**Hot Bricks Inc.**

**Introduction**

Hot Bricks Inc. is a manufacturing company that provides high-temperature bricks, which are specially produced to be used in high-temperature environments. For years, Hot Bricks Inc. produced and sold only one product: the HB22, which is useful in environments up to 2200 degrees Fahrenheit. Through their research and development, they formulated two new brick products: the HB27, and the HB29. The new products use the same raw materials and the same equipment used to produce the HB22. The components that make up the three brick products are as follows: high-purity refractory clay, alumina, and organic pellets that burn out during the manufacturing process and leave a uniform pore structure within the brick, which is desirable to their customers. Each brick product is "fired" in an oven at a temperature just above their suggested use temperature to give the bricks the desired properties. Once fired and cooled, the bricks go through a standard grinding process to create bricks with a 9"x6"x3" dimension.

**Brick Making Process**

The manufacturing process begins with mixing, where the required materials are added. The bricks are then formed using molds. One batch of the mixing process produces exactly 500 bricks. After remaining in the molds for a short duration, the bricks are allowed to air dry to remove excess moisture that could destroy the bricks during the firing process. The bricks then undergo firing at high temperatures in furnace ovens called kilns. These kilns have many burners through which natural gas enters the furnace. The firing process involves several steps. Preheating removes the water leftover from the drying process. The temperature then steadily increases to the desired level for a period of time to cause a chemical and physical change to the brick. In the final cooling stage, the temperature must be lowered slowly and steadily to prevent the bricks from cracking. Bricks fired to higher temperatures require more fuel because additional fuel is required to achieve the necessary higher temperatures and because these bricks have to pass through the kiln more slowly. The amount of fuel used is measured by BTUs.

After being fired and cooled, the bricks all pass through an automatic grinding machine that uses specialized grinding wheels to grind them to the desired size. Production managers have noted that the new brick products require more time to grind and cause more wear on the grinding wheels. They believe it is because the higher temperature used to fire them makes them harder.

On occasion, customers require specially shaped bricks. To supply the special shapes, bricks that have already been ground to 9"x6"x3" must undergo additional grinding by hand.

**Manufacturing Cost information**

Hot Bricks Inc. developed its current costing system when they only produced the HB22. That cost system has two main cost categories for producing brick products; material costs and conversion costs. The conversion cost category includes direct labor and manufacturing overhead. Both costs are allocated to each brick produced. The current material cost for a single brick of products HB 22, HB 27 & HB 29 are $4.00, $5.00 & $6.00 respectively. This cost is a function of the material composition and volume required for the molds. The higher temperature products require a greater mix of higher-priced raw materials. When HBI only manufactured the HB 22, the conversion costs (labor and overhead) were allocated based on production volume using a traditional (simple) cost system based. In the year before adding new products, HBI determined the average conversion cost per HB 22 brick to be about $4.75.

The ability to provide the new products did not require additional capital investment. HBI simply had to add an additional manufacturing shift. That decision was expected to lower short and long-term costs associated with warming up and cooling down the kiln. Previously, HBI used fuel to warm the ovens up prior to use and to control the cooling of the ovens at the end of the day. The process of cycling the furnace from cold to hot to cold each day also causes damage to the furnace. This damaged is minimized, but not eliminated, by controlling how quickly the furnace heats up and cools down; however, it did require the use of fuel and labor to monitor the process. Now that the furnace is kept at an operating temperature around the clock, HBI expects to eliminate wasted fuel and labor costs, as well as the cost of repairs due to cycling the temperature.

In the most recent analysis of product costs, which includes the new products, the average conversion cost per unit was about $5.50 per brick. This was calculated by dividing total conversion costs for the month by the total numbers of bricks produced in the month. While there is clearly an increase in the average conversion cost of each brick, management has not put its finger on a specific reason for the higher costs.

**Pricing -**

HBI sets prices based on the product cost. Their markup is set to cover selling and administrative expenses and return a desired level of profit. The current prices have a 50% markup over the manufacturing cost. Based on the most recent conversion cost information, the price of the HB22s has increased.

**Market conditions**

The HB22 has enjoyed a long-standing reputation for quality and HBI management is committed to ensuring the continued quality for the HB22 and equal quality for its new products. All reports from customers suggest that HBI has succeeded in its quality goal. HBI management has been very pleased to see higher than expected growth and market share for their new HB27 and HB29 products. This was an unexpected outcome but was a particularly welcome surprise because HBI also experienced an unexpected decrease in demand for the HB22. Another recent change in the market is that HBI has also seen an increase in the number of special shapes ordered.

**Opportunity to obtain a long-term contract with new customer**

The sales manager, Steve, has received an offer from a potential new customer for purchasing large quantities of HB27s and HB29s that are hand-ground to a custom size. The customer wants to establish a contract based on the current prices.

