we should market the card, but where we should produce it. This may be a good example to use to examine how the two organizations could combine forces to improve profits.”

REQUIRED:

You are to assume the role of a member of the Olin Consulting Group. Wendy Hammond wants your group to evaluate and opine on two issues. One is to assess the operations-based benefits achievable through the acquisition. The second is to explore the profit improvement opportunities inherent in combining the two firms. The focus here would be on the cost and profit implications of the utilization of

resources inherent in the ways the businesses were currently run, examining the potential to improve bottom-line outcomes.

The Consultant's Operations Analysis Assignment

On the operations side, Wendy Hammond wants the Olin group to provide an independent evaluation of Martin's plan. Your report should include an assessment of current operations, an evaluation of the Martin's proposed plan, and, where appropriate, suggestions for improving upon the plan. Assume that Wendy Hammond has provided your group with the following additional guidance as you begin your analysis of the operations at Hammond Cards, Inc. and Creative Designs. Her instructions state that your evaluation of Bob Martin's plan should include, but not be limited to:

1. An assessment of Hammond and CD's current production capabilities.
2. An evaluation of Martin's plan to level Hammond Card production at 37,000 and shift additional demand to Creative Designs.
3. An evaluation of Martin's plan to use Creative Designs as a learning laboratory for the combined operations.
4. An assessment of current quality management practices and an evaluation of Martin's plan for quality improvement in the combined operations.
5. A general evaluation of the operations strategy and potential impacts that may or may not have been addressed by Martin and Hammond.

The Consultant's Profitability Analysis Assignment

Wendy asked Lucy Canella to set the parameters for the profitability assessment. Ms. Canella then provided the guidelines listed below. On the financial side, the report should specifically address the following points:

- 1) Provide a determination of the break-even point, in greeting cards sold, for EACH of the two companies. Based on the results, as well as any other information about the companies, provide your characterization of the business model at each of the two companies. Add any relevant comments or state any pertinent assumptions, as you see fit.
- 2) Provide a table similar to Exhibit 7 for the 5 process steps at the Hammond plant. What is your reaction to the information revealed by this table?
- 3) Provide a table similar to Exhibit 7 for the 7 process steps at the Creative Designs plant. What is your reaction to the information revealed by this table?
- 4) Assume that the two companies merge. Use the table information from Exhibit 7 and from items #2 and #3 above (without any further adjustments!). Determine the expected margin (before general administration expense) from producing an average-sized order from a current Hammond customer for the proposed complex card:
 - a) Producing the cards in the Hammond plant.
 - b) Producing the cards in the Creative Designs plant.
- 5) Repeat item #4 for an average order from a current Creative Designs customer.
- 6) Evaluate the proposed acquisition from a profit improvement perspective. Are there actions you would have to take to ensure that the profit potential from the acquisition is realized? If so, what actions would you take and what impact would they have on the overall profitability of the combined business? Explain your rationale and cite any evidence you believe to be relevant.

Exhibit #1: Monthly and average daily demand at Hammond Cards.

| | Monthly Demand | Avg. Daily Demand | Production Rate (daily) |
|-----------|-----------------------|--------------------------|--------------------------------|
| January | 1,000,000 | 50,000 | 42,000 |
| February | 860,000 | 43,000 | 42,000 |
| March | 640,000 | 32,000 | 42,000 |
| April | 1,040,000 | 52,000 | 42,000 |
| May | 720,000 | 36,000 | 42,000 |
| June | 600,000 | 30,000 | 42,000 |
| July | 520,000 | 26,000 | 42,000 |
| August | 540,000 | 27,000 | 42,000 |
| September | 600,000 | 30,000 | 42,000 |
| October | 620,000 | 31,000 | 42,000 |
| November | 1,060,000 | 53,000 | 42,000 |
| December | 1,080,000 | 54,000 | 42,000 |

Exhibit #2: Monthly and average daily demand at Creative Designs.

| | Monthly Demand | Daily Demand |
|-----------|-----------------------|---------------------|
| January | 200,000 | 10,000 |
| February | 240,000 | 12,000 |
| March | 280,000 | 14,000 |
| April | 180,000 | 9,000 |
| May | 320,000 | 16,000 |
| June | 340,000 | 17,000 |
| July | 360,000 | 18,000 |
| August | 220,000 | 11,000 |
| September | 340,000 | 17,000 |
| October | 220,000 | 11,000 |
| November | 160,000 | 8,000 |
| December | 150,000 | 7,500 |

Exhibit #3: Process results from Hammond Cards' template cutting machine.

| Units 1-11 | Units 12-22 | Units 23-33 | Units 34-44 | Units 45-55 | Units 56-66 |
|-----------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| 18.02 | 18 | 18 | 18.002 | 18 | 18 |
| 18.001 | 18 | 18 | 18.011 | 18 | 18 |
| 18.005 | 18 | 18 | 18.002 | 18 | 18 |
| 18.001 | 18 | 18 | 18.001 | 18 | 18 |
| 18.015 | 18 | 18 | 18.015 | 18 | 18 |
| 17.999 | 18 | 18 | 18.002 | 18 | 18 |
| 18.005 | 18 | 18 | 18.007 | 18 | 18 |
| 18.001 | 18 | 18 | 17.999 | 18 | 18 |
| 17.998 | 18 | 18 | 18.001 | 18 | 18 |
| 17.999 | 18 | 18 | 18.01 | 18 | 18 |
| 18.003 | 18 | 18 | 17.998 | 18 | 18 |

