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ANALYZING / QUANTIFYING YOUR COMPANY'S ASSET MANAGEMENT OPPORTUNITY AND SELLING THE PROGRAM TO MANAGEMENT

A methodical approach to measuring your company's current reliability profile and establishing your "Asset Management Opportunity" in dollars and cents for upper management

by James W. Davis, PE

ABSTRACT. In recent years, major manufacturing companies in many industries have begun to realize the importance of Asset Management as an enterprise strategy that, properly implemented, will improve financial performance. Typical results of an effective Asset Management Strategy include a 20% - 50% reduction in maintenance cost accompanied by a 5% - 10% increase in real production capacity, with no capital investment in production equipment.

The race to acquire and implement enterprise-wide Asset Management is fueled by the pressure for companies to be increasingly cost-effective and competitive in global markets. In a recent study, Asset Productivity: The Next Wave, the Boston Consulting Group (BCG) stated that, "In order to compete for funds, companies must offer investor returns that are competitive with other opportunities. Alternative investments such as dot-com and others with non-traditional business models have raised the bar." (A PDF version of the study can be downloaded at www.bcg.com). BCG views Fixed Asset Productivity as the most powerful mechanism for increasing shareholder return.

The author believes that the most effective way to increase Fixed Asset Productivity is to maximize Asset Utilization by increasing the Reliability of the Manufacturing Assets (equipment and systems).

This paper addresses specific techniques for conducting the two most critical activities necessary to initiate such a program:

1. The process of analyzing your current status and quantifying your "Reliability Opportunity" in terms of financial improvement goals.
2. The technique of developing a "compelling argument" for Senior Management to gain support and commitment for your program.

EXECUTIVE SPEAK. If you are an Engineer or Middle Management person are going to communicate with Senior Management, you must learn to speak their language. The goal of all public companies is to enrich their investors. A requirement to increasing shareholder wealth is profitability. Profitability is the return on an investment. Measurements of return include cash flow and net income while measurements of investment include operating assets, total assets and equity. Typical measures that affect Senior Management bonuses are Return on Net Assets (RONA), Economic Value Add (EVA), and Earnings Per Share (EPS), etc. Each of these can be directly correlated to Asset Utilization, the effective measure of a Strategic Asset Management Program.

All strategies to improve profitability can be classified as employing one or more of three fundamental mechanisms of which improving reliability is one. As discussed below, each of these mechanisms has a different risk-reward relationship:

1. Eliminate waste. This mechanism includes all strategies based on cutting costs, expenses or assets that have been determined to be non-value added in delivering an offering to a customer. Initially this mechanism tends to be low risk and offers high rewards. Subsequent attempts to cut waste, without some fundamental change in a business process or infrastructure, are typically less profitable, more difficult, and more risky. Risk may increase because subsequent waste elimination strategies may be more likely to mistakenly eliminate value-adds.
2. Change the rules of the game. This mechanism includes all strategies based on changing either the offering, the market's perception of the offering, or how the offering is delivered to

the customer. Changing the rules of the game can offer the highest rewards but also the highest risk. For example, consider the pharmaceutical research investment. The average Research and Development investment by major pharmaceutical companies is 20% of their sales. This extraordinary investment is needed because early stage drugs have a one in thousand chance of even FDA approval, much less becoming a blockbuster product. Despite the risk of investing in a drug that does not bear fruit, the rewards of a blockbuster drug merits the investment.

3. Improve reliability. This mechanism includes all strategies directed at ensuring processes consistently operate at peak performance. Typically, the risk-reward relationship for improving reliability falls between the prior two strategies. Frequently, the largest risk in implementing a reliability strategy is predicting the system impact. For example, if unreliable equipment becomes more reliable, will available capacity increase? Or will something else fail, eating into the potential capacity gain? Appropriate decision support tools that can accurately predict the system result of improving reliability can mitigate this risk.

