ENG M 401
Financial Management for Engineers

Mechanical Engineering

Lecture 2A

- More about the income statement
- COGS, contribution margin, and SG&A,
- The concept of measuring the creation of value

UNIVERSITY OF ALBERTA

The Form of the Income Statement:

Start with	Gross Revenue from Sales
Minus	Allowance for Bad Debt/Warranty (optional)
Gives	Net Revenue
Minus	Cost of Goods Sold (COGS) – Variable costs
Gives	Contribution or Gross Margin
Minus	Sales General and Administrative Expense (SG&A)
Gives	Operating Income
Plus/Minus	Other Income (including interest on financing) e.g. investment or loans
Gives	Net Income (Profit or Loss)

Margin (rate) = CM ($) / Gross Sales ($)

The Income Statement:

- The form is revenue minus expenses equals earnings.
- Purpose: to answer "how much did we make?" It is the test of value creation in a business.
- It is a "rate", hence a time period must be involved.
- The time period must be long enough to make sense.
- Earnings are not the same as cash flow.

during a period of time

– Cycle time of business

Key concepts

Mechanical Engineering

- Net income = profit = earnings
- It is a measure of added-value over a period of time
- Net income = Revenue - Expenses
- Expenses: Variable, fixed, and others (COGS) (SG&A)
- Contribution margin is extra money obtained from a sale's price after deducting variable costs – It makes difference on the profitability ≠ Margin (%) ← Value-added with $0 SG&A
- Some non-cash expenses, such as depreciation
- Depreciation is a measure of wearing out of long term assets

Some Cautions:

- Recognize revenue and expense in the same time period (typically at time sale is booked).
- Income statements are often by product or business line, but tax is paid by a company. Hence, income statements *within* a company are often pre tax.
- Bad debt/warranty can show up as an expense or an allowance.
- Allowance vs. actual: will have periodic adjustment.

COGS ⇒ Variable Expenses

Mechanical Engineering

- When finished goods inventory goes down and cost of goods sold (receivable) goes up, we move an asset to an expense.
- Point of sale – Departure from the "port"
- This is the mechanism by which revenue and expense are lined up (accrued).
- Timing issues in accounting is mainly reflected by recognizing sales. Different practices incur different risks to the investors, customers, and the public as well.

~ Cost in Assets
- Finished
- WIP
- Raw materials

Calculating Margin

Mechanical Engineering

- A medical supply company has done extensive research to prove the validity of a medical diagnostic analyzer. It sells the analyzer for $37,500. All components for the analyzer are purchased and assembled by contract labor. Component cost is $19,200. Assembly and testing labor is 40 hrs at a net cost of $44 per hr. What is the contribution margin?
- The company sold 128 units in the last 12 months. It is considering to reduce price by 10%. What is the margin after the discount?
- How many units need to be sold in the next 12 months in order to achieve the same dollar value as the last year?
- What percentage increase in unit sales does it represent?

Some Cautions re Timing:

Mechanical Engineering

- Consider a company like Dacro that makes large vessels.
  - January: PO for steel ($1 million).
  - February & March: labor to build ($0.6 million), pay for steel.
  - Delivered in April.
  - Customer pays in May ($2.2 million).

What is Revenue & COGS in each of the months?

January, February, March, and May: zero

April: Revenue $2.2 M, COGS $1.6 M

Some Cautions re Allowances:

Mechanical Engineering

- Consider a company with one large vehicle that needs a new engine about every 24 months.
  - 23 months: maintenance costs are minor, income is positive.
  - 24th month: maintenance costs are major, income is negative (a loss).
  - Year to year income is irregular.

An alternative approach is to create a maintenance allowance (in essence a reserve) based on the estimated monthly cost of maintenance, and then adjust this in the 24th month (minor impact).

Tougher Rules re Allowances:

Mechanical Engineering

- One change (of many!) post Enron is less use of allowances to store money (as a deemed expense) in good times, and reversal of allowances in bad times to regenerate income.

The objective of accounting is to reflect, in the income statement, an accurate recording of the creation of value, on a period by period basis. For publicly traded companies, the period is quarterly (3 months).

Materiality and Trackability:

Mechanical Engineering

- A vessel fabrication shop uses a great deal of welding rod. Should this be considered part of COGS?
  - Yes: it is a variable cost, and the true measure of margin would treat it as variable.
  - No: the effort to do a bookkeeping entry for each use of welding rod is not justified by the value of the extra precision in information (the rod is not a *material* cost).
- On balance, we often lump untracked costs into SG&A.

Materiality and Trackability:

Mechanical Engineering

- Some variable costs are too small to track (example, welding rod) and are lumped in SG&A.

- If you allocate welding materials per hour of welder's time, it appears variable, but you really have no more information since you don't measure it, you just assume that it varies with welder's hours. Hence, you may have a false sense of the accuracy of the margin %.

- Consistency

Some Cautions re Timing:

Mechanical Engineering

- Consider a company like Dacro that makes large vessels.
  - January: PO for steel ($1 million).
  - February & March: labor to build ($0.6 million), pay for steel.
  - Delivered in April.
  - Customer pays in May ($2.2 million).

What is Revenue & COGS in each of the months?

January, February, March, and May: zero

→ April: Revenue $2.2 M, COGS $1.6 M

Timing:

Mechanical Engineering

Expenses are accrued in various asset accounts (e.g. raw materials inventory, work in progress, finished goods inventory) until the vessel is sold. This practice allows us to line up expenses and revenues in the same period.

