ABSTRACT AND OBJECTIVE

With the advent of complete automation in the form of Adaptive control constraint (ACC), Adaptive control optimisation (ACO), and Computer integrated manufacturing (CIM), avigorous search is on to generate more reliable, predictable, accurate and cost based machinability data and integrate these data into a "System Module." Many authors including Olsen(18) and Brewer(122) and the present investigator found unexplained variability in the experimental results of Surface Finish.

As the tolerance and surface finish are the two very important objectives of machining, assignment of values of which solely determine the quality, productivity and the cost of machining. Though the assignment of tolerance value has got some scientific basis the same is not true for the assignment of values for surface finish. Even the selection of cutting parameters for getting a surface finish is more or less arbitrary as not much reliable relating data is available, namely, cutting parameters – surface finish, surface finish – tool life and surface finish – COST/OPTIMUM COST.

The OBJECT of the present investigation is to carry out experiments to determine the variability in SURFACE FINISH and to select a suitable variability index which can represent the extent of variation with respect to selection of various cutting and other parameters. It has been found that the ratio $R_{max}/R_a$ serves well as the variability index.

Next, with reference to the explanation provided by the variability index, attempt is made to identify VARIOUS FACTORS.
that cause the variability and to determine as to what extent each of them effect the surface finish. It has been observed that all factors do not effect the surface finish in the same way, some causes deterioration where as some other may even improve the surface finish with respect to the theoretically expected value. MATERIAL FACTOR is one such area in which not much work has yet been done. An attempt is made to find out the effect of GRAIN SIZE, HARDNESS and other parameters on the machined surface roughness.

As already pointed out, the tolerance and surface finish are the twin objective of machining, assignment of which mostly effect the COST of machining. Some work has already been done on the TOLERANCE COST but no attempt has so far been made to determine the COST OF SURFACE FINISH. In this investigation an attempt is also made to develop and solve two models of SURFACE FINISH OPTIMISATION, to determine the optimum cost/piece, optimum cutting parameters for machining "a given surface finish".

Thus, to say in brief, work is carried out in the following area as part of the search for finding new factors that effect the surface finish:

VARIABILITY INDEX AND VARIABILITY FACTORS,
MATERIALS FACTORS- Grain Size and Hardness, along with other Parameters
COST FACTORS - to determine Cost of Surface Finish