OPTIMIZATION OF PROCESS PARAMETERS IN BORING OPERATION: A REVIEW

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In agricultural sector, especially in arid region, where borewell is much required. So we required Efficient and fast borewell drilling process for which we should make the parameter of boring process more efficient.Parameters which more affect on surface finish are 1) revolution Speed, 2) Feed, 3) depth of cutDirection of damping process. We will see effect of these parameter , their combine effect and affect of different material of spindle. In this paper we will quick review of Taguchi experiment on optimization of computer numerical control (CNC) boring operation parameters for aluminum alloy 6061T6 using the grey relational analysis (GRA) method and others investigation related to this.

Keywords: *Optimization boring parameter.*

Introduction

Boring process is most commonly used in recent time as the demand of food resources increases day by day. Boring is process in which we create a long cylindrical hole in work piece , where work piece is fixed, by a moving tool with certain velocity and cutting tool have multiple edges to perform different process . Selection of proper combination of tool help in increase the speed And effectiveness of work(minimize roughness). A experience holder is required to control all

Process.

Boring process include many process like providing velocity to spindle(drilling tool) at other

end from opposite end where power is attach, feeding and compressed air is thrown to drag

all waste out of bore. Speed of cutting tool: The bottom surface of the drilling tool is circular , let 'V'Bethe rotation provided to tool 'r' be the radius of the tool.As we know whole the circumference of tool is contact as it moving with certain velocity it cut and give surface finish

Velocity(Va) which act on work piece is given by

Va= V*2*pi*r/1000

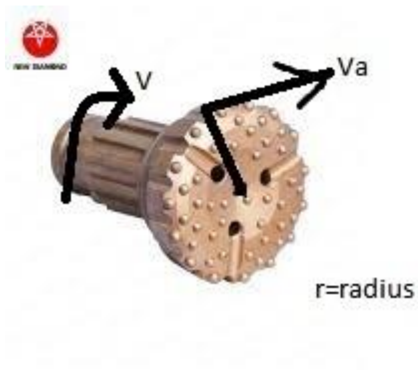

Figure 1 The movement of a rotor

Feed: Feed is the distance moved by drill in after each revolution by spindle.

Let ‘F’ be the feed per revolution.

Mainly it is express in mm.

Depth of cut: As it’s name suggest it is cut in the work piece par revolution. It is half of the

Diameter of the spindle

So

D(cut)=2*r/2=r

Time of drilling in boring process

Let ‘T’ be the time in the drilling so

S = Distance travel by the drill

T=S/(V*F)

Material of spindle with the variation in diameter

Solid Boring Bars Speeds & Feeds

Material	HB/Rc	Speed (SFM)		Cutting Conditions						
					Tool Diameter					
		Uncoated	ALTiN+	Feed IPR	.015-.045	.050-.100	.110-.160	.180-.230	.290-.320	.360+
					Max Doc	Max Doc	Max Doc	Max Doc	Max Doc	Max Doc
Cast Iron	160 HB	75-200	200-550	.0005-.010	0.006	0.008	0.010	0.014	0.020	0.031
Carbon Steel	18 Rc	75-200	200-450	.0005-.007	0.003	0.005	0.006	0.008	0.012	0.017
Alloy Steel	20 Rc	75-200	200-425	.0005-.007	0.003	0.004	0.005	0.007	0.010	0.015
Tool Steel	25 Rc	75-175	175-300	.0005-.005	0.002	0.003	0.004	0.006	0.008	0.012
300 Stainless Steel	150 HB	75-175	175-350	.0005-.005	0.003	0.003	0.004	0.006	0.008	0.013
400 Stainless Steel	195 HB	75-210	130-420	.0005-.005	0.002	0.003	0.004	0.006	0.008	0.012
High Temp Alloy Ni & Co Base	20 Rc	50-130	130-300	.0005-.004	0.002	0.003	0.003	0.005	0.007	0.010
Titanium	25 Rc	50-120	120-275	.0005-.005	0.003	0.004	0.005	0.006	0.009	0.014
Heat Treated Alloys (38-45 Rc)	40 Rc	50-100	100-200	.0005-.005	0.002	0.002	0.003	0.004	0.006	0.009
Aluminum	100 HB	75-250	250-750	.0005-.015	0.011	0.015	0.019	0.026	0.038	0.056
Brass, Zinc	80 HB	75-300	250-650	.001-.010	0.009	0.012	0.015	0.021	0.030	0.045

It is show that feed , depth of cut and surface finish also depends upon the material used in the spindle. It is higher in the case of Aluminum than Brass,zinc followed by cast iron and other material.

Literary survey

Show shyanlin conduct operation on optimization of parameter to check roughness in boring process. He investigate CNC boring on Aluminum alloy 6061T6 using gray relational analysis. He stated that feed and cutting speed affect on roughness and roundness respectively. There he found that largest value for gray relational grade for cutting speed is 85m/min and feed is 0.05mm/revolution and depth of cut is 0.6mm. He conclude that feed

Rate is affect the roughness most and roundness is affected by the cutting rate.

Wasisnugroho ,NorBahiyah baba and Adisaptari made 48 experiments on the boring process parameter . They used Aisi1050 carbon steel. +the investigation made on the position of damper , feed , depth of cut and insert radius. He conclude that four factor (depth of cut,feed rate , damper position and insert radius) have significant effect on roughness. The impact of parameter than most significant is insert radius the second is feed rate third is

Depth of cut and last is damper position. On the interaction of all four parameter the insert radius have more significant. If we interact two parameter than damper position, insert radius

And depth of cut ,feed rate.. The result wereanalyised by different method like ANOVA in MINITAB and they used other methods too.

Harsimran Singh Sodhi investigate on boring process**.** He used RMS methodology to investigate parameter optimization. The main work of the research is to observe the parameters like feed rate, depth of cut , velocity of revolution of spindle . He conclude that the parameter depth of cut , feed rate and speed of spindle , the most effective on roughness of surface is feed rate and cutting speed and depth of cut is less significant. He used the ANOVA analysis and DOE(DESGIN EXPERT) 9.0 for the analysis.

G.l.chern applied vibration on the boring process and analysis the effect of vibration on boring in vibration cuttingand surface roughness on work piece using Taguchi method of variance and he stated that high frequency vibration can be reduce the burr formation in intersecting hole effectively.

Balamuruga Mohan raj works on optimization of parameter of boring process. He work on all three Parameter depth of cut , speed and feed rate and their effect on the surface which was Calculated using a tool and get result of accurate surface roughness

A.M Badadhe , S.Y. Bhave and L.G. navalemade investigation on various parameters(length to diameter ratio, depth of cut, spindle speed and feed rate) to get better surface finish. They used AISI1041(EN9) carbon steel and investigate that varying the condition of the parameter and using Taguchi design. The analysis of variance was carried out to find significant factor and the individual response(surface roughness). It shows that parameter produced various effect on the variables and the use of Taguchi help in getting the proper optimization of boring process.

Conclusion and Future Scopes

1. From all the above analysis it is conclude that feed rate, revolution speed and position of damper play a important role in optimization of boring process.
2. Depth of cut is not as significant as other parameter in surface finish.
3. The material of spindle also play a important part in the surface finish.

4. Using taguchi design and other method we can optimize the boring process.
5. Roundness of the surface is also get affected by the parameter.

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