Title: Machinery Replacement Problems Model.

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Abstract: The effect of deterioration on resale value is examined in this study. Previous works on machinery replacement lay emphasis on the minimization of total, maintenance and operating costs and the maximization of profit without recourse to the effect of deterioration on the resale value. Some models exclude resale value in the build-up of cost. In other models values of deterioration are assumed or at best determined by methods that are highly subjective and sometimes expensive like the popular failure analysis. In this work, values of deterioration are generated as random numbers using the Monte Carlo simulation under the uniform probability distribution. Dynamic programming enumeration process is adopted as the solution technique. The model is calibrated and the results are verified with field data from different industries. Finally, the results of the model are compared with those of existing models. Basically, the results show that with regular and timely corrective maintenance the optimal replacement dates are between 4 and 6 years for construction machines, 16 and 20 years for pharmaceutical machines, 13 and 17 years for plastic machines and 6 and 9 years for transport vehicles. The results also show that the model is reliable, operational and simple in application.

Keywords: Replacement model, Deterioration/ Salvage value, Dynamic programming.