Example – Project X

A company wants to invest in equipment that will enable them to manufacture and sell a particular product over the next 10 years. Table 1 summarizes the assumptions used.

Assumptions for Project X	
1a. Equipment Cost	750,000
1b. Equipment Maintenance Cost as a % of Equipment Cost per year	1%
1c. Equipment depreciation value per year	10%
1d. Selling Price of Equipment after 10 years (Terminal Value)	80,000
1e. Maximum Machine Capacity per Year	20,000
2a. Product Selling Price in Year 1	30.00
2b. Product Seling Price Increase per year	1%
3a. Unit Stock Cost in Year 1	5.00
3b. Unit Stock Cost Increase Per Year	2%
4a. Staff Wages in Year 1	80,000
4b. Staff Wages Increase Per Year	5%
4c. Staff Recruitment Costs	10,000
5a. Admin Cost in Year 1	50,000
5b. Admin Cost Increase Per Year	2%
6. Project Duration in Years	10
7. Interest per annum for loan to purchase equipment	3%
8. Corporate Tax Rate	33%
9. Discount Rate or Hurdle Rate	10%

Table 1. Assumptions for Project X

Notes on Assumptions

1. *The equipment cost is 750,000 and is depreciated by 10% per year over 10 years. At the end of the 10th year, the asset value or the book value in the balance sheet will be ZERO. Although this is so, the assumption made is that the equipment can be sold in the secondary market at 80,000. This is referred to as the 'Terminal Value' or the 'Residual Value'.*

2. *It is also assumed that the maintenance costs for the equipment is 1% of its initial costs (750,000) per year.*

3. *The annual machine capacity is 20,000 units.*

4. *The product will be sold for 30 per unit. The selling price will be increased by 1% every year.*

5. *The cost of the stock is 2 per unit. The cost increases by 2% every year.*

6. *Total staff wages in Year 1 is 80,000 after which it increases by 5% per year. The recruitment cost is 10,000 and we assume that there is ZERO attrition.*

7. *Total Admin cost in Year 1 is 50,000. The cost increases by 2% per year.*

8. *The project is estimated to be for a duration of 10 years.*

9. *A bank loan of $750,000 was taken out to fund the purchase of the equipment. In addition to the principal payments of $75,000 per year over 10 years, interest on the principal amount is 3% pa.*

10. *The Corporate Tax Rate is 33%*

11. *The required Discount Rate or Hurdle Rate is 10%.*

Working Capital Requirements

The additional sales (revenues) from Project X will likely to require an increase of working capital for the company as cash will be tied up in additional Debtors Accounts (Accounts Receivables) and inventory. Although the cash will be offset by additional Creditors Accounts (Accounts Payables), additional cash will still be needed as there will be bound to be delays in payments by customers.

