

Estimating Project Benefits

Examining what is involved in estimating the direct financial benefits of maintenance and engineering projects.

BY LEN MIDDLETON

This is third of a series of articles on executing maintenance and engineering projects. In earlier articles we saw the impact if projects are not done right, and how to estimate project costs. This month we will look at what is involved in estimating the direct financial benefits of projects.

Tangible versus intangible benefits: Tangible benefits can sometimes be estimated and quantified. For most organizations, the organizational expectations are that the benefits for projects should be quantified.

Ironically, many intangible benefits have greater value than the tangible ones. The example from the previous article (*Machinery & Equipment MRO*, Feb. 2008, pg. 33) was the use of timely and quality information from a CMMS to make better decisions. This is important and valuable, but not quantifiable.

To credibly 'sell' intangible benefits (yes, selling is what you will need to do), they must address an existing situation, support the organization's current vision, strategy, or tactics, or address a significant risk.

Tangible benefits — revenue, cost, and margin: Let's start by using a simplified diagram to help understand the relationship between revenue, cost and margin for a capital-intensive industry (see Diagram 1). To simplify, an underlying assumption is that all costs and revenues are linear with no volume discounts or step changes. Another issue is that costs are either fixed or variable, which in the case of labour is not correct, as it can exhibit both characteristics.

The 'Sales Revenue' line is a straight line starting at 0,0 (you sell nothing, you get nothing) with the slope determined by the selling price per unit. In this diagram, the selling price is \$1 per unit.

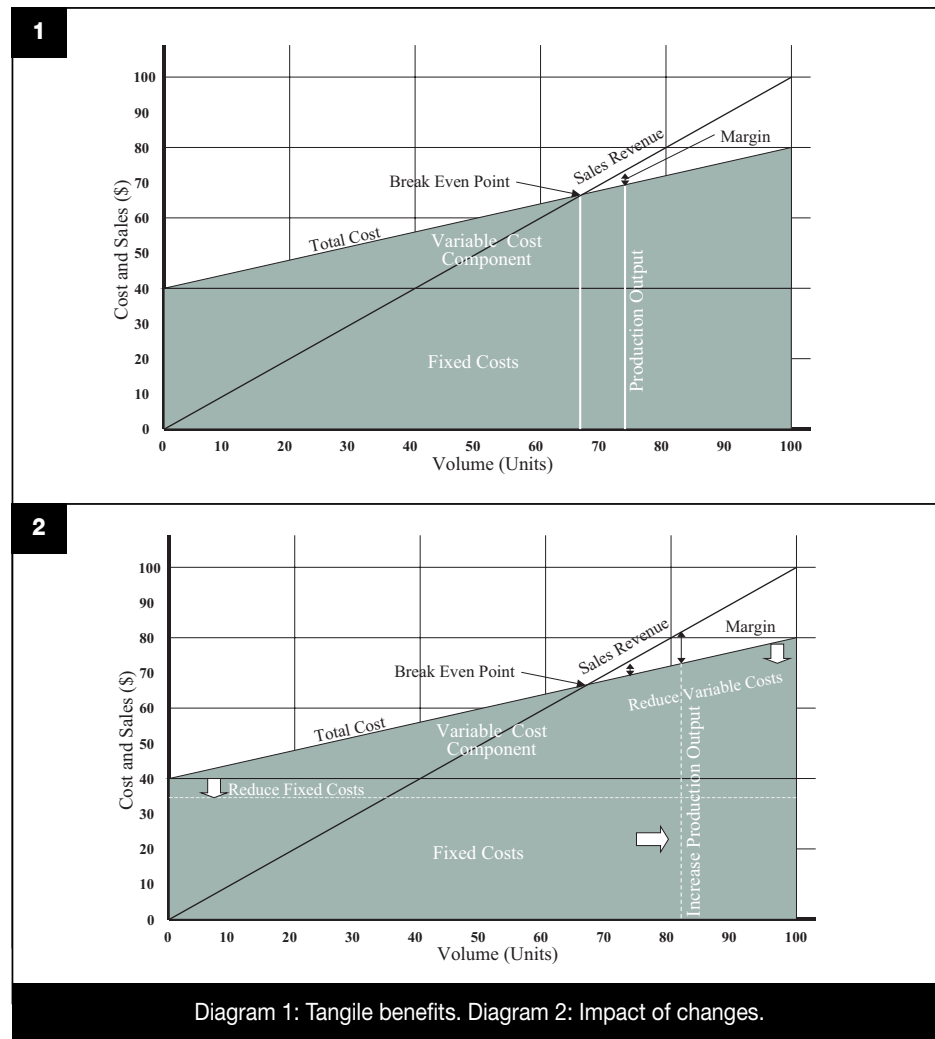
'Fixed Costs' are a horizontal line, as fixed costs do not change with the volume. In this diagram, they are \$40, regardless of the volume. Being capital intensive, the business' fixed costs are a higher percentage of the costs than it would be for a labour-intensive business. Fixed costs include overheads, financing costs and other costs that are not impacted by volume.

