**WHAT IS OUR MOST**

**‘*PROFITABLE PRODUCT’***

This short scenario is aimed at showing the critical importance of time in all our business activities.

The purpose is to make us **stop** and **think** about any preconceived ideas we may have about the business acquisition and order acceptance procedures, and tries to answer the question:

What is our most “profitable product”?

**OBJECTIVES**

This short scenario is aimed at all who know, or would like to know, what our most “profitable product” is.

The purpose is to make us **stop** and **think** about any preconceived ideas we may have about the business acquisition and order acceptance procedures, and the business processes in general.

It is recommended (though not essential) that the Enterprise Resource Planning (ERP) Overview course be attended prior to reading this scenario.

This story uses simplified products (**just 2**) and a straightforward Bill of Materials (BOM). The prices, timescales and volumes of the two products concerned are for illustrative purposes only. It is the **concepts** behind the scenario, and not the details, which are important here.

Thank you for your patience and understanding.

The story will take about ten minutes to read.

**Scenario Background**

You are a salesman. You have a customer who wishes to place two orders on the Capability Green factory:-

**Order E and Order W**

You know that this will load up the site quote a lot. What is to be done? You could:-

* Play it safe and only accept **one** of the orders.

OR

* Time **phase** or stagger the orders.

OR

* Take a stance that your job is to **sell**, therefore take **both** orders at the same time and claim commission on the sales that you have just made!

Let us assume the latter. Let us assume we take both orders for Job E and Job W in the same time frame. What is Capability Green’s factory (CGF) profit?

Now please turn over and let the story unfold!

**So, with just these two orders what is the**

**Capability Green Factory profit?**

 Operating expenses (Salaries etc) = £6,000k / year and CGF runs 1200 ‘hours’ / year.

Remember,

Profit = Sales Prices – Raw Materials – Operating Expenses

**Make a rough Profit calculation now** ……………. Decided?

OK, can’t decide now, do you need more information?

Please turn over ………..

**Bill of Materials** (I know, this looks complicated, it’s not really, it’s only 2 products passing through 4 types of manufacturing teams!)

Selling Price £900k each

Selling Price £1,00k each

Assembly & Dispatch

75 hrs / unit

Assembly & Dispatch

25 hrs / unit

Hardware Team

75 hrs / unit

Software Team

75 hrs / unit

Hardware Team

50 hrs / unit

**Raw Materials**

Assume

* Salaries (Operating expense) = £6,000k / year
* Availability/Team 1200 hours / year

Module Test 50 hrs / unit

Module Test 25 hrs / unit

Software Team

75 hrs / unit

**Product E**

**Product W**

**Bought In Part**

**So, what is the factories profit?**

Using the Bill of Materials (BOM) Diagram and as;

**Profit = Output - Input**

Profit = P

P= (Sales of products **E** & **W**) – (Raw materials) – (Labour costs etc.)

Profit =((**900 x 10**) + (**1000 x 5**)) – ((**450 x 10**) + (**400 x 5**)) – (6000)

Profit = (14000) – (6500) – (6000)

**So Profit = £1,500k**

**Agreed?**

Please turn over

**Sorry but, yes you guessed it, this answer is wrong!**

**WHY? BECAUSE EACH TEAM ONLY HAVE 1200 HOURS PER YEAR AND TO DO BOTH IN THE YEAR WE NEED 1500 HOURS ON THE BOTTLENECT RESOURCE!**

But we knew that right? Well, all the information was to hand, and it’s not as though there were lots of orders, or we had a very complicated set of Products. In fact it couldn’t get much simpler than **two** products could it?

OK, so what is the **constraint**? What is **limiting** us producing all the Products in the same time frame?

Obviously, in this example, it can be seen from the **Bill of Materials** that it is the ‘*Software Team’*, as both Projects **E & W** use that same team heavily.

Now, time used in ‘Software Team’ =

(75 hours x 10 units of Project E) +

(150 hours x 5 units of Project W)

= 750 + 750 = 1500 hours

**and we only have 1200 hours/year**

**Agreed?**

**Well Yes, this is correct.**

**OK, so now what do we make?**

‘The *most profitable product’*?