Exhibit #4: Process results from Creative Designs' template cutting machine.

| Units 1-11 | Units 12-22 | Units 23-33 | Units 34-44 | Units 45-55 | Units 56-66 |
|-----------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| 18.020 | 17.998 | 18.001 | 17.996 | 18.025 | 18.020 |
| 17.996 | 18.025 | 17.998 | 18.011 | 17.998 | 18.002 |
| 18.005 | 18.006 | 17.996 | 18.002 | 17.994 | 17.995 |
| 18.001 | 17.998 | 17.998 | 18.001 | 18.001 | 17.999 |
| 17.991 | 17.998 | 17.998 | 18.015 | 17.999 | 17.985 |
| 17.999 | 17.998 | 17.996 | 17.998 | 17.996 | 18.017 |
| 17.991 | 17.997 | 18.001 | 18.007 | 17.999 | 18.005 |
| 18.025 | 18.004 | 17.999 | 17.991 | 17.985 | 18.001 |
| 17.998 | 18.001 | 17.985 | 18.001 | 18.001 | 17.985 |
| 17.999 | 17.985 | 17.985 | 18.010 | 17.998 | 17.996 |
| 17.991 | 17.999 | 18.002 | 17.998 | 18.006 | 18.001 |

Exhibit #5: Selected Comparative Cost and Volume Data

| Data Item | Hammond Plant | Creative Design Plant |
|---|----------------------|------------------------------|
| Average selling price per card | \$0.34 | \$0.75 |
| Average order size (number of cards) | 2,500 | 500 |
| Annual base production volume for analysis (volume of greeting cards) | 10,000,000 | 3,000,000 |
| Materials costs at projected base volume: | | |
| Card stock | \$437,500 | \$131,250 |
| Greeting cards per card stock sheet | 20 | 20 |
| Ink | \$272,500 | \$105,900 |
| Envelopes | \$25,000 | \$7,500 |
| Direct labor costs (includes fringes): | | |
| Hourly wages, non-printing processes | \$7.75 | \$7.75 |
| Hourly wages, printing operations | \$7.75 | \$8.25 |
| Paid hours per day | 8 | 8 |
| Working days per year | 240 | 240 |
| Paid days per year | 260 | 260 |
| Production overhead (excluding machine depreciation): | | |
| Variable overhead: | \$45,000 | \$13,500 |
| Building rent, heat, etc. | \$24,000 | \$20,000 |
| Indirect labor, Plant Administration, etc. | \$324,000 | \$175,000 |
| Sales and Administration costs: | | |
| Variable packing supplies and boxes | \$3,000 | \$900 |
| Sales account representatives | \$125,000 | \$375,000 |
| Order entry clerks | \$33,000 | \$33,000 |
| Shippers | \$15,000 | \$72,000 |
| Book-keeping | \$45,000 | \$70,000 |
| General administrative salaries | \$305,000 | \$155,000 |
| Building rent, heat, etc. | \$68,750 | \$55,000 |
| Annual furniture and fixtures depreciation | \$48,300 | \$43,700 |
| Gross book value of furniture and fixtures | \$575,000 | \$500,250 |

Exhibit #6: Comparative Depreciable Machine Purchase Costs

| Machine Type | Hammond | | Creative Designs | |
|---------------------|-------------------------|-----------------|-------------------------|-----------------|
| | Cost per machine | Quantity | Cost per machine | Quantity |
| Template Cutting | \$295,000 | 2 | \$295,000 | 1 |
| Printer #1 | 950,000 | 4 | 175,000 | 2 |
| Printer #1A | n/a | none | 225,000 | 2 |
| Printer #2 | 950,000 | 5 | 225,000 | 2 |
| Printer #2A | n/a | none | 160,000 | 3 |
| Folding/UPC code | 205,000 | 2 | 205,000 | 2 |
| Scanning/Packaging | 215,000 | 2 | 95,000 | 2 |

Note: All machines to be depreciated using straight-line depreciation over a ten year period.

Exhibit #7: Canella's ABC Analysis of Combined Sales and Administration Functions

Activity Cost Computation

| | Selling Process | Order Processing | Order Picking | Pack & Ship | Billing & A/P | Total Cost |
|-------------------------------------|------------------------|-------------------------|----------------------|------------------------|--------------------------|-------------------|
| Salaries and Wages | 500,000 | 66,000 | 52,200 | 34,800 | 115,000 | 768,000 |
| Variable Packing Supplies and Boxes | | | | 3,900 | | 3,900 |
| Equipment Depreciation | 8,000 | 4,000 | 40,000 | 12,000 | 16,000 | 80,000 |
| Occupancy Costs | 28,125 | 16,875 | 11,250 | 39,375 | 16,875 | 112,500 |
| Total Activity Cost | \$536,125 | \$86,875 | \$103,450 | \$90,075 | \$147,875 | \$964,400 |
| Cost Driver* | | | | | | |
| # Customer Contact Hours | 15,360 | | | | | |
| # Orders | | 10,000 | | | | |
| # of Different Card Styles Shipped | | | 140,000 | | | |
| # of Boxes Packed | | | | 26,000 | | |
| # of Billing transactions | | | | | 10,000 | |
| Cost per Driver | \$34.90 | \$8.69 | \$0.74 | \$3.46 | \$14.79 | |

* Recall that a *package* is a collection of 20 greeting cards put together in the last production process step, Scanning and Packaging. A *box* is a shipping carton filled with 25 packages of cards (500 cards). Boxing is part of the sales distribution function.

