

**Title:** Dynamic Programming for Machinery Replacement Models.

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**Abstract:** Dynamic programming is an optimization technique used in solving problems that exhibit the characteristics of overlapping sub-problems and optimal substructure.

Optimal substructure indicates that optimal solutions of sub-problems can lead to the optimal solution of the overall problem. Machinery replacement problems exhibit such properties and therefore can be solved by dynamic programming technique. The technique is simple in application and produces definite solutions to machinery replacement problems. It has this advantage over other optimization techniques like the cumbersome forward/backward algorithm which may produce infinite solutions. This paper demonstrates the use of dynamic programming technique in solving machinery replacement problems of a hypothetical front-end loader and an identified Motor Grader. The choice of hypothetical and measured cost data from the construction industry is deliberate. The focus here is on the versatility of the dynamic programming technique in handling such data from the same industry. It can also be extended to other industries. The result reveals the simplicity and efficiency of dynamic programming technique in solving machinery replacement problems. It also shows the difference between hypothetical and measured data. There is also an indication that the Motor Grader has an appreciable secondhand value. The dynamic programming technique is therefore a good tool for industry managers in making machinery replacement decisions.

**Keywords:** Dynamic programming, machinery replacement, inventory control.