'Variable Costs' are a straight line starting at 0,0 (make nothing, you incur no variable costs) with the slope determined by the variable cost per unit. In this diagram, they are \$0.40 per unit. Variable costs include energy used in operations, production materials and other costs that change directly with the production volume.

Rather than showing variable costs directly on the diagram, the 'Variable Cost Component' has been added to the fixed costs, resulting in a 'Total Cost' line. The intersection where the total cost line equals the sales revenue line is the 'Break Even Point'.

Operating at a volume of less than that point, and the total costs exceed the revenue and the result is losing money. Operating at higher volume than that point results in 'Margin', as revenues are greater than costs.

How is this information useful to us? Let's see the impact of some changes to the above diagram (see Diagram 2).



If the fixed costs are reduced, the cost reduction is added directly to the margin, and reduction remains the same regardless of the volume. It also shifts the break-even point left (meaning it would break even at lower volume).

Similarly if variable costs are reduced, the slope of the total cost line is reduced. The cost reduction is also added directly to the margin, but the total amount of the cost reduction will depend upon the operating volume. The break-even point is also shifted to the left.

If we increase production output, margin increases quickly in a capital-inten-

sive industry, as the fixed costs are allocated over a larger number of units. In this diagram, if the output is increased by 10% from 75 units to 82.5 units, the margin increases from \$5.00 to \$9.50, almost double. Therefore we want to be operating as far right as possible (maximum output), as that provides the highest margin.

For an undifferentiated commodity product, this is the preferred course of action. However, some organizations are externally constrained by market demand (differentiated product), critical supply of inputs/raw materials, logistics (JIT — Just In Time manufacturing),

and derived demand (transportation, transmission). With an external constraint, the organization should operate to the point of the external constraint, for maximum margin.

Impact on maintenance

Organizational issues: It is important to understand who is going to support a change that will result in cost reductions, and who is going to feel the pain.

Maintenance cost reduction efforts can have an impact on suppliers, contractors, the workforce and/or staff. The reduced revenue to suppliers and contractors is something they understand and there may even be some expectation of it happening, depending upon the current industry environment. They may be prepared to cooperate in the cost reduction efforts if they can increase their margin (e.g. provide additional services, assume greater risk, etc.) to help offset some of the pain caused by the reduced revenue.

Cost-reduction efforts can have an impact on the staff and workforce in a couple of ways: reduction in overtime and reduction in headcount. Cost-reduction efforts that have an impact on the staff and workforce headcount can be very problematic. Even if there is a suspicion that there could be a headcount reduction, it can be difficult to implement changes.

In a unionized environment, it can get more difficult, as the union is compensated for the service they provide to the rank and file by the number of members to whom they can charge union dues. A reduction in the union member headcount equals a loss in revenue to them.

