ABSTRACT
In the present paper a review of Parametric Optimization of Process Parameter for Roller Burnishing Process. A roller burnishing tool is used to perform roller burnishing process under different parameters. There are so many parameters which can be optimized for better performance of surface roughness and surface hardness. It has been used to impart certain physical and mechanical properties, such as friction, corrosion, wear and fatigue resistance. Roller burnishing is an economical process, where skilled operators are not required. The present paper is a review of the different techniques used in the recent past.

KEYWORDS: Roller burnishing, Taguchi’s method, roller diameter, Surface finish

I. INTRODUCTION
Surface treatment is an important aspect of all manufacturing processes. It has been used to impart certain physical and mechanical properties, such as friction, corrosion, wear and fatigue resistance. The function performance of a machined component such as fatigue strength, load bearing capacity, friction, etc. depends to a large extent on the surface as hardness, nature of stress and strain induced on the surface region. During recent years, however, considerable attention has been paid to the post-machining metal finishing operation such as burnishing which improves the surface characteristics by plastic deformation of the surface layers. Roller Burnishing is the plastic deformation of a surface due to sliding contact with another object. Roller Burnishing is a Super-finishing process. It is a Cold Working process which produces a fine surface finish by the planetary rotation of hardened rollers over a bored or turned metal surface.

II. INTRODUCTION TO ROLLER BURNISHING PROCESS
Burnishing is a cold rolling process without removal of metal. A set of precision rollers is used to roll on the component surface with adequate pressure. As a result all the pre-machined peaks get compressed into valleys thus giving a mirror like surface finish. The surface of metal parts worked through turning, reaming or boring operations is a succession of “PROJECTION or PEAKS” and “INDENTATION or VALLEY” when microscopically examined. The roller burnishing operation Compresses the “Projection” (Peaks) into the “Indentation” (Valley)

Fig-2 roller burnishing process

The roller burnishing process comprises of hardened rollers that are guided over the work piece with pressure and displaced the surface peaks into the boundary layer. Roller burnishing is a process for micro finishing metallic surfaces which belongs to the forming processes. When roller burnishing, a rolling body, usually a roller is pressed onto the surface and rolled over it. By this means a high compressive stress is created in the surface finish peaks which induce the material to flow. In doing so a forming of the boundary layers in micron range is induced.

Fig-3 Layout of work piece on lathe for roller burnishing process
stress) are identified by GMDH considering burnishing speed, depth of penetration and number of passes. (2) The established models are useful in improving the quality of the burnished surface responses which can be predicted by selecting proper input parameters that were used in this work before conducting the burnishing process. (3) The extent of the influence of selected variables on all burnished surface responses can be deduced quantitatively from the models. (4) Burnishing speed should not exceed about 120 m/min to obtain high surface quality

M.H. El-Axir [2]. Is work on an investigation into roller burnishing. Material and the tool used for the Experimental work Steel-37, roller bearing – outside diameter of 22 mm and a width of 6 mm. Process parameter and the Proposed methodology used feed rate -0.1 mm/rev, depth of cut -0.2 mm, spindle speed - 600 rpm RSM method, variance analysis (F-test).

And they are found the conclusion as follows (1). A good correlation between the experimental and predicted results derived from the model was exhibited. Thus, using the proposed procedure, the optimum roller burnishing conditions should be obtained to control the surface responses of other materials. (2). It was shown that the spindle speed, burnishing force, burnishing feed and number of passes have the most significant effect on both surface micro hardness and surface roughness, and there are many interactions between these parameters. (3) The recommended spindle speeds that result in high surface micro hardness and good surface finish are in the range from 150 to 230 rpm (4) the residual stress is at a maximum near the surface and decreases with an increase in the depth beneath surface.

