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## MEMORANDUM

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**DATE:** 11/8/2006  
**TO:** PROFESSOR MATTHEW FORD  
**FROM:** MICHAEL MURPHY  
**RE:** INVENTORY CONTROL REVISION #1

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### **Introduction**

The following is an analysis of the current inventory policy for the Crosset Company. The focus is on the use of Economic Order Quantity calculations to compare the current inventory policy to an alternative policy. EOQ helps to determine the most effective order quantity, timing of orders and lower total cost.

### **Findings**

**Order Quantity.** The current policy is to order 800 packing crates per order. EOQ calculations recommend reducing the number of crates per order to 392. Ordering more frequently allows for a reduction in the cost of holding the inventory.

**Length of Order Cycle and Total Cycles per Year.** The current policy results in an order cycle of approximately 30 days. This results in 12 order cycles per year. EOQ calculations recommend a reduction of the order cycle to approximately 15 days. This results in approximately 25 order cycles per year. More frequent ordering under EOQ results in increased order costs when compared to the current policy.

**Total Costs.** The current policy has a total cost of \$1736. EOQ calculations result in a total cost of \$1372. EOQ calculations show a significant reduction in total cost.

### **Analysis**

#### ***Method***

The data used for this analysis was received from Thomas Jones, an operations manager with the Crosset Company. He stated that he currently orders 800 packing crates per month at a cost of \$10/unit. Orders are currently placed once per month. Ordering costs are \$28/order and the annual carrying cost is 35% of the purchase price per crate. The lead time is 5 days. 365 working days are assumed since none was given. Demand is assumed to be consistent throughout the year. This data will be used to compare the

current policy with an Economic Order Quantity (EOQ) model. The EOQ model helps to minimize total costs by determining the optimal quantity of crates per order.<sup>1</sup>

### ***Order Quantity***

The current policy is to order 800 crates per order. EOQ calculations recommend reducing the number of crates per order to 392. The EOQ is calculated by  $Q_o = \sqrt{[(2DS) \div H]}$ , where  $Q_o$  = Economic Order Quantity,  $D$  = annual demand (9600 crates/year),  $S$  = ordering cost (\$28), and  $H$  = the annual carrying cost (35% of purchase price/crate which is \$3.50). Ordering in smaller quantities, like the EOQ model suggests, helps to reduce cost by reducing the holding cost of the inventory.

### ***Length of Order Cycle and Total Cycles per Year***

The current policy results in an order cycle of approximately 30 days. This results in 12 order cycles per year. The proposed EOQ calculations recommend a reduction of the order cycle to approximately 15 days. The EOQ order cycle is calculated by dividing the order quantity  $Q_o$  by the annual demand  $D$  and then multiplying the resulting fraction by the number of working days in the year. Since working days were not given, it is assumed to be 365 days. The proposed EOQ calculations result in approximately 25 order cycles per year. Order cycles per year are calculated by dividing the annual demand  $D$  by the order quantity  $Q_o$ .

An order cycle is the amount of time between when an order is placed and when the next order after it is placed. The cycles per year are simply the total number of order cycles completed in one year. In comparing these two policies solely on the basis of order cycles and total cycles per year, the EOQ policy results in \$686 order cost versus the current policy's order cost of \$336. The ordering cost is calculated by taking the annual demand  $D$  divided by the crates per order  $Q_o$ , and then multiplying by the given cost per order  $S$ . Remember, this is only one part of what makes up the total cost calculation.

### ***Total Costs***

The current policy is based on orders of 800 crates placed 12 times per year. This policy results in a total cost of \$1736. The proposed EOQ policy is based on orders of 392 crates placed approximately 25 times per year. The EOQ total costs are \$1372.

The carrying costs are calculated by dividing the order quantity  $Q_o$  by 2 and then multiplying by the annual carrying cost percentage given  $H$ . The carrying costs are then added to the ordering costs to come up with the total cost.

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<sup>1</sup> Stevenson, William J. 2007. *Operations Management – 9<sup>th</sup> Edition*. New York: The McGraw-Hill Companies.

**Table 1: Comparative Analysis of Current Policy to Proposed EOQ Policy**

		<b>Current Policy (Given)</b>	<b>Proposed EOQ Policy (Calculated)</b>
<b>1)</b>	<b>Order Quantity</b>	<b>800 crates per order</b>	<b>392 crates per order</b>
<b>2)</b>	<b>Length of Order Cycle</b>	<b>30 days</b>	<b>15 days</b>
<b>3)</b>	<b>Total Cycles per Year</b>	<b>12 cycles per year</b>	<b>25 cycles per year</b>
<b>4)</b>	<b>Ordering Cost</b>	<b>\$336</b>	<b>\$686</b>
<b>5)</b>	<b>Carrying Cost</b>	<b>\$1400</b>	<b>\$686</b>
<b>6)</b>	<b>Total Costs</b>	<b>\$1736</b>	<b>\$1372</b>

**Related formulas:**

1)  $EOQ = Q_o = \sqrt{[(2DS) \div H]}$

2)  $Order\ cycle = (Q_o \div D) \times Total\ working\ days\ in\ a\ year$

3)  $Cycles/ year = D \div Q_o$

4)  $Ordering\ cost = (D \div Q_o) \times S$

5)  $Carrying\ cost = (Q_o \div 2) \times H$

6)  $Total\ cost = Ordering\ cost + Carrying\ cost$

Where  $Q_o$  = Economic order quantity (392 crates/order),  $D$  = annual demand (9600 crates/year),  $S$  = ordering cost (\$28/order), and  $H$  = annual carrying cost (\$3.50/crate per year).

***Limitations***

Although the EOQ policy may look like the winner based solely on the total cost comparison, it does have some potential drawbacks. The increased number of orders placed under the EOQ policy puts a greater demand on suppliers to deliver efficiently once an order is placed. The EOQ policy also places a higher demand upon the purchasing department of Crosset Company. They will be expected to order and track twice as many orders under EOQ versus the current policy.

Before changing policies, both the suppliers and purchasing department need to be evaluated to determine their ability to deliver under the increased demands of EOQ. Also,

the purchasing department needs to be evaluated to determine if the EOQ policy can be implemented without additional staffing. If it is necessary to add staff to handle the increased ordering demands of the EOQ policy, some of the cost savings may be negated by the cost of any additional staff. Before such implementation, it needs to be determined if \$360/year is considered significant enough savings to implement the change even as a trial on the departmental level.

### ***Implementation***

The first step in implementation of the EOQ policy is to try it on just the crates in this department. Every department of the company places orders for various items. Success with the crates could result in expansion of the EOQ policy to other departments. If the EOQ policy is expanded, the company will ultimately realize even greater cost savings. These greater cost savings may be significant enough to implement EOQ for the entire company on a permanent basis.