Also, it is difficult to get someone to change the way things are done so that you can terminate them or one of their colleagues. Not impossible, but difficult except maybe in dire situations where everyone is at risk.

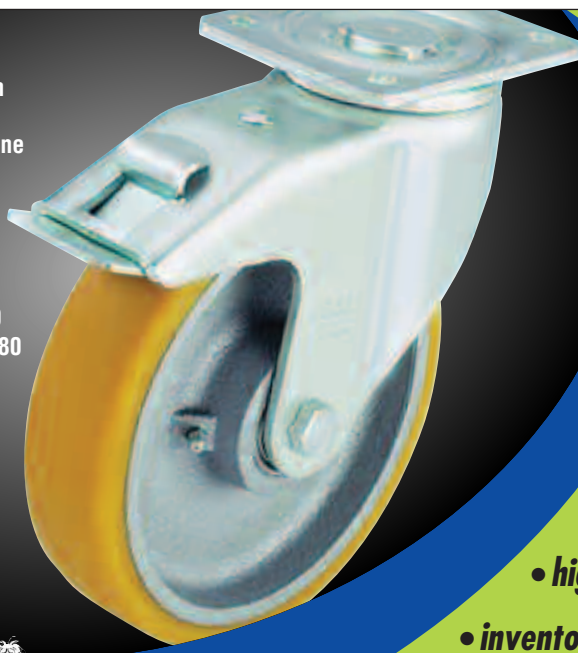
An increase in output resulting in an increase in revenue and an increase in margin is a much easier proposition to sell throughout the organization. It makes the company more viable to shareholders and long-term employees.

Lining up the beans for the accountants to count: How you are able to calculate and claim cost reductions will depend upon the details of

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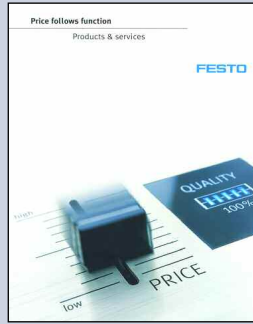
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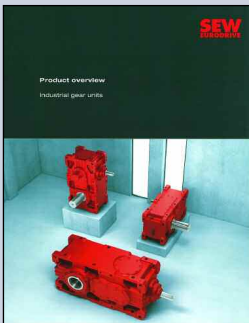
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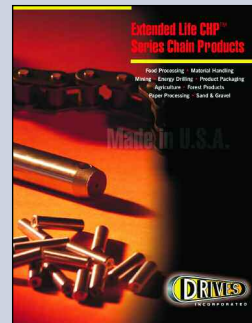
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Estimating Project Benefits...

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your organization's accounting practices. In general terms, it will be the net change in fixed costs (with some consideration for the cost of capital), combined with the changes in variable costs.

When it comes to evaluation of the proposed initiative, the benefit will be compared to the implementation costs. For example, we might propose improving the effectiveness of our maintenance

work management, with the benefit of getting our non-emergency corrective work done on straight time. We could review past work orders to see what overtime work could have been done on straight time if it was properly planned and scheduled. We could then propose that we would achieve a certain dollar value reduction in overtime as the quantifiable benefit, remembering of course

to under-promise and over-deliver.

When there is an increase in output, the organization might consider the benefit just as the increase in revenue, or consider the increase in margin. Ideally the margin increase should be highlighted, for as noted above there is a large increase in margin through a small increase in output.

Examples of initiatives that increase output (improve OEE — Overall Equipment Effectiveness) include improved PM schedule compliance, Reliability Centred Maintenance

and Root Failure Cause Analysis.

In all cases, you should work with the accounting department to ensure that your calculated benefits are in accordance with the organization's practices, and ideally have it on your side when you put together the numbers for submission.

MRO

Len Middleton of Asset Management Solutions of Toronto can be reached via e-mail at len@asset-management-solutions.com. His next column will be on estimating project proposals.