

# Economic Design of a Fixed Amount Compensator for a Tool Wear Process

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## *Abstract*

A fixed amount compensation plan which is characterized by initial setting and compensation limit is proposed for a tool wear process. It is assumed that the tool wear function can take any form as long as it is nondecreasing. Cost models are constructed which involve process adjustment cost and quality loss. Symmetric and asymmetric quadratic functions of the deviation of a quality measurement from the nominal target value are considered as the quality loss functions. Methods of finding optimal values of initial setting and compensation limit are presented. Numerical examples are given to illustrate the optimal decision rule for the compensating adjustment and numerical studies are then performed to investigate the effects of the cost parameters. The fixed amount compensator is compared with the fixed interval compensator of Quesenberry by the Monte Carlo simulation, and is found to perform better for the case where the tool wear is the most important factor affecting machining accuracy.