Note 1: Costs shared across production process steps.

- Variable overhead costs are driven by the number of machines in each production step.
- Costs for building rent, heat, etc. are also proportional to the number of machines in each process step.
- Costs of indirect labor, plant administration, etc. are proportional to the number of direct workers at each process step.

Exhibit #8: Cost Drivers for Process steps: Process cost share assigned to products

| Process step | Driver activity |
|---------------------|---|
| Template Cutting | Number of card stock sheets used |
| Printer #1 | Number of printer #1 impressions |
| Printer #1A | Number of printer #1A impressions (not applicable at Hammond plant) |
| Printer #2 | Number of printer #2 impressions |
| Printer #2A | Number of printer #2A impressions (not applicable at Hammond plant) |
| Folding/UPC code | Number of folds |
| Scanning/Packaging | Number of packages produced |

Exhibit #9: Data for Proposed Complex Design Card

Current Standard Design

| | |
|--------------------------------------|----|
| Cards per stock sheet | 20 |
| Number of background colors | 2 |
| Number of foreground colors | 2 |
| Number of folds/card | 1 |
| Standard number of cards per package | 20 |

Proposed Complex Design

| | |
|--------------------------------------|----|
| Cards per stock sheet | 15 |
| Number of background colors | 4 |
| Number of foreground colors | 3 |
| Number of folds/card | 2 |
| Standard number of cards per package | 20 |

NOTE: Each printing machine at each plant can print up to two colors in a single pass. More than two colors from one machine will require more than one printing pass. Although there are more ink colors in the proposed complex product design, the total amount of ink consumed is the same as the current standard card.

Exhibit #10: Typical Customer Profiles for Current Sales

| | Hammond | Creative Designs |
|---------------------------------------|----------------|-------------------------|
| Average number of cards per order | 2500 | 500 |
| Average number of styles per order | 20 | 10 |
| Average number of cards per style | 125 | 50 |
| Average boxes per order | 5 | 1 |
| Average sales contact hours per order | 0.96 | 1.92 |
| Standard number of bills per order | 1 | 1 |

Hammond Cards, Inc: The Creative Acquisition

Teaching Note

Introduction

Many business programs in recent years have moved toward an integrated curriculum. Integration, however, remains a formidable challenge. One reason is the lack of good integrative teaching materials. This case is designed to address this gap by focusing on the connection between operations management and strategic cost management. It is primarily meant for MBA audiences but it can be used in advanced undergraduate management accounting and operations classes. The central integration point in this case is the relationship between the selection of an operations/production strategy and its impact on profitability.

Case Overview

Wendy Hammond is the President of Hammond Cards, a business her father started. Hammond Cards is small relative to industry leaders such as Hallmark. To grow the business, Wendy is thinking of acquiring Creative Designs, another Card manufacturer. Wendy believes that the proposed acquisition of Creative Designs would provide scale economies and cross selling opportunities to existing customers of the two companies and bring new customers as the combined operations can offer a wider variety of products.

The two companies, Hammond and Creative, have different manufacturing operations and different customer profiles. Hammond produces simple and standard-sized greeting cards that are packaged in sets of 20 cards to a package. They are sold to large low priced retailers such as K-Mart, Wal-Mart or Walgreens or to major wholesale/distribution operations. The retailers sell the cards as a boxed set or open the package and vend them one at a time. Hammond's business model is low margin high volume. It requires high capacity utilization to make money.

In contrast, Creative Designs specializes in so-called studio cards. These are high-end greeting cards sold individually at retail. Because it produces cards in non-standard sizes, Creative Designs does not participate in the big-store supply chain. The majority of Creative Designs cards are sold through smaller specialty shops and chains (stationery, cards, gifts, etc.). It serves a niche market and there is little opportunity to make money through high capacity utilization. Creative's production operations are optimized for high margin-moderate volume production.

Even though the companies produce different types of cards and sell them to different customers, their manufacturing operations are remarkably similar. Both companies use the same kind of machines in the same way with the same, union-established pay rates. The main point of difference in the products is the size and design of the cards. As a result, the two production operations have essentially the same production steps, but the Creative Design plant uses more printers in order to produce their more elaborate card designs. Wendy is hoping that this similarity in operations will allow opportunities for improved process management by sharing the combined demand across the two plants. There is also the opportunity to transfer best practices between plants. The reduction in waste and inefficiency will lessen overall costs as a percentage of revenues and increase the bottom line. On the market side, the ability to exploit the different distribution channels and customer segments could help to smooth out seasonal demand fluctuations and allow efficient management of inventory.

Before proceeding with the merger, Wendy wants to make certain that those expected benefits will be forthcoming. The students are instructed to act as her external consulting team – Olin Consultants. She wants them to talk to Bob Martin, Vice-President of Operations at Hammond Cards. Martin is looking to maintain level production at the Hammond plant and offload peak demand to Creative, but the different business models of the two plants make this difficult. Offloading excess demand from Creative to Hammond makes profit sense, but there is no excess demand at Creative. Offloading excess demand from

Hammond to Creative does not make profit sense, but transient demand peaks exceed capacity at Hammond. The new joint venture will require some modification of production at both sites if production of both product lines is to be done across plants.

