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Review on Ball Burnishing process

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Abstract

Burnishing is a chip less finishing method, which employs a rolling tool, pressed against the work piece, in order to achieve plastic deformation of the surface layer. Features of burnishing include a good roughness (comparable to grinding), as well as improvement of mechanical characteristics of the surface (fatigue strength, corrosion resistance), due to implementation of compressive stresses into the surface layer. An important objective was roughness minimization. For selected ball diameters, the influence of burnishing parameters such as force and burnishing speed on selected surface geometry parameters have been determined.

Keywords- Burnishing, plastic deformation, mechanical characteristics, surface roughness, burnishing parameters.

1. INTRODUCTION

Burnishing is a post finishing operation, in which highly polished ball or roller burnishing tools are pressed against pre-machined surfaces to plastically deform peaks into valleys. Today it is becoming more beneficiary process among the conventional finishing operations in metal finishing processes in industries because of its many advantages. Inducing the compressive stresses in metal surface increases many properties associated with metal surface like surface finish, surface hardness, wear resistance, fatigue resistance, yield and tensile strength and corrosion resistance[1]

Burnishing is the plastic deformation of a surface due to sliding contact with another object. Visually, burnishing smears the texture of a rough surface and makes it shinier. Burnishing may occur on any sliding surface if the contact stress locally exceeds the yield strength of the material.

Types of burnishing

There are several forms of burnishing processes, the most common are roller burnishing and ball burnishing (a subset of which is also referred to as ballizing). In both

cases, a burnishing tool runs against the workpiece and plastically deforms its surface. In some instances of the latter case (and always in ballizing), it rubs, in the former it generally rotates and rolls. The workpiece may be at ambient temperature, or heated to reduce the forces and wear on the tool. The tool is usually hardened and coated with special materials to increase its life. Ball burnishing, or ballizing, is a replacement for other bore finishing operations such as grinding, honing, or polishing. A ballizing tool consists of one or more over-sized balls that are pushed through a hole. The tool is similar to a broach but instead of cutting away material, it plows it out of the way. *Ball burnishing* is also used as a deburring operation. It is especially useful for removing the burr in the middle of a through hole that was drilled from both sides. Ball burnishing tools of another type are sometimes used in CNC milling centres to follow a ball-nosed milling operation: the hardened ball is applied along a zig-zag toolpath in a holder similar to a ball-point pen, except that the 'ink' is pressurised, recycled lubricant. This combines the productivity of a machined finish which is achieved by a 'semi-finishing' cut, with a better