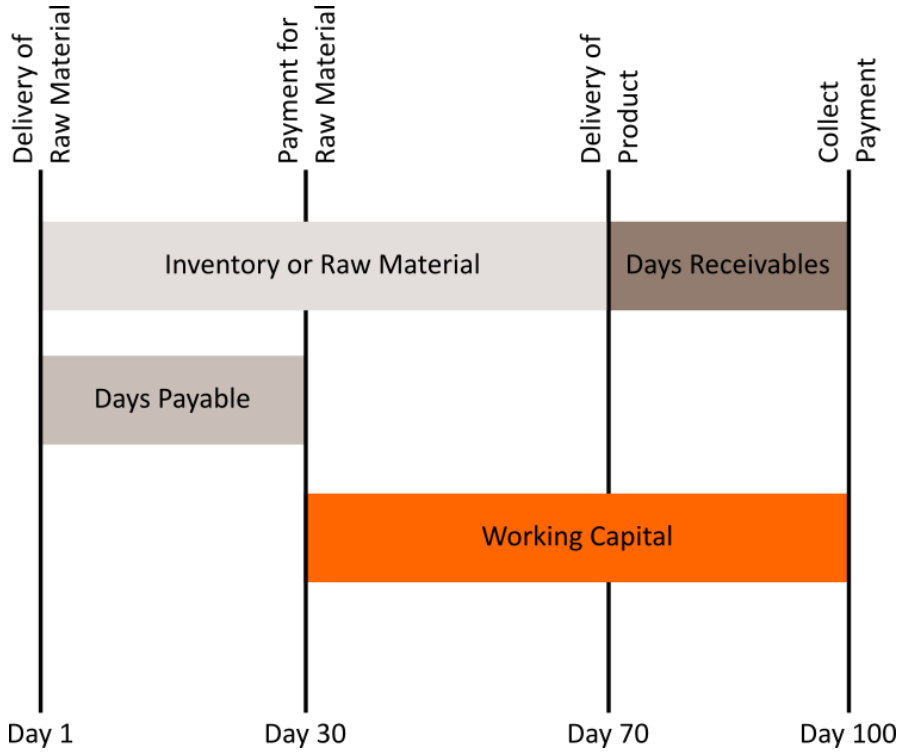

Figure 1. Working Capital Requirements

However, to keep things simple in this example, we have assumed that no additional working capital is needed and that Cash will flow in and out of the company at the same time as Sales (Revenue) and Costs are recorded in the P&L Statement.

Setting-up the Model

The Sales Volume Projections

We begin setting up the model with some initial data from the Assumptions section above. You will notice that we have a Year 0. We will explain the significance of having a Year 0 a little later.

Machine capacity is 20,000 units per annum. The unit selling price and unit cost are $30 and $5 respectively as per Assumptions in Table 1.

The number of units that are projected to be sold over the next 10 years. You will notice that in Year 1, the projected sales volume is 10,000 units. The projected sales volume increases by 2,000 units per year until it hits the maximum capacity of the machine in Year 6.

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
	0	1	2	3	4	5	6	7	8	9	10
Machine Capacity per Year		20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Unit Stock Cost *[a]*		5.00	5.10	5.20	5.31	5.41	5.52	5.63	5.74	5.86	5.98
No. of Unit Sales *[b]*		10,000	12,000	14,000	16,000	18,000	20,000	20,000	20,000	20,000	20,000
Unit Selling Price *[c]*		30.00	30.30	30.60	30.91	31.22	31.53	31.85	32.16	32.49	32.81

Table 2. Building the Sales and COS forecast

Do note that Sales volumes, unit selling price and unit stock costs are assumptions that need to be forecasted by Business, Sales and Procurement teams. These assumptions can make or break your project.

Building the P&L Statement

From the Sales volume projections, you can now build the rest of your P&L statement. Total Sales *(b x c)* is essentially no. of unit sales multiplied by the unit selling price which is initially 30 and increases by 1% each year. Similarly, the Cost of Sales (COS) or Cost of Goods Sold (COGS) is the unit sales multiplied by the unit cost. *(b x a)*

After computing the Gross Profit, you work down the P&L and add your expenses accordingly – which include *Staff Recruitment, Promotion, Rent, Staff Wages, Admin and Equipment Maintenance* until you arrive at Profit After Tax (PAT)

Profit & Loss Statement										
Revenues or Total Sales *(b x c)*	300,000	363,600	428,442	494,544	561,926	630,606	636,912	643,281	649,714	656,211
COGS *(b x a)*	50,000	61,200	72,828	84,897	97,419	110,408	112,616	114,869	117,166	119,509
Gross Profit	250,000	302,400	355,614	409,648	464,507	520,198	524,296	528,413	532,548	536,702
Staff Recruitment	10,000									
Promotion	10,000	10,000	8,000	6,000	5,000	5,000	5,000	5,000	5,000	5,000
Rent	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Staff Wages	80,000	84,000	88,200	92,610	97,241	102,103	107,208	112,568	118,196	124,106
Admin	50,000	51,000	52,020	53,060	54,122	55,204	56,308	57,434	58,583	59,755
Equipment Maintenance	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Total Expenses	161,500	156,500	159,720	163,170	167,862	173,807	180,016	186,502	193,279	200,361
EBITDA	88,500	145,900	195,894	246,477	296,645	346,391	344,280	341,910	339,269	336,341
Depreciation *[d]*	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
EBIT	13,500	70,900	120,894	171,477	221,645	271,391	269,280	266,910	264,269	261,341
Interest on Loans	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500
Principal Repayment	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
PBT	(84,000)	(26,600)	23,394	73,977	124,145	173,891	171,780	169,410	166,769	163,841
Tax Paid	-	-	7,720	24,413	40,968	57,384	56,687	55,905	55,034	54,068
PAT *[e]*	(84,000)	(26,600)	15,674	49,565	83,177	116,507	115,093	113,505	111,735	109,773
PAT %	*-28%*	*-7%*	*4%*	*10%*	*15%*	*18%*	*18%*	*18%*	*17%*	*17%*

Table 3. The complete P&L forecast

Calculating Cash

As we know, Profit After Tax (PAT) is not equals to Cash. We have already made the assumption that for this example, that Cash will flow in and out of the company at the same time Sales (Revenue) and Costs are recorded in the P&L Statement.