To test the profit impact of the joint operations, the strategic cost analysis uses a new order from a customer as a test case to determine which of the two plants is best suited to produce the cards and which customer is the most profitable for this particular design. The analysis is designed to test whether there is a match between certain card styles, production quantities and customers or whether for a certain type of order one plant or one customer type will dominate. This type of analysis is what allows integration between the two disciplines of operations and strategic cost analysis.

Case Learning Objectives

The case has both separable discipline specific as well as integrative learning objectives. They are:

Operations Discipline

1. Apply basic process analysis to compute available capacity and cycle time.
2. Identify capacity bottlenecks and use the information for line balancing;
3. Compute finished good and work-in-process inventories as lead times change and production planning becomes speculative.
4. Learn the tradeoff between JIT inventory management versus level production planning.
5. Evaluate quality management practices using cost of quality, capability analysis, histograms, and Pareto charts, and run charts.

Strategic Cost Analysis Discipline

1. Compute a breakeven point and use cost variability analysis to understand the difference in the operating leverage between the two companies.
2. Use the results of process analysis to compute activity costs for different production processes.
3. Apply activity based costing to compute the cost of serving different customers.
4. Use the results of activity based operations costs and customer service costs to analyze potential production sourcing and customer mix decisions.

Integration Objectives:

1. Understand how process design and operational characteristics such as lead time and cycle time create inventories.
2. Understand the conceptual relationship between quality management practices and cost of quality.
3. Examine the relationship among production strategy, plant design, cost structure and operating leverage (i.e. how they production strategy changes breakeven point).
4. Appreciate the balance between operational efficiencies and customer service costs in increasing profitability.

Teaching Strategy

This case is best taught when the operations and strategic cost sessions are taught within the same week so there is little time lag between the discussion of operations and cost issues. Operations management is the logical place to start with strategic cost analysis following closely on its heels. However, we have designed enough independence between the two parts of the case so that they could be used even if the classes are not scheduled close together.

An important aspect of teaching an integrated case is the interdependence of data between operations and cost. For example, the calculation of cycle time impacts production capacity which in turn affects unit product cost. If students have different numbers for productive capacity, their unit cost calculations will be different. This dependence, while logical for showing the connections between the production side and the cost side, can create a pedagogical challenge. Differences in assumptions or minor arithmetic and rounding differences can result in production quantities which have little significance for the operations side but can result in students having very different cost numbers. This can confuse the class as they may not know whether their numbers are the result of logic errors or simply reflect viable alternative assumptions. To avoid confusion that can come from teaching with multiple set of numbers, we often make the numbers close but independent in the two parts of this case and provide the following additional instruction to the students:

“Assume that Wendy’s charge to Olin stipulates not to **COMPLICATE** the operations and accounting analyses by combining or cross-tabulating them in any way. Rather, she wants you to produce two separate reports. One should be focused only on the operational issues so that she could better assess the potential operations-based benefits of the proposed acquisition – independent of the financial effects. The other should be focused on the cost and profit implications of the utilization of resources inherent in the ways the businesses were currently run, examining the potential to improve bottom-line outcomes.”

This instruction, while creating an artificial distinction between the two disciplines, helps to narrow the numbers to one set of computational issues can be separated from conceptual issues. Alternatively, if the sessions are sequenced in a “hand-off” pairing, a set of exit data from the first session can be officially added to the data set in the case and applied to the second session.

Suggested Detailed Agenda—Operations Class Session (90 minutes)

We recommend that the instructor take a couple of minutes upfront to set the stage for the integrative learning from this case. A good way to set the stage is to use an example that demonstrates the relationship between production operations strategy, market strategy, and cost. We use the defense industry in the 1990’s as a real world example of how operations and cost strategy can get disconnected or are difficult to synchronize. After the end of the cold war, the defense industry faced a massive reduction in capacity. Several defense contractors such as Hughes, Rockwell Collins, and Textron decided to shift their strategy to use their proprietary technologies to produce low cost civilian products. Many of these technologies, for example, mini radars and large screen high definition TV, had come out of the military side and it seemed logical to create spin-off products for the civilian market. The effort, however, was mostly unsuccessful. One reason was that the operations were optimized for defense applications that were low volume, high performance (high quality) and high cost to serve a single customer (the Pentagon). Civilian markets, on the other hand, required high volume, acceptable quality, low cost, and agile marketing. Defense firms found it hard to change their operations strategy to meet the new cost and market challenges. Many who tried ended with a mismatch between their market strategy and their operations strategy. This is why civilian firms such as BMW and Fujitsu were the first to introduce mini-radars and high definition TV commercially. (5 minutes)

1. We usually begin by asking someone (or a team) to summarizing the “big issue” in this case. Surprisingly, students have a great deal of difficulty enunciating the business issue. They tend to get caught with the discipline based issues and often phrase the big issue as a capacity matching or production rate or cycle time problem. We try to steer them away to from discipline based issue to the business issue. Once we get them to see that the big issue for Wendy is whether there are synergies in the combination and therefore whether to go ahead with the merger, we put this on a side blackboard so we can bring the discussion back to the big issue throughout the class. We find this simple technique to

be very helpful in integrating across disciplines. The business issue is the glue to hold both the operations and cost discussions together. (5 minutes)

2. We then ask a student or a team to lead the class discussion by providing an assessment of Hammond and Creative's production capacity. This is usually easier if the presenters have a spreadsheet to display or share with the class. (The instructor may want to make this requirement explicit so people do not try to "talk" through numbers with no visual aids). The key points that the student analysis should cover are:
 - a. Students should create a matrix similar to TN-1 and TN-2. For introductory courses, you may wish to provide a template for this analysis. A complete analysis should identify system cycle time, bottlenecks, system capacity and capacity utilization for both the Hammond and Creative Design production environment.
 - b. Additionally, we expect students to note that Hammond's line is reasonably well-balanced and that, in violation of Martin's target, at daily production rates of 42,000 current capacity utilizations are approaching 100%.
 - c. Students should also recognize that shifting daily production rates to 37,000 will permit Martin to achieve the targeted utilization rate – now 86% at the bottleneck step.
 - d. By contrast, the Creative Design system is poorly balanced, though there is evidence of excess capacity that could support the proposed demand shift.