CATEGORIES OF OPPORTUNITY. There are basically four categories that offer significant potential return from an Asset Management Program:

1. Fixed Cost Expense Reduction
2. Increased Product Throughput
3. Capital Spending Avoidance
4. Reduction of Inventory Investment

The easiest of these to achieve is the reduction of fixed costs in terms of maintenance expense, a waste elimination mechanism. It is critical to identify the broken or inefficient business processes and infrastructures that create the waste and to replace them with well designed processes and structures. This mechanism is employed by reducing the amount of unplanned equipment outage and becoming more effective in managing the resource allocation function, what we at SAMI call developing an effective “Managing System”.

Increasing product throughput by developing a more reliable operation, while more challenging, has a double impact on financial performance. It significantly reduces the unit cost of the product while reducing the level of maintenance repair required on the equipment. This is a particularly effective mechanism in industries where fixed costs represent a significant per cent of the total cost of making product as all additional units produced are made at a total cost equal to the variable cost of production, yielding the highest profit.

In an industry where product demand is high and Capital Investment is needed to increase plant capacity, a strong Asset Management Program can often achieve the required

additional throughput, avoiding the requirement for capital spending. This mechanism often provides the biggest bang in terms of financial improvement as it avoids the cost of borrowed money for investment in facilities as well as the increase of asset values on the company’s books. (Remember that profitability is a measure of return on assets employed.)

Raw material, finished product, and MRO inventories are held to account for unreliability in the manufacturing process. In a Lean Manufacturing environment where inventories of raw materials and finished product are minimized, it is critical that the company establish and maintain an effective Asset Management Strategy. As the manufacturing process and associated assets become more reliable, inventories of both of these as well as MRO supplies can be significantly reduced with little risk.

FIXED COST EXPENSE REDUCTION. A.T. Kearney created the Maintenance Cost to Replacement Value Ratio (RAV) in the early 80's as part of a benchmarking survey for DuPont. It is calculated as:

$$RAV = \text{Maintenance Cost} / \text{Asset Replacement Value}$$

expressed as a per cent. Industry experience has shown that excellent performance is indicated by a RAV of 1.5% - 2.5% depending on the industry and type of manufacturing process.

To date, it is an accepted measure in the maintenance and reliability profession; however, it is not an absolute number and must be used in conjunction with other performance metrics.

In its various uses, companies adopted different methods of actually making the calculation. Some made an attempt to establish a number for replacement capacity rather than assets. Others, such as Rohm and Haas and Dupont, inflate original and subsequent construction costs by a CPI equivalent or inflation indices provided by the insurer. A sample table follows:

Category	Buildings	Machinery & Computers	Lab Equipment	Office Equipment	Vehicles
1901	46.7	55.0	123.0	306.5	98.6
1902	46.7	55.0	123.0	306.5	98.6
1903	48.0	55.0	123.0	306.5	98.6
1904	47.7	55.0	123.0	306.5	98.6
1992	1397.9	940.5	489.2	800.6	315.2
1993	1479.0	961.9	498.9	823.7	323.3
1994	1510.4	980.8	512.0	842.5	332.7
1995	1550.1	1009.0	528.1	828.1	335.5
1996	1574.0	1034.6	539.8	877.8	338.0
1997	1574.0	1034.6	539.8	877.8	338.0
1998	1622.4	1049.6	547.9	890.8	330.9
1999	1677.0	1060.1	555.6	894.6	337.5
2000	1707.8	1065.3	561.6	894.6	339.8
2001	1711.8	1091.6	567.3	894.6	366.5
2002	1809.0	1091.4	589.8	894.6	334.2

Years between 1904 and 1992 are omitted for simplicity. The main issue is to use RAV as a relative measure, calculate it consistently and use the results to measure progress to objectives.

RAV ratios are not identified as accounting ratios or terminology because accounting practices have changed very little since the late 1930's, and have not kept pace with current business theories and practices. However, GAAP and SFAP, do substantiate the following: The term "replacement value" is the value of an asset as determined by the estimated cost of replacing it for like capacity/purpose in its original technology. in accordance with standard accounting practices relating to only "fixed" assets.