Adding Back Depreciation

However, Depreciation is not representative of Cash. It is just an accounting adjustment to 'spread' the cost of say an Equipment to match the Sales (Revenues) being generated.

In Table 4, we have added back the allocation that we made for Depreciation. *[d']*

Investment & Terminal Value of Equipment

We have also in Year 0, taken into account the huge outflow of cash to pay for the Equipment. This outflow is recorded as a negative $750,000. *[f]*

At the end of the project, in Year 10, we have also made the assumption that we are able to sell the equipment at $80,000 and thus having an inflow of Cash. This value is referred to the Terminal Value. *[g].* See Table 4.

Projected Future Cash Flows

The total projected future cash flow is the computed by adjusting for depreciation, outflow of cash from the initial investment in Year 0 as well as the disposal value (terminal value) of the equipment at the end of Year 10 to the Profit After Tax (PAT) value. *[e+d'+f+g]*

PAT *[e]*		(84,000)	(26,600)	15,674	49,565	83,177	116,507	115,093	113,505	111,735	109,773
Cash Flow Computation											
Add Back Depreciation *[d']*		75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
Investment in Equipment (Cash Out) *[f]*	(750,000)										
Terminal Value of Equipment *[g]*											80,000
Projected Cash Flow *[e + d' + f +g]*	(750,000)	(9,000)	48,400	90,674	124,565	158,177	191,507	190,093	188,505	186,735	264,773

Table 4. Adjusting for Depreciation, Investment and Terminal Value to arrive at Future Cash Flows

PV of Projected Future Cash Flow

The present value (PV) of future cash flows (Year 1 till Year 10) is then computed. Essentially, we are computing these future cash flows (Year 1 till Year 10) to be in 'same terms' to the value of the investment (Present Value (PV)) of cash in Year 0.

$$PV = \frac{FV_1}{(1+i)} + \frac{FV_2}{(1+i)^2} + \ldots\ldots \frac{FV_n}{(1+i)^n}$$

Where
PV = Present Value of Cash Flows
FV = Future Value of Cash Flows in Year n
n = Year of Cash Flows
i = Discount or Hurdle Rate

Using the formula for each of the years, you will arrive at the PV of Projected Cash Flows in Table 5. Adding the values, you will arrive at a Net Present Value (NPV) of $8,101

NPV = PV of Projected Cash Flows – Initial Investment

Any NPV greater than 0, will yield a return of greater than the Discount or Hurdle Rate of 10% used in this example. Thus, the project should proceed as planned. Do note that there are many assumptions have been made to build the financial model and at the implementation stage of the project, one must diligently track the progress against what has been assumed and forecasted.

In this example, for instance, we have assumed that we are able to start production and achieve sales and profits (and hence generate cash) a year after the purchase of the equipment (outflow of $750,000). If there is any delay in the delivery and commissioning of the equipment, production will be delayed, no products will be rolling out of the manufacturing plant for sale.

PAT *[e]*		(84,000)	(26,600)	15,674	49,565	83,177	116,507	115,093	113,505	111,735	109,773
Cash Flow Computation											
Add Back Depreciation *[d']*		75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
Investment in Equipment (Cash Out) *[f]*	(750,000)										
Terminal Value of Equipment *[g]*											80,000
Projected Cash Flow *[e + d' + f +g]*	(750,000)	(9,000)	48,400	90,674	124,565	158,177	191,507	190,093	188,505	186,735	264,773
PV of Projected Cash Flow	(750,000)	(8,182)	40,000	68,125	85,079	98,216	108,101	97,548	87,939	79,194	102,082
NPV	8,101										

Table 5. Computing the Present Value (PV) and Net Present Value (NPV)