We close this segment by getting one agreed upon set of numbers for the productive capacity of the two companies. (25 minutes)

3. Next we ask a different student or team (one that typically has the numbers we have agreed upon in part 1) to provide us with an evaluation of Martin's plan to level Hammond Card production at 37,000 and shift additional demand to Creative Designs. Exhibits TN-3 and TN-4 show the calculation and matching of Hammond and Creative production capacity with demand. The key points that students must recognize from this analysis are:
 - a. As noted above, students should observe that setting production levels to 37,000 achieves the desired effect at Hammond.
 - b. However, Martin's effort to shift demand to Creative Designs will result in utilization rates greater than 90% in four of the twelve months. A common error, and critical teaching point, among our students is the calculation of 'average demand' and 'average utilization'. Students must understand that period-specific (monthly here) utilization calculation is necessary with variable demand and a chase-demand production strategy.
 - c. A complete inventory analysis will demonstrate that finished goods inventory will actually increase under Martin's proposal. This is both a problem and an opportunity. It is a problem in that the goal was reduction in finished good inventory. It is an opportunity if Martin adjusts his proposal to shift less demand to Creative Designs, which will address the high utilization levels in peak months.
 - d. Students can estimate work-in-process inventory based upon current lead times. This allows further analysis to estimate Work In Process (WIP) reduction necessary to meet market expectations. This rough analysis facilitates a discussion of WIP reduction strategies and challenges.

We usually close this segment in 20 minutes. If the discussion takes longer, we usually skip the quality question and simply go to number 5 below.

4. We next turn to another student or team and ask them for their assessment of the current quality management practices and to evaluate Martin's plan for quality improvement for the combined operations. A good response typically covers the following key points:
 - a. Students should complete an analysis of quality processes at both companies. This analysis will demonstrate that quality is actually worse at Creative Designs, as compared to Hammond, which has implications for the proposed learning laboratory.
 - b. The quality analysis can be framed by Juran's cost of quality framework, incorporating assessment of prevention, appraisal, internal failure and external failure in the analysis.
 - c. Creative Design's utilization is quite low, which may suggest that operators are correcting errors (internal failures) prior to shipment. This has obvious cost implications and will not be sustainable at higher levels of capacity utilization.
 - d. It is also likely that external failure costs are higher than management perception. Management currently uses a metric of 'returned cards' – but who returns a card? This can lead to a discussion of quality metric validity – are you examining the 'right' metrics.

We allocate 15 minutes to this segment.

5. Our final question is to ask the class for their general evaluation of the operations strategy and potential effects that may or may not have been addressed by Martin and Hammond. The typical responses we get are:
 - a. The analysis of the demand transfer effects on Hammond and Creative Designs often allow students to more fully appreciate the differences between a level production and a more variable, chase-demand environment. Time permitting; you can expand this discussion to the challenges associated with service operations and arrival time variability.
 - b. Students often become internally focused on the process and quality analysis. This causes them to miss potential supply chain management implications of the proposal. Hammond should not go forward with this proposal prior to a full examination of inbound and outbound logistics implications. For example, can Hammond's suppliers deliver to the Creative Design facility?
 - c. The concept of a learning laboratory may have benefits for process improvement. However, Hammond may be the better location for this laboratory given the presence of a balanced line, stable demand, higher volume of repeatable tasks and more consistent quality.

This session usually takes 15 minutes.

6. We use the last five minutes of the class to summarize the key lessons from the operations analysis. The most important lessons are:
 - a. Process analysis matters! You can't assess the full potential of a strategy shift without assessing the total impact on operations.
 - b. The potential benefit of an informed (process analysis) results in a hybrid solution somewhat different than Martin's proposal. His plan has merit; but it needs some fine-tuning to be a viable and profitable solution for Hammond.
 - c. Inventory and supply chain management can not be taken for granted. It's easy to ignore the potential SCM issues for Hammond. Similarly, a qualitative assessment will lead to belief that Martin's plan reduces inventory.

Suggested Detailed Agenda -- Strategic Cost Analysis

We start the strategic cost analysis class by asking someone in the class to summarize the key lessons from the operations side. The effort here is to connect the major lessons from the operations side (the last five minutes) to set up the discussion for the cost side.

