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## Quick and simple ways to greatly increase cement plant profits

For over a hundred years, cement manufacturers have continued to use the same or at least very similar methods for calculating profit. But as consultant George Handley points out in the first part of a refreshingly honest paper, these methods are incorrect and only serve to inhibit true profitability. George will present a paper at the forthcoming Global Cement Quality Control Conference in Düsseldorf, 20-21 April 2009.

Many sophisticated and advanced cement companies spend vast sums of money on the very latest technology, but continue to use antiquated old-fashioned ways of measuring profitability. Many companies still use costing techniques that were first devised in the 19th century. Instinctively, the traditional way of measuring profit is to subtract all the costs of cement manufacture from the price per tonne of cement.

This logic goes something like this: I sell a tonne of cement for US\$100. I have spent US\$60 on basic costs like raw materials, energy and transport, etc. These are the variable costs that can go up and down as I make more tonnage or less. Then I also have to spend money on capital expenditure, replacing worn out plant, staff, new technology, land, bank charges etc. These are more complex and more difficult to calculate, but I still have to account for these costs over time. These costs are called fixed costs or overheads. Let us say that these costs total US\$30.

So far my calculation goes like this: Profit = price – variable costs – fixed costs. So, the profit per tonne of cement = US\$100 – US\$60 – US\$30 = US\$10 in profit. That is a nice and simple method, but it is riddled with basic logic complexities and bad thinking.

For example, if I have a bagging plant, I must allocate all the costs of the bagging plant only to bagged prod-

ucts. That means I have to start to carefully separate all my costs and make sure that costs are only allocated to those cement products that use the cost. But it is not that simple. What do I do with my team of maintenance engineers? They work on 200 pieces of the plant during the course of the year. Do I have to keep detailed records of where they are and for how long? What about all the other shared costs? For example R&D, bank charges, management. It soon becomes a ‘ Gordian Knot ’ of complexity. I will need armies of clerks to keep up with the data collection and analysis.

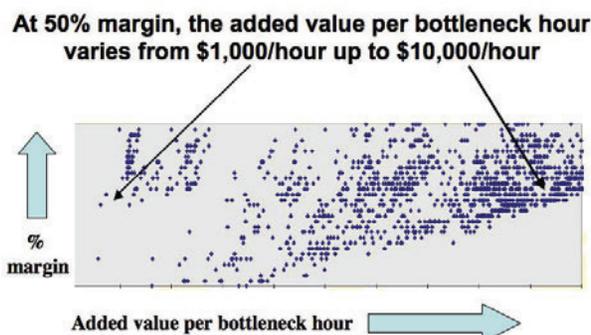
However all this work is a complete waste of time anyway, because cement plants should not be measuring costs per tonne. That sounds alarming because everybody talks about tonnes. Tonnes is a splendidly easy way to measure cement.

### Time is money

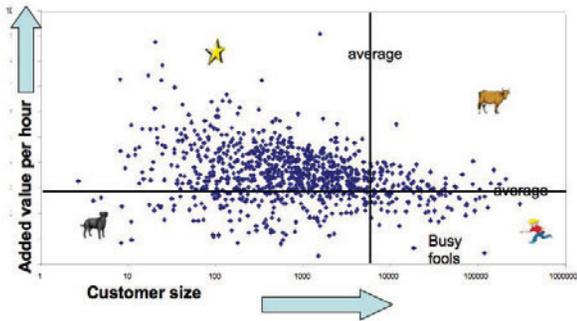
Of course we sell cement in tonnes, but if I have a large, complex, expensive cement plant I am not selling tonnes, I am selling *time*. I have one year at a time to make as much profit as possible. My tonnage output will vary depending on the mix of cements that I produce. Some cements pass through the plant much more quickly than others. It depends on which plant they use and the t/h that the plant produces. In addition, the price per tonne increases if I add value. A good example of this is bagged products. They sell at a higher price, but use the same kiln and mill time as a non-bagged product. If I use the conventional method of costing bagged products, I will greatly underestimate the value of having a bagging plant.

Some cement plants that I have visited are totally and utterly wrong in the way they measure profitability. Not only are they wrong, but their costing methods are driving down profitability. If they have ‘under-costed’ a product, the price is too low and they will attract orders. Conversely, if they have ‘over-costed’ a product they will not get orders for an ideal product in their plant. This

Graph 1 (below): Percent margin versus added value per bottleneck.