N.S.M. El-Tayeb, K.O. Low, P.V. Brevern[3] is developed Influence of roller burnishing contact width and burnishing orientation on surface quality and tribological behaviour of Aluminums 6061. In this study Aluminium 6061 used as work piece material and carbon chromium rollers with different roller contact widths (1, 1.5, 2mm) is used in a burnishing tool with interchangeable adapter for ball and roller for the purpose of the experimental tests. In this literature survey parameter is used as Burnishing speed (rpm) -110, 230, 330, 490, Burnishing force (N)- 155, 200, 240, 280, Roller contact width (mm) -1, 2, 3, Burnishing feed rate (mm/rev)- 0.11, Lubricant- Kerosene. And they are found the conclusion as follows (1) Burnishing force above 220N is capable of decreasing the surface roughness by 35%. Below this limit, the surface roughness starts to deteriorate plastically (2) Burnishing speed 110 rpm yields the highest improvement in hardness, as much as 30% increase. However, the improvement diminishes as higher burnishing speeds are applied (3) Under dry contact condition, burnished surface using smaller roller contact width produces the lowest friction coefficient

Binu C. Yeldose, B. Ramamoorthy [4] is Work On An Investigation Into The High Performance Of Tin-Coated Rollers In Burnishing Process. In This Experiment Material is used for the Experimental work AISI 4340 (EN24) steel, and tool is a rollers - (EN31 material)to a size of 20mm outer diameter and internal hole diameter of 8mm. Process parameter and the Proposed methodology used Burnishing speed, S (m/min) 40, 60, 80 rpm, Burnishing force, F (N) 100, 300, 600 N, Feed, f (mm/rev) 0.028, 0.04, 0.6, Taguchi’s experiments and ANOVA analysis. And they are found the conclusion as follows (1) The burnishing speed, feed, burnishing force and number of passes are the influencing parameters on the final quality of the components, namely the surface finish (2) The performance of the coated rollers is similar to the uncoated rollers at higher speeds, feeds, burnishing force and at more number of passes due to the reason that the coating was peeling off (3) The Taguchi’s experiments and ANOVA analysis indicate that the speed, burnishing force and number of passes are having almost equal importance in burnishing, particularly with reference to the surface finish of the components produced.
roughness (Ra) is three to six times smaller than that of the surface which was turned. Due to burnishing, there forms an anisotropic surface and the height of surface irregularities gets reduced as well as the values of the rest of the surface topology indices after centre less burnishing are fairly good. Based on the empirically derived mathematical model and its graphic interpretations.(2) The hardness of the studied work pieces before centre less roller burnishing does not significantly affect the result of burnishing; quenched and tempered work pieces (HB = 340daN/mm²) showed very good surface condition after burnishing

Khalid. S. Rababa and Mayas Mohammad Almahase [6] has studied Effect of Roller Burnishing on the Mechanical Behavior and Surface Quality of O1 Alloy Steel. Material and the tool were used for the Experimental work 6061-T6 aluminum alloy, A burnishing roll -22 mm diameter. Process parameter is used burnishing speeds- 63 to 160 mm/min. Burnishing depth- ranging from 0.05 to 0.25 mm. The number of passes. Five different passes from 1 to 5. Widely used methods of finishing treatment that create necessary parts with the given roughness usually do not provide optimum quality of the surface. Therefore, methods of Surface Plastic Deformation (SPD) are used And they are found the conclusion as follows (1) RB process has a large effect on the micro hardness of O1 alloy steel(2) The stress of mass has been increased of about150 MPa(3) RB has a positive effect on the surface roughness ofO1 alloy steel. The improvement percentage on the surface quality was 12.5%(4) - RB has an effect on the ultimate tensile strength, the UTS has been increased by 166 MPa (5) RB has an effect on ductility of material; the percentage elongation of material has been increased of 13.6%(6) RB has an effect on cross sectional area, the reduction of cross sectional area has been increased of 1.8 %

P. Zhang, J. Lindemann, W.J. Dinga, C. Leyensc,[7] d have studied Effect of roller burnishing on fatigue properties of the hot-rolled Mg– 12Gd–3Ymagnesium alloy, Material used for the experimental work hot-rolled Mg–12Gd–3Y (wt.%) magnesium, and ball(6mm hard metal)tool used, process parameter including for the work are spindle speed - 36 min⁻¹, rolling forces - varied between 50 and 300 N. They found the conclusion from this paper (1) RB improved fatigue strength of the Mg–Gd–Y alloy significantly. After RB, the fatigue strength increased from 150and 155 MPa, to 225 and 210MPa in the as-rolled alloy and the T5 heat-treated alloy, corresponding to the improvements in fatigue life of about 50% and 36%, respectively. Due to the larger process-induced compressive residual stresses and greater deformation degree, the effect of RB in the as-rolled alloy is superior to that in the T5-treated alloy (2) Fatigue cracks in the Mg–12Gd–3Y alloy at the roller-burnished condition nucleated in subsurface. In addition, facets of the cleavage plane were observed in the crack nucleation area. (3) The present results demonstrate that RB is an effective method to improve fatigue performance of the Mg–Gd–Y alloy.

