INVESTIGATIONS INTO MAGNETIC ABRASIVE FINISHING OF ROUND FLAT SURFACES

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ABSTRACT

When difficult to machine materials subjected to conventional method leads to many limitations like lack of accuracy, wear of tools, micro cracks, surface distortion etc. To overcome the problems associated with the conventional methods, the non – conventional methods were developed. These processes are capable to machine and finish any type of intricate shapes with the desired accuracies, up to micro and nanometer scale. MAF process is relatively new advanced finishing process when compared with other finishing methods like buffing, lapping etc. Literature survey reveals that MAF process is becoming popular and have a lots of applications in finishing, deburring of different type of products like medical instruments, semiconductor parts, capillary tubes, sanitary tubes, atomic energy parts, aerospace parts, ball bearing, wave guides, vacuum tubes, deburring of drilled holes, micro deburring of precision parts of cutting tools used in cutting of hard materials like titanium alloy. In the present work, an experimental setup of MAF process has been developed to resolve the problems associated with the conventional/manual metallurgical polishing method which is not only time consuming but hazardous to the operator. The finishing of flat surface has been studied by using aluminum oxide based magnetic abrasives and the effect of input parameters viz. quantity of lubricant, quantity of magnetic abrasives plus permanent magnet rotational speed on the percentage improvement in Surface Finish (PISF), which is the response parameter. In order to analyses and experimental design, the response surface methodology approach is used. The results of the experiments shows that brass is finished with aluminium oxide based magnetic abrasives. The process yields best results of rotational speed of permanent magnet = 1065, the quantity of lubricant = 0.19 grams, the quantity of magnetic abrasives = 4 grams, and processing time = 30 minutes for PISF. The PISF was improved by 85.8%. The minimum value of surface roughness obtained was 0.166 μm.