1. We begin the cost part of the class discussion by asking a student or a team to lead us into a discussion of the breakeven point for each of the two companies. Exhibit TN-5 contains the results of the breakeven analysis. The computations are fairly straight forward and most students do not have difficulty separating fixed and variable costs. The one error that some students make is to confuse the gross book value of fixed assets with depreciation. We get the numbers out of the way fairly quickly and ask students to tell us what they have learned from the breakeven analysis. Their response should cover the following major points:
 - a. Even though they have a similar production process, the two companies have different cost structures. Creative has a higher material and labor cost per unit.
 - b. Creative has a higher Return on Assets than Hammond because it has a better utilization of its assets as measured by the Asset Turnover.
 - c. Hammond's breakeven point in cards is almost 3.5 times as high as Creative confirming that Hammond is a high volume producer.
 - d. Both companies have a poor operating leverage since it requires nearly 80 percent plus of their productive capacity, as measured by current demand, simply to breakeven.

(15 minutes)

2. The breakeven provides data about the cost structure and existing capacity utilization to see if off-loading transient demand is possible. The next step is to determine the unit production cost for the two plants. This is fairly easy as we have provided a sample table to keep the variation in the numbers down and to make the case easier to handle within the 90 minute time frame. We use something similar to Exhibits TN-6 and TN-7 to show the activity based cost analysis of Hammond's and Creative's operations. Once we get the numbers out of the way (which can be done relatively quickly), we focus on the insights gained from the numbers. The following major points emerge:
 - a. On an absolute basis, Template Cutting and Scanning are the most expensive parts of the production process for both companies. This should be the focus for process redesign.
 - b. The highest proportion of unit product cost is contributed by the printing steps. This should be the focus of product redesign.
 - c. To print a card that requires multiple printing steps, means running it twice through the two printers at Hammond whereas in Creative, it goes through once but uses four printing machines.

(30 minutes)

3. We next turn to the question of sourcing the production for the new proposed complex card. We ask students what happens if the new card is printed at Hammond and at Creative respectively. Exhibits TN-8 and TN-9 show the cost and the expected gross margin from producing the card at the two plants. The Exhibits should be used to mine the following insights:
 - a. The cost of producing the card at Hammond is \$0.39 and the cost of producing it at Creative is \$0.41 per card. Even though printing the card is more complex at the Hammond plant, efficiencies in other production steps make the card less expensive overall to produce there. It appears that the Hammond plant is cheaper to produce this new card type.

Exhibit TN-2: Creative's Production Capability

| | CT per 100 | Set-up | Lot size | Mach | Wkrs | Avg. CT | Capacity | Cap Util | Dir. Labor | Mach. | Cap Util |
|------------------|--------------|----------|------------|----------|----------|--------------|---------------|------------|--------------|-----------------|----------|
| | Assm Line | | | | | | 450 | 18000 | | | 7500 |
| Step 1 | 0.8 | 1 | 100 | 1 | 1 | 0.018 | 25,000 | 72% | 0.018 | 0.008 | 30% |
| Step 2 | 0.03 | 0 | 1 | 2 | 2 | 0.017 | 27,000 | 67% | 0.0333 | 0.033333 | 28% |
| Step 3 | 0.03 | 0 | 1 | 2 | 4 | 0.013 | 36,000 | 50% | 0.05 | 0.025 | 21% |
| Step 4 | 0.03 | 0 | 1 | 2 | 2 | 0.013 | 33,750 | 53% | 0.0266667 | 0.026667 | 22% |
| Step 5 | 0.04 | 0 | 1 | 3 | 6 | 0.013 | 33,750 | 53% | 0.08 | <u>0.04</u> | 22% |
| Step 6 | 0.02 | 0 | 1 | 2 | 2 | 0.012 | 38,571 | 47% | 0.0233333 | 0.023333 | 19% |
| Step 7 | 0.42 | 0.25 | 20 | 2 | 4 | 0.017 | 27,000 | 67% | 0.0666667 | 0.020833 | 28% |
| T-Put | 2.615 | | | 14 | 21 | | 18,000 | | 0.298 | 0.177167 | |
| | | | | | | | | | DL | MT | |
| Lab. Ut. | 56.8% | | | | | | | | 17.88 | 10.63 | |
| Mach. Ut. | 50.6% | | | | | Step 2 | Seconds | 2 | 0.0333333 | | |
| | | | | | | Step 3 | Seconds | 1.5 | 0.025 | | |
| | | | | | | Step 4 | Seconds | 1.6 | 0.0266667 | | |
| | | | | | | Step 5 | Seconds | 2.4 | 0.04 | | |
| | | | | | | Step 6 | Seconds | 1.4 | 0.0233333 | | |
| | | | | | | Step 7 | Seconds | 25 | 0.4166667 | | |

Exhibit TN-4: Creative's Demand Analysis

| | Monthly | Daily | Overflow Demand | Total Demand | CD Capacity | CD Total Cap. Util. | CD Util. w/only CD |
|--------------|------------------|----------------|------------------------|---------------------|--------------------|----------------------------|---------------------------|
| January | 200,000 | 10,000 | 13,000 | 23,000 | 25,000 | 92% | 40% |
| February | 240,000 | 12,000 | 6,000 | 18,000 | 25,000 | 72% | 48% |
| March | 280,000 | 14,000 | 0 | 14,000 | 25,000 | 56% | 56% |
| April | 180,000 | 9,000 | 15,000 | 24,000 | 25,000 | 96% | 36% |
| May | 320,000 | 16,000 | 0 | 16,000 | 25,000 | 64% | 64% |
| June | 340,000 | 17,000 | 0 | 17,000 | 25,000 | 68% | 68% |
| July | 360,000 | 18,000 | 0 | 18,000 | 25,000 | 72% | 72% |
| August | 220,000 | 11,000 | 0 | 11,000 | 25,000 | 44% | 44% |
| September | 340,000 | 17,000 | 0 | 17,000 | 25,000 | 68% | 68% |
| October | 220,000 | 11,000 | 0 | 11,000 | 25,000 | 44% | 44% |
| November | 160,000 | 8,000 | 16,000 | 24,000 | 25,000 | 96% | 32% |
| December | 150,000 | 7,500 | 17,000 | 24,500 | 25,000 | 98% | 30% |
| | 3,010,000 | 150,500 | 67,000 | 217,500 | 300,000 | | |
| Daily | 4,200 | | 1,340,000 | 4,350,000 | 6,000,000 | | |
| Monthly | 84,000 | | | | 116,000 | | |
| Annual | 1,008,000 | | | | 6,116,000 | | |

