MIT OpenCourseWare
http://ocw.mit.edu

15.963 Management Accounting and Control
Spring 2007

For information about citing these materials or our Terms of Use, visit: http://ocw.mit.edu/terms.

# 15.521 Managerial Accounting and Control

## Spring 2006

*Prof. Mozaffar Khan*

*MIT Sloan School of Management*

# MDD

- What is the competitive environment MDD faces?
  - Product market is extremely price sensitive.
  - It is a captive supplier for its parent company.
    - Provides 40% of parent's chip requirement.
  - It only produces proprietary chips.
  - It is not a low cost producer.
    - When a chip becomes a commodity, it is outsourced.
  - It depends on technology transfers from competitors in exchange for commodity chip volume.

# MDD

- What is the production process at MDD?
  - Silicon wafers are purchased.
  - Passed through the Fabrication department where IC's are made.
  - Wafers are diced into chips in the Assembly department, and packaged.
  - Chips undergo final testing.
- What is MDD's cost structure?
  - 8% direct materials.
  - 15% direct labor.
  - 77% overhead.
    - 65% of overhead is fixed.

# MDD

- What is the issue currently confronting MDD?
  - What to do with the excess capacity – should more chips be insourced?
    - How should these insourced chips be costed, for pricing purposes?
- How was this excess capacity created?
  - Long-term yield improvements.
  - Short term yield variability.
  - Product mix changes due to declining demand for certain process families.
  - Lumpy capacity.

# MDD

- How would insourcing help MDD?
  - Spread fixed costs over more volume.
  - Quality improvements due to increased wafer cleanliness with continuous production at higher volumes.
  - Credible threat of insourcing would provide incentive to other suppliers to lower prices.
- What are the different capacity costing alternatives?
  - The question essentially is what number to use in the denominator in calculating the overhead allocation rate.

# MDD

- Assume all overhead is fixed, and that it is $12m annually.
- Consider the following alternative denominators.

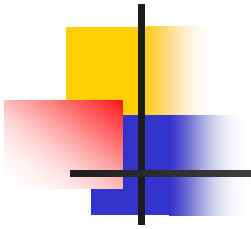
| Capacity Defn. | Units | Allocation Rate |
|---|---|---|
| Theoretical | 120000 | 100 |
| Practical | 100000 | 120 |
| Normal | 80000 | 150 |
| Budgeted | 75000 | 160 |

# MDD

- Suppose we use practical capacity, and this year's sales turn out to be 80k units. How much of the fixed cost is recovered through product prices?
  - $120 x 80k units = $9.6m
- Using practical capacity, how many units need to be sold to recover all fixed costs?
  - Exactly 100k
- If actual sales are 80k units, what happens to the remaining $2.4m of overhead?
  - The company still has to pay this $2.4m, but customers are not forced to pay through higher prices (or a higher allocation rate).
  - This $2.4m is the cost of excess capacity.
- **So at issue in choosing a capacity definition is whether customers should pay for the excess capacity.**

# MDD

- But what is excess, i.e., what is the benchmark level of full capacity?
- Theoretical capacity?
  - Under this definition, the allocation rate would be $100/unit. If sales are 100k (practical capacity) then $10m is recovered from product costs. Is the remaining $2m the cost of excess capacity?
    - No, since theoretical capacity is unattainable.
    - **If we use theoretical capacity as the denominator, we will always erroneously identify some fixed costs as due to 'excess capacity.'**
- Practical capacity?
  - This seems reasonable, since it is attainable.
  - So it would be correct to use practical capacity as the denominator.



# MDD

- What else can we use as the denominator in calculating the overhead allocation rate?
  - Normal utilization, which is the average expected volume over the next three or five years.
  - Budgeted utilization, which is the expected volume over the next (one) year.
- Capacity is acquired with the expectation that it will be used.
- Therefore, the normal utilization (or utilization over longer periods) will generally approach practical capacity.

# MDD

- However, as in MDD, normal utilization may drop well below practical capacity due to learning and process improvements (e.g., increasing long term yields).
- Suppose we use normal utilization as the denominator. The allocation rate will be $150 per unit, and prices will be higher accordingly (under cost-based pricing).
  - Sales will be 80k x 3 = 240k units over the next three years.
  - Total overhead will be $12m x 3 = $36m over the next three years.
  - Overhead recovered through products = $150 x 240k units = $36m over the next three years.
  - Customers have been charged all the overhead.
- If practical capacity had been used, customers would have been charged $120 x 240k units = $28.8m, and MDD would have paid (or absorbed) the $7.2m cost of excess capacity.

