User Guide for Equipment Restoration Optimization Model

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User Guide for Equipment Restoration Optimization Model

The model is a Microsoft Excel spreadsheet that permits you to do ‘what-if’ scenarios comparing the cost of continuing to do equipment maintenance to an aging equipment item, verses the cost of restoring the equipment to as-new condition, or replacing it with new.

It helps you make decisions such as – If you had an old car that was costing more to keep, when do you replace it for the least total cost to you?

Data is entered into selected fields of the spreadsheet and used to populate the calculation tables, which then return the results shown in the remainder of the table.

The curves on the charts are drawn by the model.

Nomenclature and Definitions

**Refurb Cost**  today’s cost to overhauling the equipment to ‘as new’ condition.

**BD Cost**  today’s direct maintenance cost of fixing a breakdown.

**Direct**  the money actually spent to fix a breakdown with no other consequential costs included. Usually the tally of invoices, parts issued and own labour.

**Indirect**  the additional business wide costs of a failure above the direct maintenance cost of fixing the failure. Typically the direct cost of maintenance is a small part of the total business-wide impact of a failure.

**Spreadsheet Inputs Explained**

The allowed spreadsheet inputs are those fields coloured ‘light green’. These are:
• **Heading** – the name of the equipment being investigated

• **BD Costs Steady** – today’s direct maintenance cost of fixing a breakdown

• **BD Costs Linear** – expected annual increase in maintenance costs, assumed to be linear growth

• **BD Costs Compound** – the average inflation rate

• **Indirect/BD Linear** – the ratio of business-wide costs of failure compared to the direct maintenance costs of fixing the failure

• **Indirect/BD Power-O-R** – an exponent that adjusts the impact of Indirect/BD ratio

• **Prevention Now** – the start-up cost of establishing a preventive maintenance program

• **Prevention Steady** – today’s annual cost of doing the preventive maintenance

• **Prevention Linear** – expected annual increase in preventive maintenance costs, assumed to be linear growth

**Explanation of Theory Behind the Model**

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**Selling Good Maintenance**

CBrstore is an example of how calculations can be used to support estimates and make the case for increased preventive maintenance funding.

However,

1) the analysis is no better than the estimates it is based on and
2) the detailed calculations may not appeal to your management.

Simpler approaches may be more cost effective in your organization.

For example – Lets say that you want the operators to actually clean the machines not just for the boss to talk about TQM.

Most people in an Industrial Plant will agree that a dirty, hot environment will promote failure.

The issue is to gain commitment to improve the situation.

Create Ownership  Set out Target  Build Consensus & Commitment
CBRestore

The Simple Spreadsheet can be extended by relating total cost (recurrent expenditure, capital investment, residual failure and hidden cost) to time of replacement.

**Given:**
- A relationship between Direct Maintenance and Indirect Cost
- Cost of Money as a Discount Rate
- Restoration (refurbishment/replacement) Cost

And Given the relationship over time since Restoration for:-
- The Proposed Expenditure on Preventative Maintenance.
- The Expected Break Down Maintenance Cost

**CBReferb will compute:**

The Minimum Cost and the Restoration time to achieve that cost

Assumes Restoration to **As Good As New** (resets the clock)  
- i.e. Costs (in today’s $) year after Restoration are the same as year 1.

Options can include an up-front investment. Used in developing a business case for expenditure for maintenance improvements in this year’s budget.

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**Importance of Ratios $Indirect/$BD & $PM/$BD**

Assets Cost Money
You Can Choose whether that money is spent keeping it in good condition ($PM)  
OR
Fixing after Failures ($BD)

**When making this decision on a financial basis**

You may **CHOOSE** to keep your vintage car in perfect condition  
- but this choice is not made on a financial basis

**If**

$Indirect/$BD is high  
There is increased incentive to reduce $BD
Option Comparison

The Program computes minimum cost for one set of data
BUT
Its main use is to compare minimum cost with different data.

The best application is to compare results from different data
Different
- $ on Prevention
Hence different
- Expected BD $
Thus different
- Minimum costs and years to refurbishment

i.e. If you consider that increased $ on Prevention you get Decreased BD Cost you can -
"Plug in" both sets of estimates and compare minimum cost of these plans.

Explanation of the Model Design