INCREASED PRODUCT THROUGHPUT. The Boston Consulting Group believes that shareholder return is a result of three factors:

- Asset Growth: Compounded Asset Growth Rate
- Cash Flow Margin: Ratio of Cash Flow to Sales
- Asset Productivity: Ratio of Sales to Asset

BCG views asset productivity as the most powerful mechanism for increasing Shareholder return. They state, "Companies have exhausted methods of traditional cost cutting. They have experienced the downside of rapid growth and have neglected the balance sheet. Fundamental changes in industry structure such as deregulation, outsourcing, and IT innovations have taken their toll. The only remaining opportunity is to increase Asset Productivity." The author believes that the most effective way to increase Fixed Asset Productivity is to maximize asset utilization by increasing the Reliability of the Assets through an effective Asset Management Program.

To calculate your current level of Fixed Asset Productivity (FAP) or Asset Utilization (AU) you can use the following formula:

$$\text{FAP} = \frac{\text{Sales Volume} \times \text{Selling Price/Net Fixed Assets}}{\text{Assets}}$$

$$\text{Sales Volume} = \frac{\text{Max Daily Rate} \times \text{Asset Utilization} \times 365 \text{ days}}{\text{Assets}}$$

Where utilization is calculated as:

$$\text{AU} = \frac{\text{Actual Annual Production}}{\text{Max Daily Rate} \times 365 \text{ days}}$$

$$\text{Max Daily Rate} = \frac{\text{Demonstrated Capacity}}{\text{Assets}}$$

Your opportunity is then simply the difference between current AU and AU = 100%.

As a result of a focus on improving AU, the profitability at Rohm and Haas doubled, going from 7% in 1993 to over 12% in 1998 as measured by Return on Net Assets (RONA). The program is

credited with adding \$100,000,000 to the bottom line annually.

CAPITAL SPENDING AVOIDANCE. Where your company is "sold out", and demand for your product is strong, there is often a significant motivation to invest Capital for expanding capacity of the facility. If your AU is less than 70%, the generally accepted average for all North American industry, there is a very strong probability that you can achieve the desired capacity by implementing an Asset Management Program that raises AU to the 90% range.

The Opportunity calculation in this case is simple; it avoids the spending of the \$100 million needed for the capital project and does not add to the Asset Value of the facility. It also avoids all of the confusion and consternation that usually accompanies construction, commissioning and startup of new capacity in existing facilities.

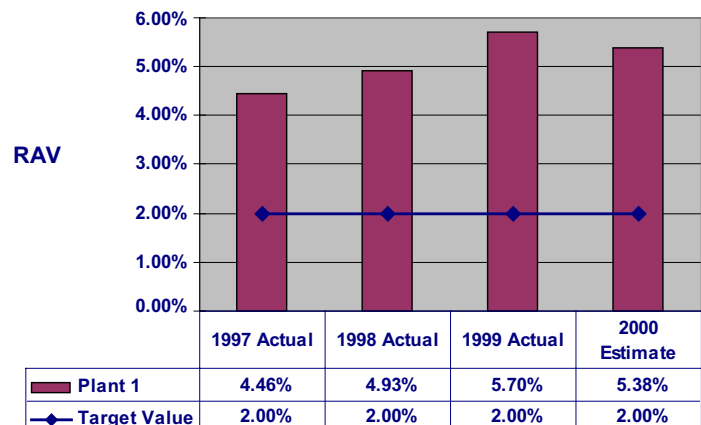
REDUCTION OF INVENTORY INVESTMENT. Various manufacturing industries hold raw material and finished product inventories as insurance against manufacturing delays and unexpected demand. They maintain large MRO Inventories (parts and maintenance supplies) for similar reasons. These inventories can amount to a significant portion of the Asset Value carried on Corporate Balance sheets, negatively impacting profitability. The objective of Lean Manufacturing concepts is the reduction or total elimination of these inventories. Poor reliability resulting from ineffective Asset Management will destroy any Lean Manufacturing benefits.

