Assessing the Value of Improvement

Assessing the true benefits of any improvement in the operation is a difficult task and subject to many variations, assumptions and factors within the business. When working in a TPM[3] environment the focus is assessing the value of an improvement in OEE. The purpose of this paper is to discuss the calculation of the dollar value associated with a 1 OEE point improvement on an individual machine or process.

In dealing with the model of costs (fig 1 below) it can be seen that there are two aspects to costs relating to the cost of poor equipment performance.

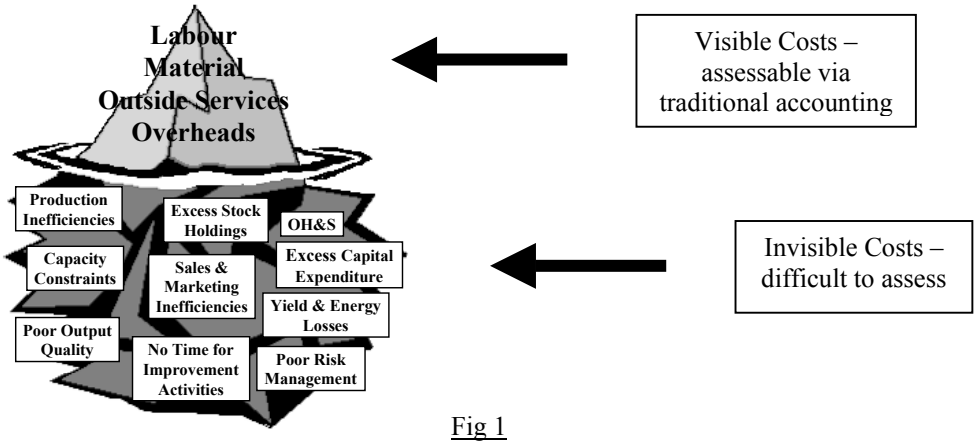


Fig 1

The theory here is that the poorer the OEE, the larger the relative size of the bottom of the iceberg.

Assessing the component of production inefficiency:

To assess the visible value of an OEE point improvement via traditional accounting means has several possible options. The key issue is that the leadership group must develop a model to satisfy the business situation. This is not a simple matter and gaining consensus is the key factor.

The first issue is to determine some of the current situations in the business. Factors include:

- current capacity (can you sell more)
- current scheduled time for the machine (hrs per week)
- nature of product (material cost and value)
- capital intensive
- people intensive
- high energy / operating costs

The costs for the line need to be collected. This is all direct costs and allocated overheads. (e.g. Variable OH and Fixed OH for product manufacturing line). These are the allocated costs that are recovered with every product made.

Taking a simplistic view, in the case where additional product could be sold the benefit is additional recovered cost attained by manufacturing the additional product.

	Starting Point	**Improvement of 1% OEE (2% improvement in throughput)**
	50% OEE	51% OEE
Annual Unit Production	Budget rate x available hrs	Increase of 2%
	18,229,248	18,593,833
Additional Units		364,585 p.a.
Recovered cost per unit (no margin)	$0.37	$0.37
Increased recovery = additional tubes x recovered cost		**$13,464 p.a.** per OEE point

If margin was added to the benefits, this value would increase significantly.

If additional product cannot be sold there are many other opportunities to assess the benefits.

Overtime costs could be reviewed or the costs of casual labour could be reduced.

Another method can be applied in the case of another process, performing below expectations. The approach would be to review the performance against budget levels and equate any improvement to a reduction in expense beyond budget.

Current Performance = 3555 units per hr
Budget Performance = 3750 units per hr
Deficit = 195 units per hr
Units lost per year = 1,300,000 units (based on annual hrs)
Fixed costs per unit (not recovered) = $0.0726
Labour costs per unit (not recovered) = $0.0284
Costs not recovered = $131,300
Budget OEE = 75%
Current Performance = 71.1%
Difference = 3.9 points
1 OEE point = $131,300 / 3.9 = $33,667 per point.

These situations are examples only. They should be used in this light and need to be reviewed in line with current performance levels. Importantly any such calculation should be carried out in conjunction with the plant financial controller and leadership team to ensure consensus.

In many cases people will claim there is no “true” benefit in any of these situations. If this is truly the case then it could be argued there is no need to improve at all! There

must be a scenario to measure this improved performance. It is a matter of finding and agreeing to it.

Assessing the component of Poor Quality (scrap):

A useful activity is to calculate in this are is the value of 1% point of scrap. In product where material represents a high component cost this could be significantly higher in value than a standard OEE point.

Using a tube line as an example line again, with a Sunsilk tube:

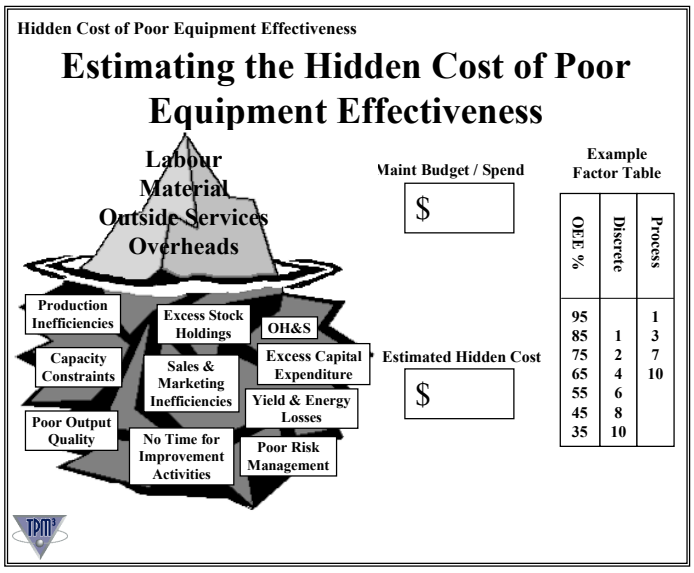
Material cost per tube	= $0.31
Tubes per year	= 18,229,248
1% scrap in material only	= $5,647 p.a.
1% scrap in cost of tube	= $34,000 p.a.

Improving machine performance and hence OEE would normally improve the quality rate and reduce scrap.

Broadly Assessing the entire invisible component:

Improved response time, reduced stocks, less scrap, less rework, reduced need for additional plant, better customer relationship, downstream improvement.

There are difficulties in assessing the impact of the hidden costs accurately but several studies have been undertaken to ascertain the relationship between OEE and the hidden costs. The following table relates attributable maintenance costs for a machine to "hidden costs". The table on the right provides the multiplier factor to calculate the "hidden costs".



To further assess the benefits outside of OEE improvement please see paper – "Bottom of Iceberg Analysis"

Conclusion:

The above is intended as a discussion paper. As stated the calculation method utilised needs to be agreed between operation and finance groups. The exact method will depend on the circumstances in the business and the strategic intentions.