# MDD

- Should MDD use Normal utilization as the denominator?
  - No, this would not be sustainable in a competitive product market. (Remember that commodity chips will be insourced).
  - Competitors who do not have the excess capacity will be able to charge less and gain customers.
- The same problem applies in using budgeted utilization as the denominator. In this case, the allocation would be $160 per unit, which is even higher.
- In addition, using budgeted utilization will cause cost estimates, and prices, to fluctuate from year to year.
  - Some argue that using budgeted utilization is useful for control, but this is debatable.

# MDD

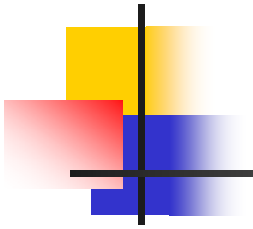
- Using budgeted utilization could lead to another problem.
- Suppose sales are expected to be low next year, so that budgeted utilization is 60k units. The allocation rate is now $200 per unit, and prices will be increased accordingly.
- Should you increase prices when demand drops?
  - No! Remember the death spiral.
- Using budgeted utilization as the denominator will send the wrong signal to marketing managers. Seeing a higher unit cost, they will be tempted to raise prices at exactly the wrong time.

# MDD

- So we are going to use practical capacity as the denominator.
- Now what do we do with the cost of excess capacity (the $2.4m in our example)?
- This depends on the reason for the excess capacity.
- Consider first the excess capacity due to short term yield variability at MDD.
- This should be charged to the product!
- This excess capacity is required by the production process. It is an unavoidable cost of production, even for existing competitors and potential new entrants.

# MDD

- Now consider the excess capacity due to increasing long term yields.
- This is avoidable by a new entrant into the industry, so it should not be charged to the product.
- The cost of this excess capacity should be separated from the product cost, and shown to managers separately, as in the Insteel case.
- Separating the cost of excess capacity:
  - draws managerial attention, and
  - prevents erroneous actions (death spiral, etc.).



# MDD

- What about the capacity created by product mix changes?
- Ideally, the life of the process family (e.g., three years) should have been forecasted at birth, and the denominator should have been the average volume over the life of the family.
- This would have allowed full cost recovery for each process family over its life.
- If this was not done, it is unlikely the cost can now be recovered through a higher allocation rate and higher prices.
  - Raising prices is likely untenable when the demand for a process family is declining.

# MDD

- What about excess capacity due to lumpy resources?
- These might be an inherent cost of the production process and therefore unavoidable.
- If so, they can be charged to the product.
- Excess capacity can arise in yet another way. Consider Ibiza Airlines.
- It serves 16k passengers in each of the summer months, but only 8k in any other month.
- Ibiza has long term leases for its aircraft.
- Aircraft not used in non-summer months represent excess capacity in those months.
- Who should pay for the cost of this excess capacity?

# MDD

- This capacity is demanded by, or due to, summer travelers, so they should pay for it.
- Competing airlines are likely to face the same capacity constraints in the summer months, so raising prices for summer travelers may not be harmful.
- Allocating higher costs to, and raising prices for, non-summer travelers will not work because:
  - The signal from the cost system will be that summer travelers are cheaper, and managers will try to attract more summer travelers, thereby only raising the costs of excess capacity.
  - Competing airlines with reduced summer service levels will be able to offer lower prices to non-summer travelers, because they won't have the extra capacity.

# MDD

- This is consistent with peak-load pricing, which is the practice of charging higher rates when demand approaches capacity.
  - Peak-load pricing is observable in, e.g., the telecom, hotel and car rental industries.
  - An alternative explanation for peak-load pricing is price discrimination.
- As another example, if excess capacity is required to service a large customer with variable demand, then that customer should be charged the cost of the resulting excess capacity.

# MDD

- MDD is related to other cases we have covered, e.g., Bridgeton, Insteel, Colorscope.
- Takeaways:
  - In a competitive product market, consumers will not pay for any discretionary excess capacity.
  - Deviations from practical capacity can be regarded as excess capacity.
  - In general, the cost of excess capacity should be separated from product costs and highlighted, to prevent erroneous decisions and to focus managerial attention on the issue.
  - Excess capacity demanded by the product (i.e., an excess capacity cost that is inherent in the production process) should be charged to the product.
  - Excess capacity demanded by a customer (i.e., due to the customer's buying pattern) should be charged to the customer.