CALCULATING MAINTENANCE / RELIABILITY INITIATIVE RETURN ON INVESTMENT (ROI)

SOURCE: "RULES OF THUMB FOR MAINTENANCE AND RELIABILITY ENGINEERS"

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Before any reliability project or initiative can begin a business case must be established with the financial benefit or risk determined. In this chapter we will deal more with financial risk rather than with the business risk as it pertains to safety or environmental issues.

In order to determine the ROI (return on investment) it is important to first establish the objective for the reliability initiative. The initiative's objective should have a financial value assigned. An example may be:

Reliability Objective: Increase reliability of production assets on a specified production line by 8% with a financial value of $8million the first year.

Developing the initiative's objective and assigning value to the objective is important in order to receive management's approval. The objective above could be broken down further into more defined measurements to include:

- Increase number of units produced in year 1, year 2, year 3 etc.
- Reduction in unit cost per unit in year 1, year 2, etc.
- Increase in quality yield by % in year 1, year 2, etc.
- Reduction in maintenance cost by 10% in year 2, 20% in year 3, and 30% in year 3 based on current maintenance material, labor, and contractor cost

Leadership ROI Team

The first step in this process is to develop a team of professionals who would jointly develop the business case which includes the ROI. This team must consist of the plant, or corporate financial person, production leadership, maintenance and engineering leadership, and plant or executive management. Many times any one of these personnel will try to not participate in this process, however, if they do not participate, the chance of the initiative being approved is very low. I always ask managers how much their time is valued. In most reliability initiatives the value is so high they have no option but to participate.

Case Study

An example of this value would be a true situation where I will change the names to protect the company's true identity.

Company name: XYZ Company

Situation: Demand for this plant's product was expected to double in the next one year - two years.

- Company was adding additional production lines in the plant in order to keep up with production demands.
- According to production management no additional capacity of current assets was available.

- Equipment reliability was concern because downtime was seen as high (no real numbers available)
- Skill level of maintenance personnel was seen as a problem because of reliability issues so a “pay for skills” program was implemented and was seen to have little effect on the reliability issues.
- A new maintenance manager was appointed from engineering.

The Team:

- A team was developed by the plant manager to determine a solution to the reliability problem with real concern that the new production lines will have similar production issues if equipment reliability is not improved.
- Team consisted of the plant manager, production and maintenance manager, engineering manager, plant comptroller, outside consultant.

Findings: After an evaluation of the situation the following information was found to be valid and agreed upon by the management team.

- Asset reliability problems consisted of only 3% of total downtime
  - Maintenance department had PM program developed based on manufacturer’s recommendations and were very vague
  - Maintenance department had no repair procedures developed
- Change over standards were set too high resulting in a total downtime of 40%
  - Change over standards were developed based on plant startup 6 years prior with no further evaluation for improvement
- Quality losses were exceeding 9% of production rate due to lack of good production operating procedures
  - Operating procedures were developed after the plant initially started up and were never updated
- Little if any data tracking system could be found
  - The computerized maintenance software system was used very little
  - The production software system was used very well however the data being reported was not valid

Return in Investment results:

- Plant was operating at 57% of true capacity rate
  - Change over standard was set to high (4 hour change over went to 45 minutes)
  - Change over between shifts was costing an average of 15 minutes between shift times two shifts a day
- Industry known product quality benchmarks were found to be 3% where this plant’s quality losses were at 9% resulting in a delta of 6%
  - 78% of quality losses were caused by operator error on each production line
  - The other losses were a result of many factors

Final numbers:

- Plant capacity increased to 94% within 6 months (sold to corporate as two year project)

  “Under commit, over deliver”
  - Resulting in an increase net profit = $12 million
  - Capital expenditure was halted resulting in a savings of $4 million
- Quality increase to 4% in one year
  - Resulting in an increase in net profit by $800,000

- Maintenance cost increased in the first year by 10%
    - Maintenance cost decreased over the next two years by 34% ($420,000)
- Total cost of the project (2 years)
    - Production consulting services = $400,000
    - Maintenance consulting services = $800,000
    - Skills Training = $150,000
    - Other cost (training for managers, visits to other plants, etc) = $120,000
    - TOTAL COST
        - (year 1) = $1.1 million
        - (year 2) = $250,000
    - INCREASE IN REVENUE
        - (year 1) = $13 million
        - (year 2) = $4,220,000

In Conclusion: In the final analysis the plant spent $1,350,000 in order to return $17,220,00. If you notice the cost was front end loaded. Corporate was told the expected return was $3,200,000 and not $17,220,000. The cost was stated as estimated. The plant team "under committed but over delivered". This was one of many situations which actually happened.

Lessons Learned:

1. Develop a leadership team to identify ROI
2. Have the number one financial person on the team to provide hard validation of cost and ROI
3. Determine where all of the losses may be occurring and focus on the losses worth going after. Some losses will always occur but must be determined and accepted as part of management's operating strategy.
    - Reliability
        - Schedule downtime
            - Weekly, monthly, yearly schedules based on time and not asset health
        - Unscheduled downtime
            - Rework
            - In-effective PM program (apply RCM Methodology such as FMEA, RCM, etc)
            - Total functional failure
        - Maintenance cost (this will reduce as a result of an increase in reliability and reduction in production reactivity)
            - Maintenance overtime
            - Maintenance labor (never layoff, loose through attrition)
            - Maintenance material purchased
            - Maintenance storeroom value
            - Maintenance material overnight delivery cost
            - Maintenance contractor cost
            - Maintenance capital (replacing equipment because it was not maintained appropriately)
    - Production – if the equipment is not operating to the functional requirements then it is producing a loss.
        - Product changeovers
        - Startups
        - Breaks, lunches

- Product quality
- Operator error
- Partial and total functional failure

4. Determine the objective of the project or initiative and quantify it
5. Under commit, over deliver every time

Questions or Comments? email me at rsmith@worldclassmaintenance.org

World Class Maintenance vs Typical Attributes

Category	Typical Maintenance	World Class Maintenance
Maintenance Cost as a % RAV	5.6 – 11%	2.0-2.5%
Budget Compliance	Less than 60%	100%
Planners per Craftsperson	No Planner or No Proactive Planning Process	1 - 20
Absenteeism	10% plus	+/- 5.0 %
Ready Backlog in Weeks	Unknown	2-4 weeks
% Planned Work	15% or less	90%
Schedule Compliance	50%	90-100%
PM Compliance	60%	95-100%
Inventory Accuracy	Unknown	95% plus
Maintenance Training Cost	No Budget	6% of Budget
Maintenance Rework	High	Low
Accurate Maintenance Dashboard	Not Available	100%

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