The Opportunity in this case is the total value of Raw Material and Finished Product Inventory that is maintained to account for unplanned manufacturing outage as well as a significant piece of the MRO Inventory.

DEFINING THE OPPORTUNITY.

Calculate your current RAV trend: The chart below reflects one Plant's performance over a four year period.

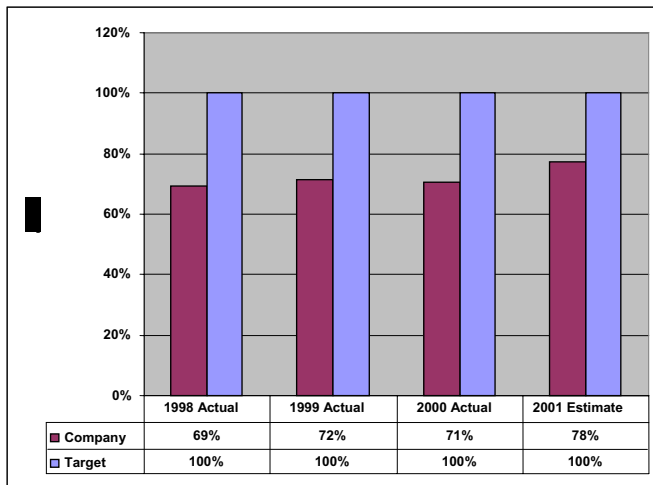
The cost reduction opportunity can be calculated as follows:



2001 Estimated Maintenance Cost = \$37.0M
Current Asset Replacement Value = \$1,787M
Current MRV = 5%
Target MRV (Best in Class) = 2.5%
Target Annual Maintenance Costs = \$18.5 M
Maintenance Cost Opportunity = \$18.5 M

benefits. Remember, without change in processes, you cannot achieve the future state that will deliver the benefits. In a future paper, I will address the subject of identifying the core processes, evaluating the current state, and mapping the road to future success.

Calculate your current AU trend: The chart below reflects one company's AU trend over a four year period. The AU throughput opportunity calculation is done as follows:



2001 Estimated Production = 4.16M tons
Current Asset Utilization = 78%
Maximum Asset Utilization = 100%
Target Annual Clinker Production = 5.33M tons
Additional Production Realized = 1.17M tons
Variable Cost @ \$15/ton = \$17.55M
Additional Revenue @ \$65/ton = \$76.05M
Production Opportunity = \$58.50M

If the Capital investment avoidance or inventory reduction opportunity applies, simply add them to the opportunity calculation to arrive at the total opportunity. In the example above, the total opportunity is:

$$\text{\$58.5 million} + \text{\$18.5 million} = \text{\$78 million}$$

This will make a compelling argument with any Executive for getting on with an Asset Management Program.

CHANGING THE PROCESS. Now that you have defined an opportunity, you must be able to address the question of how you can achieve all or part of this opportunity. This means changing the existing business processes. The first step is to evaluate the current state; the second is to identify the process changes that will yield the expected financial

Title	Author	Copyright	Publisher
Asset Productivity: The Next Wave	Ron Nichol, Phillipe Amouyal	1998	The Boston Consulting Group
Introduction to TPM	Seiichi Nakajima	1988	Productivity Press
Maintenance Engineering Handbook	Lindley Higgins	1994	McGraw-Hill
Maintenance Planning and Scheduling Handbook	Richard D. Palmer	1999	McGraw-Hill
Reliability-Centered Maintenance, 2nd Ed	John Moubray	1997	Industrial Press Inc.
Root Cause Failure Analysis	R. Keith Mobley	1999	Butterworth -Heineman
The Six Sigma Revolution	George Eckes	2001	John Wiley & Sons
The Six Sigma Way	Peter Pande et al	2000	McGraw-Hill
The Visual Factory	Michel Greif	1991	Productivity Press
Uptime: Strategies for Excellence	John Dixon Campbell	1995	Productivity Press
Improving Profitability through Reliability	Carol Vesier, Ph. D	1994	Paper @ SMRP