PRODUCTIVITY IMPROVEMENT IN LUGGAGE INDUSTRY

A REVIEW

Shraddha Chougule[1],Vivekkumar Mote[2],Shivani Nawale[3],Siddhesh Vichare[4],Prof.Mitali Mhatre[5]

[1]Student, Saraswati College of Engineering, India,cshraddha44@gmail.com

[2]Student, Saraswati College of Engineering, India,vivekmote18@gmail.com

[3]Student, Saraswati College of Engineering,India,shivaninawale196@gmail.com

[4]Student, Saraswati College of Engineering, India,vicharesiddhesh76@gmail.com

[5]Professor, Saraswati College of Engineering, India

Abstract*:* In this project we are visiting the industry (PRECITECH) which works on the operation of Luggage whose material is supplied from SAMSONITE. Tool may be guided directly by the plate or by case hardened steel bushes. Bushes are used to guide drill, reamers, boring tools & other cutting tools. This paper gives different research papers on design of bush, materials used in bushing and the various methods used for improvement of overall productivity.

Key words: Drill Bush; Mild Steel; EN31; Hardening

1. Introduction

Tool may be guided directly by the plate or by case hardened steel bushes. Bushes are used to guide drill, reamers, boring tools & other cutting tools. The jig bushes shall support tools which slender & delicate. Bushes are in interference in the drill plate. Bushes are made of hardened Carbon Steel with 0.85-1% Carbon, 0.5-0.9% Manganese. They are hardened to RC 60-64 to minimize wear due to contact with hard, rotating tools. Bushes are finished by grinding the inside & outside diameter within 0.001mm concentricity. The inside diameter has certain precision running fit with the drill. The outside diameter is made press fit, precession location fit or precession running fit depending on application of the bush. A drill bushing, also known as a jig bushing. They are designed to guide, position, and support the cutting tool. Drill bushings can generally be classified as: press fit bushings or renewable bushings. Press fit are available in two types with liners or without (wearing bushings). Liner bushings, sometimes called master bushings, are permanently installed into the jig and accept liners that can easily be replaced. Press-fit wearing bushings are used in short run applications. Renewable bushings are installed in liner bushings. This type of bushing is used in large production runs where a bushing

will wear out over time or when multiple renewable bushings are used in one liner to provide various sized holes. There are two types of renewable bushings: fixed and slip. Fixed renewable bushings are used in applications where the liner is meant to be used until it wears out. Slip renewable bushings are designed to be interchangeable with a given sized liner so that two different sized slip renewable bushings can be used in one liner bushing." Wear is commonly defined as the undesirable deterioration of a component by the removal of material from its surface. It occurs by displacement and detachment of particles from surface. The mechanical properties of steel are sharply reduced due to wear. The wear of material may be due to the friction of metals against each other, eroding effect of liquid and gaseous media, scratching of solid particles from the surface and other surface phenomena.

2. Literature Survey:

Kumari and Kumar [1] presented the analytical study of Design & Analysis of indexing type of drill jig. They have concluded that the result obtained after drilling like bore, surface finish etc. are found to be within limit. They have further concluded that the design of indexing type of drill jig involved about 287mm x 203 mm dimensions. The material of the component is Aluminium Alloy (LM 20). The Clamping force is more than the drilling force (calculated) .The assembly of the Indexing Type of Drill Jig is found satisfactory. 5. The results obtained after drilling like bore, surface finish etc. are found to be within the limit. Patel et al. [2] analysed Design & Manufacturing of jigs for drilling machine .The jig of drilling machine of different material rather than mild steel to reduce the weight and to ease the work handling. By manufacturing of these jigs we can reduce the setup time of raw material on machine. The weight of jig comes out to be 3.5 kg after manufacturing that is less compare to mild steel jig plate which was 25kg. Momin et al. [3] experimented Design & Manufacturing of Acrylic jig. The error observed in pcd of component at drilling operation .Spacing between equi-spaced holes is maintained. Production idle time is reduced. CDD (contractual delivery date) is maintained. Due to Acrylic material jig manufacturing cost is. Seifi et al. [4] analysed the Frictional coefficient estimation in bush interference using finite element model updating. In this paper, a new method was applied for modification of the finite element model of interference shaft/bush joints. Also a suitable approach was proposed for calculation of the friction coefficient in the contact area of the interference joints by the use of experimental data. Miller et al. [5] analysed Tool wear in friction drilling. The wear of a friction drilling tool was minimal after producing 11,000 holes in a low carbon steel work piece. The hard carbide tool proved to be durable. Precise measurements of tool dimensions indicated that the wear was

concentrated at the tool centre region and at the intersection between the conical and cylindrical regions. The tool tip self-sharpened during friction drilling, which reduced the thrust force as tool wear progressed.