But which is it, product **E** or product **W**?

The basic ‘profit’ on a product could be

regarded as: *sales price – raw material costs*

Therefore ‘profit’ on **E** = 900 – 450 = £450k

And profit’ on **W** = 1000 – 400 = £600k

**Where £450k and the £600k are equivalent to the ‘throughput’.**

Therefore we make **product W** first as this product contributes more to the business and with the time left we make Product E?

Now is this correct?

**Agreed**?

Well, after what happened last time let’s check?

**Let us check this. . .**

After all that has gone on above, we must check the time it takes to make each product and that Product W is best to make first.

What is the total amount of time needed to make each product?

Let’s add up **all** the *time* a Product spend in *each* department.

**E** = 75 + 75 + 50 + 25 + 75 = **300 hours**

**W** = 75 + 50 + 25 + 75 + 25 = **250 hours**

OK, as W’s can be designed and make *quicker* than E’s it seems to check out. **So we make product W’s first and then, with the time that is left we make Product E.**

After all, product **W** appears to be the ‘most profitable product’ **and** out of the two products concerned product **W** is also the quickest to design and make!

**Agreed**?

If not why not? Everything checks out - right?

**OK, so what is the profit now?**

**First** let us find the amount of **time left** the software team has after designing and making all the **W’s**. This will let us determine how many product **E’s** we can make.

The time taken in the software team to make all 5 units of . . . . .

Product **W** = 5 X 150 hours in Software Team = 750 hours

**This** gives us, in the 1200 hour time period, 450 hours left to make what we can of Product E.

**So this means that we can make 5 product W’s and with the time left of the ‘time period’ we can make 6 product E’s.**

Therefore profit = (5 x 600) + (6 x 450) – Operating Expense = 3000 + 2700 – 6000

**Profit = - £300k Oops!**

So from a profit of £1500k estimated on page 6, we now work around to a ….

**Loss of £300k?**

**Agreed?**

**But yes, you guessed it, this answer is also WRONG, . . . .**

Why? Because we have not fully utilised the constraint.

Time wise we have, but not in:

**Throughput £’s per Constraint Period terms!**

What’s that!

When we offer Product W to the market we get

£600k divided by 150 hours = £4k per hour of the Software Team.

And when we offer Product E to the market we get

£450k divided by 75 hours = £6k per hour of the Software Team

So, the throughput £ks per Constraint-hour is better for Product E than for Product W.

It is nothing to do with traditional costs, these units are

**THROUGHPUT CONTRIBUTIONS!**

**OK, so now let us make Product E first**

(We push the ‘dog’ product and ignore the ‘star’?)

So now let’s make;

10 Product E’s and therefore we only have time for 3 Product W’s

Now Product . . .

**E** will bring 10 – 450 = 4500 throughput K£s

and

**W** will being 3 x 600 = 1800 throughput k£s

Therefore now as

Profit = Throughput – Operating Expense

Profit = 6300 – 6000

**Profit = £300k**

**Conclusions**

**The term ‘most profitable product’ does not make sense! (as it all depends upon what else we are doing at that time).**

The above scenario has been for a *very simple* site with only *two* products/projects passing through four resources.

A real factory/Job-shop/Project-Team have many products/projects going through them at any one time. All these products can be designed and made by very many staff.

We need a deep understanding and sophisticated processes and systems to assist in the running and planning of the business.

In answer to the question ‘What projects should be undertaken to make more profit for the company? The answer should be:

**The projects that maximise throughput Pounds per Constraint unit of Time’!**

The greater the understanding and awareness of these types of business issues are the better it will be for the business as a whole.

**Comments and suggestions**

Please make any notes, whilst you think of them here, or if I have made a mistake please let me know.

All constructive comment welcomed.

(eg: How could we best bring penalty clauses into the scenario?)

(Should the ERP information change the Review process? Etc)

Name ………………………………………..

Date ……………………………………………….

Telephone ………………………..….

**Thank you.**

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