Problem 13-19 (60 minutes)

1. The $90,000 in fixed overhead costs charged to the new product is a common cost that will be the same whether the tubes are produced internally or purchased from the outside. Hence, they are not relevant. The variable manufacturing overhead per box of Chap-Off would be $0.50, as shown below:

Total manufacturing overhead cost per box of Chap-Off	$1.40
Less fixed portion ($90,000 ÷ 100,000 boxes)	0.90
Variable overhead cost per box	$0.50

The total variable costs of producing one box of Chap-Off would be:

Direct materials	$3.60
Direct labor	2.00
Variable manufacturing overhead	0.50
Total variable cost per box	$6.10

If the tubes for the Chap-Off are purchased from the outside supplier, then the variable cost per box of Chap-Off would be:

Direct materials ($3.60 × 75%)	$2.70
Direct labor ($2.00 × 90%)	1.80
Variable manufacturing overhead ($0.50 × 90%)	0.45
Cost of tube from outside	1.35
Total variable cost per box	$6.30

Therefore, the company should reject the outside supplier's offer. A savings of $0.20 per box of Chap-Off will be realized by producing the tubes internally.

Problem 13-19 (continued)

Another approach to the solution would be:

Cost avoided by purchasing the tubes:	
Direct materials ($3.60 × 25%)	$0.90
Direct labor ($2.00 × 10%)	0.20
Variable manufacturing overhead ($0.50 × 10%)	0.05
Total costs avoided	$1.15 *
Cost of purchasing the tubes from the outside	$1.35
Cost savings per box by making internally	$0.20

* This $1.15 is the cost of making one box of tubes internally, since it represents the overall cost savings that will be realized per box of Chap-Off by purchasing the tubes from the outside.

2. The maximum purchase price would be $1.15 per box. The company would not be willing to pay more than this amount, since the $1.15 represents the cost of producing one box of tubes internally, as shown in Part 1. To make purchasing the tubes attractive, however, the purchase price should be *less than* $1.15 per box.

Problem 13-19 (continued)

3. At a volume of 120,000 boxes, the company should buy the tubes. The computations are:

Cost of making 120,000 boxes:	
120,000 boxes × $1.15 per box	$138,000
Rental cost of equipment	40,000
Total cost	$178,000
Cost of buying 120,000 boxes:	
120,000 boxes × $1.35 per box	$162,000

Or, on a total cost basis, the computations are:

Cost of making 120,000 boxes:	
120,000 boxes × $6.10 per box	$732,000
Rental cost of equipment	40,000
Total cost	$772,000
Cost of buying 120,000 boxes:	
120,000 boxes × $6.30 per box	$756,000

Thus, buying the boxes will save the company $16,000 per year.

Problem 13-19 (continued)

4. Under these circumstances, the company should make the 100,000 boxes of tubes and purchase the remaining 20,000 boxes from the outside supplier. The costs would:

Cost of making: 100,000 boxes × $1.15 per box.....	$115,000
Cost of buying: 20,000 boxes × $1.35 per box.....	27,000
Total cost.....	$142,000

   Or, on a total cost basis, the computation would be:

Cost of making: 100,000 boxes × $6.10 per box.....	$610,000
Cost of buying: 20,000 boxes × $6.30 per box.....	126,000
Total cost.....	$736,000

   Since the amount of cost under this alternative is $20,000 less than the best alternative in Part 3, the company should make as many tubes as possible with the current equipment and buy the remaining tubes from the outside supplier.

5. Management should take into account at least the following additional factors:
   a) The ability of the supplier to meet required delivery schedules.
   b) The quality of the tubes purchased from the supplier.
   c) Alternative uses of the capacity that would be used to make the tubes.
   d) The ability of the supplier to supply tubes if volume increases in future years.
   e) The problem of alternative sources of supply if the supplier proves undependable.