[6] studied the Procedure for fabrication of wear resistance bushes for high temperature application. The cracking susceptibility of Colmonoy 6 hardface deposit can be controlled by using appropriate preheat, interpass temperature and slow cooling during deposition, and using weld deposition in the longitudinal direction to minimise residual stresses in the hardface deposit with 50% over-lapping technique. They further studied that the dimensional stability on ageing at 823 K for up to 1000 h confirmed suitability of these bushes its intended application. Kira et al. [7] analysed the Development of anti-corrosive & wear- resistance copper alloy for bushing. Addition of nickel to copper alloy has improved the corrosion resistance. The simultaneous addition of fine AlN particles and Fe3P particles into the copper matrix has improved the wear resistance without deterioration of machinability. Based on this study, a new material for piston pin bushings for a high performance engine was developed. Brown et al. [8] analysed that the Fatigue life variability due to variation in interference fit of steel bushing in Al lugs. For a given stress, the life can vary by anywhere from 1.4 times to 147 times. Life changes are greater in the low load region of the S–N curve and smaller in the high load region. They further studied that over the range of loads tested, it is possible to incorporate the amount of interference into an equation that can define the different S–N curves. Gosai and Bhavsar [9] studied the Experimental study on temperature measurement in turning operation of EN36. Mathematical empirical model of temperature measurement has been developed for EN36 as work piece material and coated carbide insert as tool material. Mathematical model has been validated by experimental tests and the error in temperature measurement found to be less than 10%. Optimized values of cutting parameters have been achieved for minimum temperature with desirability of 98.9 %, which is highly acceptable. Johnson et al. [10] experimented the Optimization of cutting parameters & fluid application parameters during turning of OHNS steel. Turning with minimal cutting fluid application improved the cutting performance by giving improved surface finish. It also produced promising results when compared with dry turning and conventional wet turning. The also studied that the minimal cutting fluid application technique promoted green environment in the shop floor, by minimizing the industrial hazard and usage of large quantity of cutting fluid.

[11] experimented on the Friction drilling of cast metals. The work piece pre-heating and high spindle speed had proven to be beneficial to reduce the thrust force, torque, energy, and power for friction drilling of brittle cast metals. Higher feed rate and shorter cycle time for hole drilling was demonstrated to be feasible with the reduced thrust force and torque. Hasan et al. [12] studied the Modern advancement in micro drilling techniques. In this work, the cutting edge technologies used for micro drilling in

wide variety of different applications, have been listed and reviewed. The techniques are classified into two broad categories, conventional and non-conventional. The conventional method is to employ a micro drill bit of different shapes and geometric configurations. The techniques that do not require a drill bit are called as non-conventional micro drilling. Zuzek et al. [13] experimented on the Effect of bushing in thermometric fixed point cells. In the paper, the use of bushings and their effects were researched. Both experimental measurements and modelling results were presented. Modelling results should be taken as qualitative results, but nevertheless they provide an additional insight in bushing effects. Shah et al. [14] experimented on the Prototype high voltage bushing: Configuration to its operational demonstration. 50 kV prototype HVB, a scale down configuration of DNB HVB is experimentally validated for its performance. Configuration of the insulators and their demountable connections with metal flanges ensure that the acceptable stress values at different location of bushing which is benchmarking solution to confirm the configuration of DNB HV bushing for ITER. After carrying out all required testing, the PHVB will be used as high voltage bushing in two accelerator based twin source system. Pachbhai et al. [15] analysed the Design of Fixtures. The efficiency and reliability of the fixture design has enhanced by the system and the result of the fixture design has made more reasonable. To reduce cycle time required for loading and unloading of part, this approach is useful.

[16] analysed the Effect of void damage include by warm prestressing (WPS) on cleavage fracture of notched steel specimen. In this study when the applied load ratio Po/Pgy in the WPS at room temp. 1.0, the notch toughness parameter, E & cleavage fracture stress at low temp are higher & do not change with Po/Pgy. Koteswararaoa et al. [17] studied the Machining Parameter in EDM of High Carbon Steel Alloy (EN31). Experiments were conducted according to Taguchi method by using the machining set up and the designed U-shaped tubular electrodes with internal flushing. Discharge current is most influencing factor on MRR and then pulse duration time and the last is diameter of the tool. In the case of Tool wear rate the most important factor is discharge current then pulse on time and after that diameter of tool. In the case of over cut the most important factor of discharge current then diameter of the tool and no effect on pulse on time. In the present study on the effect of machining parameters on MRR, TWR and OC of the EN31 alloy steel component using the cu tool with internal flushing system tool have been investigated for EDM process. Zhang et al. [18] experimented on the Wear and friction properties of laser surface hardened En31 steel. The surface micro hardness of En31 steel can be enhanced to 1000 Hv by CO2 laser transformation hardening. The microstructure of the hardened zone is fine martensitic.) For the improvement of wear and friction properties, it is not necessary to treat the entire component surfaces with overlapping tracks. Hardened tracks with spacing in between can provide a similar improvement in wear resistance performance. Kumara et al. [19] studied the Scuffing behaviour of

EN31 steel under dry sliding condition using pin-on-disc machine. The friction coefficient increases slowly with sliding velocity at lower loads and becomes almost stable at higher speed. However at higher load, it shows stable behaviour for initial running and then decreases considerably at higher speed. The sudden increase in coefficient of friction is termed as scuffing. The transition speeds, at which scuffing phenomenon observed, are 1000 rpm, 600 rpm and 600 rpm at 10 N, 30N and 70 N load respectively. Dasa et al. [20] studied the Optimization of Surface Roughness and MRR in Electrochemical Machining of EN31 Tool Steel using Grey-Taguchi Approach. In the present study the optimization of the process parameters (electrolyte concentration, voltage, feed rate and inter-electrode gap) is carried out in ECM of EN31 tool steel for maximum material removal rate (MRR) and minimum surface roughness. Grey relational analysis is successfully employed in conjunction with Taguchi design of experiments to optimize this multiple response problem.