Exhibit TN-5: Breakeven Analysis

| | | Hammond | | Creative |
|--|---|----------------|----|-----------------|
| Price | | 0.34 | | 0.75 |
| VC/u | | | | |
| Card stock | | 0.04 | | 0.04 |
| Ink | | 0.03 | | 0.04 |
| Envelope | | 0.00 | | 0.00 |
| VOH | | 0.00 | | 0.00 |
| | | 0.08 | | 0.09 |
| CM/u | | 0.26 | | 0.66 |
| TFC | | | | |
| DL, n-p | 6 | 96,720 | 7 | 112,840 |
| DL,p | 9 | 145,080 | 14 | 240,240 |
| Building rent, heat, etc. | | 24,000 | | 20,000 |
| Indirect labor, Plant Administration, etc. | | 324,000 | | 175,000 |
| Sales account representatives | | 125,000 | | 375,000 |
| Order entry clerks | | 33,000 | | 33,000 |
| Shippers | | 15,000 | | 72,000 |
| Book-keeping | | 45,000 | | 70,000 |
| General administrative salaries | | 305,000 | | 155,000 |
| Building rent, heat, etc. | | 68,750 | | 55,000 |
| Annual furniture and fixtures depreciation | | 48,300 | | 43,700 |
| | | | | |
| Template Cutting | | 59,000 | | 29,500 |
| Background printer #1 | | 380,000 | | 35,000 |
| Background printer #2 | | 0 | | 45,000 |
| Foreground printer #1 | | 475,000 | | 45,000 |
| Foreground printer #2 | | 0 | | 48,000 |
| Folding/UPC code | | 41,000 | | 41,000 |
| Scanning/Packaging | | 43,000 | | 19,000 |
| | | 2,227,850 | | 1,614,280 |
| BEP/u | | 8,503,244 | | 2,431,328 |
| BE as percent of Productive Capacity | | 85% | | 81% |

Exhibit TN-6: Operations Cost Hammond Plant

| | | | | | | |
|--|------------------|-----------------------|-----------------------|------------------|--------------------|--------------------|
| Machines | 2 | 4 | 5 | 2 | 2 | 15 |
| Workers | 2 | 4 | 5 | 2 | 2 | 15 |
| | Template Cutting | Background printer #1 | Foreground printer #1 | Folding/UPC code | Scanning/Packaging | Total Cost |
| Direct labor | 32,240 | 64,480 | 80,600 | 32,240 | 32,240 | 241,800 |
| Variable overhead | 6,000 | 12,000 | 15,000 | 6,000 | 6,000 | 45,000 |
| Building rent, heat, etc. | 3,200 | 6,400 | 8,000 | 3,200 | 3,200 | 24,000 |
| Indirect labor, Plant Administration, etc. | 43,200 | 86,400 | 108,000 | 43,200 | 43,200 | 324,000 |
| Depreciation | 59,000 | 380,000 | 475,000 | 41,000 | 43,000 | 998,000 |
| Total Activity Cost | \$143,640 | \$549,280 | \$686,600 | \$125,640 | \$127,640 | \$1,632,800 |
| Cost Driver | | | | | | |
| Number of card stock sheets used | 500,000 | | | | | |
| Number of print impressions | | 10,000,000 | | | | |
| Number of print impressions | | | 10,000,000 | | | |
| Number of folds | | | | 10,000,000 | | |
| Number of packages produced | | | | | 500,000 | |
| | \$0.29 | \$0.05 | \$0.07 | \$0.01 | \$0.26 | |

Exhibit TN-7: Operations Cost Creative Plant

| | | | | | | | | |
|-----------------------------------|------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------|--------------------|------------------|
| Machines | 1 | 2 | 2 | 2 | 3 | 2 | 2 | 14 |
| Workers | 1 | 2 | 4 | 2 | 6 | 2 | 4 | 21 |
| | Template Cutting | Background printer #1 | Background printer #2 | Foreground printer #1 | Foreground printer #2 | Folding/UPC code | Scanning/Packaging | Total |
| Direct labor | 16,120 | 34,320 | 68,640 | 34,320 | 102,960 | 32,240 | 64,480 | \$353,080 |
| Variable overhead | 964 | 1,929 | 1,929 | 1,929 | 2,893 | 1,929 | 1,929 | \$13,500 |
| Building rent, heat, etc. | 1,429 | 2,857 | 2,857 | 2,857 | 4,286 | 2,857 | 2,857 | \$20,000 |
| Indirect labor, Plant Admin. etc. | 8,333 | 16,667 | 33,333 | 16,667 | 50,000 | 16,667 | 33,333 | \$175,000 |
| Depreciation | 29,500 | 35,000 | 45,000 | 45,000 | 48,000 | 41,000 | 19,000 | \$262,500 |
| Total Activity Cost | \$56,346 | \$90,772 | \$151,759 | \$100,772 | \$208,139 | \$94,692 | \$121,599 | \$824,080 |
| Cost Driver | | | | | | | | |
| Number of card stock sheets used | 150,000 | | | | | | | |
| Number of print impressions | | 3,000,000 | | | | | | |
| Number of print impressions | | | 3,000,000 | | | | | |
| Number of print impressions | | | | 3,000,000 | | | | |
| Number of print impressions | | | | | 3,000,000 | | | |
| Number of folds | | | | | | 3,000,000 | | |
| Number of packages produced | | | | | | | 150,000 | |
| | \$0.38 | \$0.03 | \$0.05 | \$0.03 | \$0.07 | \$0.03 | \$0.81 | \$0.38 |

