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# Quality improvement of ball-end milled sculptured surfaces by ball burnishing

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## Abstract

In this paper, the use of the ball burnishing process to improve the final quality of form tools (moulds and dies) is studied. This process changes the roughness of the previously ball-end milled surfaces, achieving the finishing requirements for plastic injection moulds and stamping dies. Ball burnishing can be easily applied in the same machining centres as those used for milling. In this way, both lead times and production costs can be dramatically reduced.

Both the burnishing system and its main parameters are taken into account, considering their influence on finishing. Workpiece surface integrity is ensured due to the surface smoothing effect of process and the associated cold working. Examples of different materials, machined surfaces, and industrial applications are explained, with respect to the maximum and mean surface roughness achieved.

The main conclusion is that using a large radial depth of cut in the previous ball-end milling operation, together with a small radial depth during burnishing can produce acceptable final roughness. Savings of production times are high, as burnishing is applied using the maximum linear feed of the machine, while milling must be made at moderate feeds. Moreover, ball burnishing NC programming is less critical and needs less care in its definition than CAM for milling.


*Keywords:* Ball burnishing; Finishing; Ball-end milling; Sculptured surfaces; Milling