3. Conclusion:

Earlier Mild Steel (30-35RC) was used which gets wear out because of its continuous drilling and it also gets dislocated which affects the accuracy of drilling. So we used EN31 which has high Carbon content which increases its hardness upto 60-62RC due to which there was less chances of wearing of bush. And hence the overall productivity was increased.

4..References:

[1] L. Kumari, G.P. Kumar," Design & analysis of indexing type of drill jig,"Journal of Mechanical and Civil Engineering., vol.12 Issue 2 Ver.1, pp.46-51, 2015.

[2] S.Patel, S.Vasoya, A. Joshi," Design & manufacturing of jigs for drilling machine," International Research Journal of Engineering and Technology (IRJET)., vol. 04 Issue 03, 2017.

[3] M.Momin, S.Lokhande, P.Gunavan, N.Kokil," Design & manufacturing of acrylic jig," International Research Journal of Engineering and Technology (IRJET)., vol. 03 Issue 05, 2016.

[4] R.Seifi, K.Abbasi," Frictional coefficient estimation in bush interference using finite element model updating," Engineering Failure Analysis., vol. 57, pp.310-322,2015.

[5] F.Miller, P.Blau, A.Shih," Tool wear in friction drilling," International Journal of Machine Tools and Manufacture., vol. 47, pp.1636-1645, 2007.

[6] C.R.Das, S.Albert, A.Bhaduri," Procedure for fabrication of wear resistance bushes for high temperature application," Journal of Materials Processing Technology., vol. 141, pp.60-66, 2003.

[7] B.Koteswararaoa, K.Siva, D.Ravib, K.Kishore Kumara, P.Chandra Shekar," Investigation of machining parameter in EDM of high carbon steel alloy (EN31)," Proceedings., vol. 4, 2017, pp.1375-1384.

[8] T.Kira, H.Yokota, J.Kamiya," Development of anti-corrosive & wear-

resistance copper alloy for bushing," JSAE., vol. 20, pp.297-302, 1999.

[9] M.A.Brown, J.L.Evons," Fatigue life variability due to variation in interference fit of steel bushing in Al lugs," International Journal of Fatigue., vol. 44, pp.177-187, 2012.

[10] M.Gosai, S.N.Bhavsar,'' Experimental study on temp. measurement in turning operation of EN36," Procedia Technology., vol. 23, pp.311-318, 2016.

[11] R.Johnson, A,Raj, B.Beatrice," Optimization of cutting parameters & fluid application parameters during turning of OHNS steel," Procedia Engineering., vol. 97, pp.172-177, 2014.

[12] G.Wang, H.Wang, F.Xuan, Z.Wang," Effect of void damage include by warm prestressing(WPS) on cleavage fracture of notched steel specimen," Engineering Fracture Mechanics., vol. 76 Issue 8, pp,1010-1023, 2009.

[13] S.F.Miller, J.Tao, A.J.Shin," Friction drilling of cast metals," International Journal of Machine Tools and Manufacture., vol. 47, pp.1636-1645, 2007.

[14] M.Hasan, J.Zhao, Z.Jiang," A review of modern advancement in micro drilling techniques," Journal of Manufacturing Processes., vol. 29, pp.343-375, 2017.

[15] V.Zuzek, V.Batageli, J.Brnovsek, J.Bojkovski," Effect of bushing in thermometric fixed point cells," Measurement., vol. 78, pp.289-295, 2016.

[16] S.Shah, D.Sharma, D.Parma, H.Tyagi," Prototype high voltage bushing Configuration to its operational demonstration," Fusion Engineering and Design., vol. 113, pp.6-15, 2016.

[17] S.Pachbhai, L.Raut," A review on design fixture," International Journal of Engineering Research and General Science., vol. 2 Issue 2, 2014.

[18] X.M. Zhang, H.C. Man, H.D. Li," Wear and friction properties of laser surface hardened En31 steel," Journal of Material Processing Technology., vol. 69 Issue 1-3, pp.162-166, 1997.

[19] P.Kumara, H. Hiranib , A. Agrawal," Scuffing behavior of EN31 steel under dry sliding condition using pin-on-disc machine," Proceedings., vol. 2, pp.3446-3452, 2015.

[20] M.K.Dasa, K.Kumarb, T.Barmana , P.Sahooa," Optimization of Surface Roughness and MRR in Electrochemical Machining of EN31 Tool Steel using Grey-Taguchi Approach," Proceedia Matrials Science., vol. 6, pp.729-740, 2014.