**Accepting or rejecting long-term price commitment**

HBI president, Pete Whittaker, is responsible for the final decision about establishing a long-term contract price with new customers. Pete is responsible for maximizing profit at HBI and receives a bonus based on overall profit. Before making his final decision Pete solicits input from Steve, the sales manager, Paula, the production manager, and Al, the accounting manager. Steve is in charge of maximizing revenue for HBI and receives a bonus for long-term revenue contracts along with sales commissions. Paula is in charge of production and is responsible for controlling production costs. She receives a bonus for keeping her costs below the flexible budget level. Al is the accounting manager but does not bonus incentive in his position.

Steve: Steve recalls from business school that companies generally prefer establishing long-term pricing contracts to minimize the costs of retention and finding new customers. In fact, the company incentive plan rewards the sales force with incrementally higher bonuses if they bring in long-term contracts. Steve is confident that the company will be happy with the quality and wants to ensure future sales. He believes that a long-term pricing contract will benefit all parties. So, he shared his recommendation that the long-term contract is established.

Paula: Paula confirmed that HBI has some capacity to produce the brick desired by the company, but would have to displace some smaller HB22 customers to meet the full needs of this customer. However, she is confident that the customer will be happy with the quality of the bricks being produced under her watch. The additional production volume will increase the variable production costs she is allowed and decrease the per-unit fixed cost. Having a greater allowance of variable costs is beneficial for her. Despite her proactive efforts to keep the production costs low, she is currently having a difficult time meeting her cost budget. With all of those factors in mind, she also supports the long-term contract.

Al: Al has mixed feelings. He does believe that the company will save money by reducing transaction costs due to having a single large customer rather than multiple smaller HB22 customers. However, he also believes that cost estimates for each product could be wrong which would impact the true profitability. His training in Activity Based Costing (ABC) leads him to believe that some products might be over-costed and some might be under-costed. He does not know how much the difference could be, but he hopes that HBI's recent price increase would cover any difference. Right now, the extra work required to manage the new products and new customers prevents him from doing a more thorough analysis. Everyone else seems to be in favor of this option, so he certainly doesn't want to raise red flags without knowing a real problem exists.

**The computer system**

The HBI computer system has information that should help Pete make the right decision. In December, Hot Bricks Inc. made sales to four different customers. Each customer bought a different mix of the three product offerings. One customer purchased bricks that required special hand grinding. The following shows a breakdown of each customer’s order.

*You are to assume the role of Pete Whittaker to analyze the information you have available and make decisions needed to ensure the continued success of HBI!*

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| **Exhibit 1- Firebrick Production Information** | | | | | |  | |  | |  | |
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| **Product** | **Temperature (F)** | | **Total BTUs used in December** | |  | **Material Cost per Brick** | | **Total Material Costs** | | **Current Selling Price per Brick** | |
| HB 22 | 2200 | | 8,400,000 | |  | $4 | | $28,000 | | $14.25 | |
| HB 27 | 2700 | | 12,000,000 | |  | $5 | | $20,000 | | $15.75 | |
| HB 29 | 2900 | | 9,000,000 | |  | $6 | | $12,000 | | $17.25 | |
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| **Exhibit 2 - Conversion Costs for December** | | | | | | | | | | |  | |
|  | | **Conversion cost pools** | | | | | | |  | |  | |
|  | | **Firing costs** | | **Grinding costs** | | | **Hand Grinding costs** | **Other costs** | **Total conversion cost** | |  | |
| **Cost categories within the cost pools** | Depreciation | $5,000 | | $3,000 | | | $600 | $11,400 | $20,000 | |  | |
| Labor | 1,000 | | 0 | | | 200 | 8,800 | 10,000 | |  | |
| Energy (gas) | 15,000 | | 1000 | | | 200 | 13,800 | 30,000 | |  | |
| Other | 1,000 | | 0 | | | 0 | 11,000 | 12,000 | |  | |
|  | **Total** | **$22,000** | | **$4,000** | | | **$1,000** | **$45,000** | **$72,000** | |  | |
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| **Exhibit 3 December Customer Activity** | | | | | | |  |  |  | |
| **Customer** | | HB22 | | HB27 | | | HB29 | **Total brick units produced and sold** |  | |
| Automotive | | 1000 | | 1000 | | | 1000 | 3000 |  | |
| Bio-technical | | 1000 | | 0 | | | 0 | 1000 |  | |
| Chemical | | 5000 | | **1000\*** | | | 0 | 6000 |  | |
| Diesel | | 0 | | 2000 | | | 1000 | 3000 |  | |
| **Total Units** | | **7000** | | **4000** | | | **2000** | **13000** |  | |  | |

**\*500 of the HB 27 ordered by Chemical required hand grinding.**