The Breakeven Point

In the AVP you heard about the concept of a Breakeven Point (BEP).

The BEP is a starting point to determine whether a certain business proposition would be worth doing. By worth doing of course we mean whether the business will be able to make a profit on the proposition under consideration.

As a first step in evaluating the business proposition, a business wants to determine how many items would have to be sold to break even. If the business thinks they can sell that many items, then they will move to step two, trying to envision how much profit they can make by selling more items. So when we solve a problem to find the breakeven point we are finding a volume, the number of items that have to be sold such that the revenues equal the expenses and the profit is zero.

At the BEP the profit equals zero. But businesses don’t exist to make zero profit. It is just the first step in a series of steps to evaluate a business idea.

Sample Problem 1-29

Let’s look at Sample Problem 1-29 to see the relationship between breakeven point questions and profit questions.

In problem 1-29 a company is evaluating two machines for possible purchase:

Machine A would have fixed costs of $75,000 and variable costs of $16

Machine B would have fixed costs of $62,000 and variable costs of $20

Machine A could produce 18,000 items per year and machine B could produce 9,000. As we solve the problem you will notice that this last bit of information (the amount of items each machine can produce) is not needed in any of the problem solutions.

Part A asks you to find the BEP for each machine if items sell for $28.

The BEP equation is derived from the profit equation. The profit equation is: \( \text{P} = s \cdot X - F - v \cdot X \) and consists of these variables:

- \( P \) – Profit
- \( s \) – Selling price of an item
- \( X \) – The volume or number of items sold
- \( F \) – The fixed costs
- \( v \) – The variable cost associated with making one item

Using this equation we can solve for any of the variables in the equation.

- **Profit:** \( P = s \cdot X - F - v \cdot X \)
- **Volume:** \( X = (P + F)/(s - v) \) (The breakeven point is a special case of this equation. It is this equation when \( P=0 \).)
- **Volume at the BEP:** \( X = F/(s - v) \) (When \( P=0 \), this is the BEP. It is a value of \( X \), the volume.)
- **Selling Price:** \( s = (P + F)/X + v \)
- **Revenue:** \( R = s \cdot X \) (The first component of the profit equation.)
- **Fixed Cost:** \( F = X \cdot (s - v) - P \)
Variable Cost: $v = (s \cdot v) / (P + F)$
Total Costs or Expenses: $TC or E = F + v \cdot X$

The first part of problem 1-29 is asking us to solve for the BEP. So we use the $X$ equation for when $P=0$, so if $P=0$ the $X$ equation becomes:

**Volume at the BEP:** $X = F / (s - v)$

Look at the Part A tab in the spreadsheet for problem 1-29 in Doc Sharing.

Part B in problem 1-29 is asking about the profit for each machine if the volume (the problem uses the word “demand” which means the same thing) equals 6,500 units. Tab B of the spreadsheet shows the calculations and how the equations would be written in Excel (see cells G27 and G31).

Part C of the problem asks you to compare the costs of the machine at a certain level (when we say certain level we are talking about volume). Cost equals the fixed costs plus the variable costs.

So we are asked to solve for $X$ for the following: Machine A costs = Machine B costs. See tab C in the sample problem 1-29.