F.J. Shiou C.H. Cheng[8] is work on Ultra-precision surface finish of NAK80 mould tool steel using sequential ball burnishing and ball polishing Processes. And the material used for the experimental work NAK80 mould tool steel and also tool and the process parameter including for the better work the abrasive material of polishing ball with the diameter of 10mm, spindle speed 14000, 18000 rpm, feed 20.60 mm/min, and Depth of penetration (_m)/polishing force (N) 60.0/0.392 120/0.817 240/2.695 depth of penetration 60/0.396, 120/0.817. And methodology used Taguchi’s L18 orthogonal table, analysis of variation (ANOVA), and the full factorial experiments. Then after they concluded from this paper Based on the Taguchi’s L18 matrix experimental results, the optimal plane surface spherical polishing parameters for the plastic injection mould steel NAK80, were the combination of the spindle speed of 22,000 rpm, the abrasive of Sic with grid no. 10,000 (1.5_m in diameter), the feed of 120 mm/min, the step over of 40_m, and the depth of penetration of 240 _m (polishing force of 2.695 N). The surface roughness Ra of the burnished specimens can be improved from about 0.08 min average to 0.016 minaverage using the optimal spherical polishing parameters. Applying the optimal plane surface ball burnishing and spherical polishing parameters sequentially to the surface finish of the mould cavity of a spherical lens, the surface roughness value on the polished surface Ra = 0.020 _m, was possible.

M.H. El-Axira, O.M. Othmanb, A.M. Abodienac[9] has studied the Study on the inner surface finishing of aluminum alloy 2014 by ball burnishing process. They have used 8mm carbon chromium steel ball material and aluminum alloy 2014 work piece material and found that from an initial roughness of about Ra 4µm, the specimen could be finished to a roughness average of 0.14µm. As a result of this study it was concluded that an increase in internal ball burnishing speed leads to a slight decrease in surface average roughness. Also they found the following conclusion (1) Inner surface finishing of non-ferrous metal which are difficult-to-grind with conventional grinding-could be carried out successfully using the proposed internal ball burnishing tool. The technique is simple, easy to apply and economical (2) Second-order surface profile parameters prediction models have been developed. Analysis of variance has indicated that these models are adequate for the obtained experimental results (3) An increase in internal ball burnishing speed leads to a slight decrease in surface average roughness (4) The best results for average roughness is obtained when applying high depth of penetration

IV. CONCLUDING REMARKS
From critical literature review it is concluded that there is wide applicability of process parameter in the field of roller burnishing process which improves bored or turned metal surface and also improve the quality of surface roughness and surface hardness. This process can be effectively used in many fields such as Automobiles Manufacturing sector, Production of Machine tools, Aerospace Industries, etc.

REFERENCES
1. M.M. El-Khabeery, M.H. El-Axir “ Experimental techniques for studying the effects of milling roller-
burnishing parameters on surface integrity” 41 (2001) 
1705–1719
2. M.H. El-Axir “An investigation into roller burnishing” 
40 (2000) 1603–1617
3. N.S.M. El-Tayeb, K.O. Low, P.V. Brevern “Influence 
of roller burnishing contact width and burnishing 
orientation on surface quality and tribological 
behaviour of Aluminium 6061” 186 (2007) 272–278
into the high performance of TiN-coated rollers in 
burnishing process” 207 (2008) 350–355
5. Mieczyslaw Korzynskia, Andrzej Pacana “Centre less 
burnishing and influence of its parameters on 
machining effects” 210 (2010) 1217–1223
6. Khalid. S. Rababa and Mayas Mohammad Al-mahasn 
“Effect of Roller Burnishing on the Mechanical 
Behaviour and Surface Quality of O1 Alloy Steel” 
3(3): 227-233, 2011
7. P. Zhang, J. Lindemanna, W.J. Dinga, C. Leyensc,d “
Effect of roller burnishing on fatigue properties of the hot-rolled Mg–12Gd– 
3Ymagnesium alloy” 124 (2010) 835–840
of NAK80 mould tool steel using sequential ball 
burnishing and ball polishing Processes.” 201 (2008) 554–559
9. M.H. El-Axira, O.M. Othmanb, “inner surface 
finishing of aluminum alloy 2014 by ball burnishing 