## DOGS, STARS, CASHCOWS, & PROBLEMS



**Graph 2 (above):** The position of so-called dogs, stars, cashcows and problems on a chart of value added per hour as a function of customer size.

incorrect logic and decisions by human beings become random over time. If several companies are operating in the same market, it is the quality of decision-making that is shaping the profiles of companies, not the shared events in the market itself.

distortion means that the plant will struggle to be profitable.

Also, and bizarrely, investment is very often in the wrong plant, and a waste of money. Ask yourself the question: "If historical logic and costing was perfect, why are the world's cement plants so different from each other?" It is because

That is also why it is the company that makes the correct business decisions that wins, not the company that has constructed the biggest plant and has the deepest pockets. Furthermore, bad decision-making becomes institutionalised. Cost accountants

have followed the same bad logic for years. It is a brave person who swims against the tide.

### So what is the answer?

The best way to measure profitability in a large complex plant is to use added value per plant hour. This is sometimes called throughput costing or opportunity cost. What you do is to measure all products and customers in terms of how much overall plant time they use. This method is totally accurate and much simpler than conventional costing.

However, there are some critical points that you must understand and completely absorb:

1. You do not add together all the different plant hours used. You use the overall throughput speed. In any and all plants the overall output is determined by the bottlenecks in the plant. There are a number of simple techniques and ways of mapping out and deciding on these bottlenecks;
2. You should only invest in bottlenecks or near bottlenecks. Investing in a non-bottleneck in order to increase capacity is a waste of money;
3. Once you have mastered and understood the concept of bottlenecks, you measure all products and customers in terms of added value per bottleneck hour. Added value is very simple. It is the price minus materials, energy and transport. Ignore other costs such as staff, plant investment etc. These other costs do not vary with volume or mix and should be ignored.
4. The profitability of customers is much more important than the profitability of products. Every customer buys a mix of products in varying tonnages. He/she buys 'profitable' and 'un-profitable' products. It is the overall mix that counts.

Once you have understood these basics you can greatly increase your company profitability by using a few techniques. What follows is the sequence of steps you should take to greatly increase your profits.

**Bottlenecks** – Find the bottlenecks using simple diagrams and charts with analysis based on percentage use.

**Bottleneck profits** – Once the bottleneck(s) has been found, calculate added value per bottleneck hour for all products and customers that use the bottleneck. Any products that do not use the bottlenecks have 'infinite' profitability. Of course, as these products increase in volume, new bottlenecks will appear. There are however techniques available that are designed to handle multi-bottlenecks. For instance, if your kiln is the bottleneck, added value per kiln hour varies from US\$1300 up to US\$9750 depending on product and customer (this example is based on a real plant).

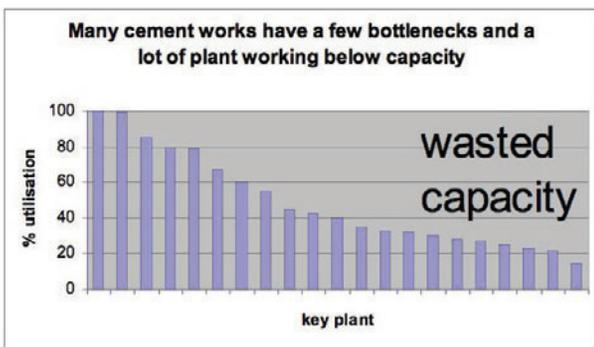
**Size and profitability** – In order to deal with the bottlenecks use 'dogs', 'stars', 'cash-cows' and problems analysis. These terms will be fully explained in a future article in *Global Cement Magazine*.

**Changing the mix without any investment** – This is about maximising the profits from the plant you already have.

**Advanced techniques** – As you start to change the mix you can employ some techniques such as linear programming in order to maximise profit and minimise costs. For instance, if you have several plants, which plants should make which products? At the same time you have to decide how to minimise distribution costs by optimising distribution and manufacture simultaneously. You cannot look at them separately.

In the May 2009 of *Global Cement Magazine* I will look in more detail at the subject of bottlenecks in cement plants. 

**Graph 3 (above):** Chart to show percent utilisation as a function of key plant.



**Below:** Linear programming techniques will help companies maximise profits and minimise costs by deciding which plants should make which products across the geographical spread of operations.