Cost of Goods Sold (COGS):

Mechanical Engineering

- COGS captures the cost of making (manufacture), delivering (service) or buying (wholesale or retail) a product.
- It should be calculated to the smallest precision possible (i.e. company to business line to product line to product).
- Vast differences in margin can exist between products. What is included in COGS varies widely from company to company, but should not vary from year to year.
- Margin, expressed as a percentage, is a crucial measure of some businesses year over year. Examples include any distribution business.

Cost of Goods Sold (COGS) (2):

Mechanical Engineering

- What kinds of businesses are pure “margin” pricers?
  - Example:
    - Retail, which sells thousands of items and just marks up by a fixed percentage.
    - Engineering firms often do the same with engineering labor.
    - Distribution companies do so as well.

- What does falling margin mean? It often means that you can’t get your customers to keep covering your increasing costs. This is a very serious sign for a business. Nothing so helps in selling a business as a steady margin.

Cost of Goods Sold (COGS) (3):

- In a perfect world, margin is fully variable (and hence constant as a percent of sales). In practice, this is only true for small deviations in sales, but this still gives guidance in business decisions.

- When inputs vary widely (for example, packaging operations), margin is a quick way to price.

- Falling margin is often a sign of an inability to extract price from customers. Reasons may include poor management or high competition.

Example Margin Question (1):

Mechanical Engineering

- Your parents run a restaurant. Average meal price is $10, and COGS (the cost of the food and an allowance of $0.10 for the gas and power to cook the meal) is $3.
- The restaurant caters to some “regulars”, including some seniors who come several times a week. However, business is slow, especially on Monday and Tuesday, and in addition your parents want to introduce the restaurant to new people.
- Since you have taken ENGG 401and 405 they ask for your help. You suggest a coupon for $5 off distributed in magazines aimed at a younger crowd, including Tuesday night movie fans.

Does the discount program increase revenue? Margin? Profit? Why? What might be a problem with such a program?

Example Margin Question (1):

Mechanical Engineering

If the coupon program brings in more customers it will increase revenue and contribution margin ($) and profit, but will reduce margin %.

The risk is that faithful customers paying $10 will hear about it and demand the same discount.

Example Margin Question (2):

Mechanical Engineering

- You run a compressor skid packaging business that services shallow gas wells. Your units compress produced gas up to pipeline pressures.
- You have a stable work force and you find things for them to do during slow times, rather than lay them off.
- Your margin has been 18 to 19.5% over the past four years. You want to expand the business by adding a larger sized unit to your product line, and then in a few years sell the business.
- Your buyer and engineer have priced all the components of the new compressor skid out at $476,000.

Should you include shop floor labor in your COGS?
What is the approximate price of the new unit?
What problem might occur if you sell for less?

Example Margin Question (2):

Mechanical Engineering

- I would not put the shop labor in COGS, because it is not variable.
- If you want to sell your business, you'd better to keep a constant margin
- If you sell for a lower margin (which you might justify by saying that you will make the same $ rather than the same % on the larger unit), then your margin % will fall and someone looking at the business will likely wonder why this occurred. Steady margin is a better business strategy.

Example Margin Question (3):

Mechanical Engineering

- You are the marketing manager for a large plant making a chemical intermediate. In the last 12 years you have had sales exclusively in North America.
- Your plant is running at 76% of capacity.
- Your president has identified a need to diversify sales into the Pacific rim because a competitor has announced plans to start up a plant in eastern Canada and when completed, in two years, the supply capacity in North America will be in significant excess even in good times.
- You check the COGS for the product, which captures feedstock, utilities, and an allowance for maintenance. It is 72%.

What “market-entry” discount would you authorize without a phone call to the president? What problems might arise?

Sales, General & Admin Costs (SG&A):

Mechanical Engineering

- Captures the cost of running a division or a company. By definition it can not be calculated by product or product line, because it includes a more general level of costing (e.g. the president and receptionist).
- Unambiguous examples include senior staff, corporate finance departments, corporate memberships, basic phone system charges, interest charges on debt.
- It usually includes sales, but if sales are strictly per product they can be put into COGS.

Sales, General & Admin Costs (SG&A) (2):

Mechanical Engineering

- In theory, SG&A is “fixed”; for small changes in sales this is an accurate assumption.
- SG&A should grow at less than the rate of growth of sales, or the company has a serious problem!
- In many businesses, a long period of “good times” leads to growth in SG&A (e.g. more support staff). This is “wrung” out of the business in down cycles.
- Allocation does not create marginality!

Thought Provoking Question (2):

Mechanical Engineering

- How many hours per year do the following pieces of equipment operate? How many hours in the total life of the piece of equipment?
  - A pump in an oil refinery.
  - A telephone switch.
  - A family automobile.
- What is the engineering significance of this?

Another Question:

Mechanical Engineering

- Two brothers inherit $1 million each. The conservative brother buys a 20 year bond yielding 5.5% and hence makes $55,000 per year. The entrepreneurial brother buys two oil well service rigs, and makes $65,000 a year in cash from the business. 15 years later, over a beer, the entrepreneurial brother brags that he made the better choice. Assuming the entrepreneurial brother didn't work in the service rig business (i.e. he had another job), was he right? Why?