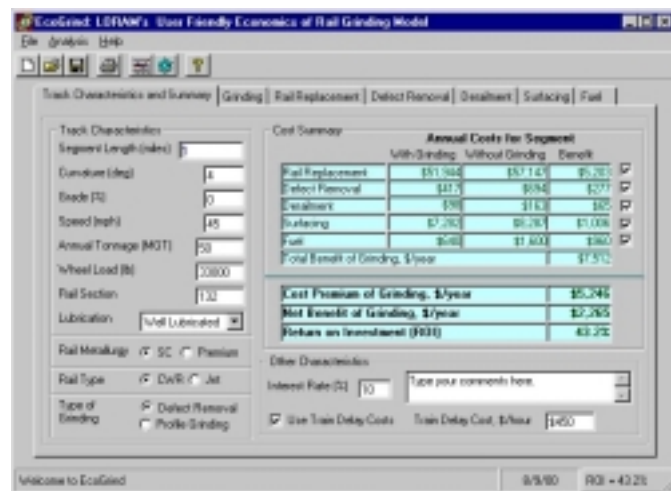


EcoGrind Economic Analysis for Rail Grinding

EcoGrind is a user friendly Windows™ based software that presents the benefits of rail grinding as compared with a base case of no-grinding. These benefits include extension in rail life, reduction in fatigue defects, reduction in surfacing cycle, reduction in derailment risk, and reduction in fuel costs.

EcoGrind evaluates the costs on an annualized basis, in order to fully understand the economics of grinding. A present value analysis is presented based on the unit costs and cycle of maintenance, and a user defined cost of money. Using the benefits of grinding and the costs of grinding, a return on investment (ROI) for grinding is determined.



EcoGrind takes site and operation characteristics into account. It uses segment length, curvature, grade, annual tonnage, rail section, wheel load, level of lubrication, and type of grinding to determine the life cycle of the various track components and maintenance activities that benefit from grinding. For each maintenance activity, a per-mile cost is built up based on unit costs. Using the per-mile costs and the maintenance life cycles, along with the cost of money, an annualized cost for each maintenance activity can be determined.

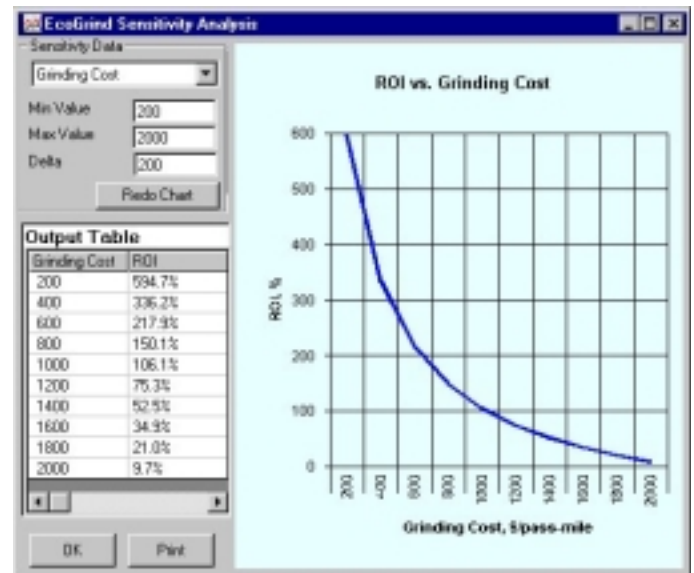
The effect of rail grinding introduced here is based on the latest research available to the industry. All the engineering information contained within the model is based on this research and can be overridden by the user, should their individual experience not match the current industry results.

EcoGrind has all the user-friendly interfaces associated with the Windows™ operating system. Inputs are through easy-to-use controls such as input boxes, option buttons, check boxes, etc.

The model is structured in a “tabbed” format that allows the user to quickly negotiate and view any aspect of the analysis, that is presented in a side-by-side format. When any variable is changed the results are provided instantaneously to the user.

The user can either analyze combined benefits of all components or the benefit on each individual item by turn off/on the check boxes next to the itemized list of analyses.

A sensitivity analysis feature allows the user to select a operating or cost variable and vary the value within a user defined range to calculate the resulting ROI at each value. The results are then presented in both tabular and graphical format as shown in the following figure.



In addition, a multiple-segment analysis option is also built in the model that allows user to evaluate the overall averaged return on investment for up to eight segments. The grinding cost and net benefits for each segment, as well as the averaged return on investment are updated instantly.