Exhibit TN-8: Proposed Complex Card Sold to Hammond Customer

| | Dollars | Drivers | Hammond Plant | Dollars | Drivers | CD Plant |
|---------------------------------------|----------------|----------------|--------------------------|----------------|----------------|-----------------|
| Revenue | \$0.65 | 2,500.00 | \$1,625.00 | \$0.65 | 2500 | \$1,625.00 |
| | | | | | | |
| COGS | | | | | | |
| Card stock | | | 145.83 | | | 145.83 |
| Ink | | | 68.13 | | | 88.25 |
| Envelope | | | 6.25 | | | 6.25 |
| Template cutting | 0.29 | 166.67 | 47.88 | 0.38 | 166.67 | 62.61 |
| Printer 1 | 0.05 | 5,000.00 | 274.64 | 0.03 | 2,500.00 | 75.64 |
| Printer 2 | 0.07 | 5,000.00 | 343.30 | 0.05 | 2,500.00 | 126.47 |
| Printer 3 (Creative only) | | | | 0.03 | 2,500.00 | 83.98 |
| Printer 4 (Creative only) | | | | 0.07 | 2,500.00 | 173.45 |
| folding/UPC | 0.01 | 5,000.00 | 62.82 | 0.03 | 5,000.00 | 157.82 |
| Packing | 0.26 | 125.00 | 31.91 | \$0.81 | 125 | 101.33 |
| | | | 980.76 | | | \$1,021.63 |
| COGS per unit | | | \$0.39 | | | \$0.41 |
| | | | | | | |
| | | | | | | |
| GM | | | 644.24 | | | \$603.37 |
| | | | | | | |
| SGA | | | | | | |
| # Customer Contact Hours | 34.90 | 0.96 | 33.50 | | | 33.50 |
| # Orders | 8.69 | 1.00 | 8.69 | | | 8.69 |
| # of Different Card Styles Shipped | 0.74 | 20.00 | 14.80 | | | 14.80 |
| # of Boxes Packed | 3.46 | 5.00 | 17.30 | | | 17.30 |
| # of Billing transactions | 14.79 | 1.00 | 14.79 | | | 14.79 |
| | | | \$89.08 | | | \$89.08 |
| | | | | | | |
| Total Margin | | | \$555.16 | | | \$514.29 |
| Margin per card | | | \$0.22 | | | \$0.21 |

Exhibit TN-9: Proposed Complex Card Sold to Creative Customer

| | Dollars | Drivers | Hammond Plant | Dollars | Drivers | CD Plant |
|---------------------------------------|----------------|----------------|--------------------------|----------------|----------------|-----------------|
| Revenue | \$0.90 | 500 | \$450.00 | \$0.90 | 500 | \$450.00 |
| COGS | | | | | | |
| Card stock | | | 29.17 | | | 29.17 |
| Ink | | | 13.63 | | | 17.65 |
| Envelope | | | 1.25 | | | 1.25 |
| Template cutting | 0.29 | 33.33 | 9.58 | 0.38 | 33.33 | 12.52 |
| printer 1 | 0.05 | 1,000.00 | 54.93 | 0.03 | 500.00 | 15.13 |
| printer 2 | 0.07 | 1,000.00 | 68.66 | 0.05 | 500.00 | 25.29 |
| folding/UPC | 0.01 | 1,000.00 | 12.56 | 0.03 | 500.00 | 16.80 |
| Packing | 0.26 | 25.00 | 6.38 | 0.07 | 500.00 | 34.69 |
| | | | 196.15 | 0.03 | 1,000.00 | 31.56 |
| | | | 0.39 | 0.81 | 25.00 | 20.27 |
| | | | | | | \$204.33 |
| | | | | | | \$0.41 |
| GM | | | \$253.85 | | | \$245.67 |
| | | | | | | |
| SGA | | | | | | |
| # Customer Contact Hours | 34.90 | 1.92 | 67.01 | | | \$67.01 |
| # Orders | 8.69 | 1.00 | 8.69 | | | \$8.69 |
| # of Different Card Styles Shipped | 0.74 | 10.00 | 7.40 | | | \$7.40 |
| # of Boxes Packed | 3.46 | 1.00 | 3.46 | | | \$3.46 |
| # of Billing transactions | 14.79 | 1.00 | 14.79 | | | \$14.79 |
| | | | \$101.35 | | | \$101.35 |
| Margin | | | \$152.50 | | | \$144.33 |
| Margin per card | | | \$0.31 | | | \$0.29 |