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Analysis of Parameters in Stone Slicing Machine

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Abstract

Granite processing industry now a day's faces the challenge of having to develop high precision products speed and economically than ever before. And hence, optimization is an innovative technique under certain conditions. Optimization in granite cutting process provides the determination of optimal set of machining parameters to satisfy the goals within the operational limits.

Keywords: Granite; industry; machining; optimization.

Introduction

These machines are used for cutting the pieces to various sizes, shapes etc. These blades are small in size relative to the cutting stone blades like 8 inches, 10 inches and 14 inches.

The diamond tools are brazed to the frames at manufacturing unit because of low thickness of the blades .We are not able to braze second time. If the life of the tool is over, we can remove the total steel frame also. These edge cutting machines are divided in to two types.

- Single blade slicing machine
- Double blade sliding machine

Single blade slicing machine

Only one blade is fixed to the spindle drive machine, firstly cut one side of the piece and based on that side, it is to cut all the edge of the pieces using this machine. We cannot get correct size of the pieces and perpendicular edges. Also the number of the pieces being cut is more by using this type of machine and is preferred for small size pieces and at low quality of the production.

Double blade slicing machine

Two blades are arranged parallel to one another to a single shaft (or) individual shafts. While cutting the pieces, the edges are perpendicular to each other so that the cutting operation is very easy to adjust the cutting arrangements while obtaining perpendicular edges. During this operation the accuracy of the cutting is very high and quality of the products will be produced.

Composition of segment

Number Composition Concentration HRC Process.
A) Cu-Co-W-Ni, Cu/Co = 1.2 40 28.6 Diamonds, Synthetic, 40/50 mesh. B)Cu-Co-W-Ni, Cu/Co = 1.2 35 ,28.2 Sintering temperature: 800°C .C) Fe-Cu-Co 35, 28.0 Segment size D) Cu-Co-W-Ni, Cu/Co = 1.6 35 30.6 25 m m x 10 mm x 9.5 mm
E) Cu-Co-W-Ni, Cu/Co = 1.7, 35, 29.3

Analysis of Parameters :

Machining on 8" inches dia blade machine:

Machining hard rough block is done using hard bond diamond tool 8" inches dia blade machine. The spindle speed is fixed at 2000 rpm. Three coolants viz. Water, Water + Cutting Oil, Water +Oil + NIRMA are used.

Machining rough block using soft diamond tool :

8 inches dia blade machine is used for cutting hard rough block using soft bond diamond tool. The spindle speed is fixed at 2000 rpm. The cut piece size is 2' X 1' Using three coolants viz. Water, Water + Oil, Water + Oil + Nirma, the experiments are conducted and the following results are obtained which are shown in table 1, 2 and 3.

TABLE – 1: Water as Coolant

S.NO	TIME CONSUMED(MIN)	POWER CONSUMED (KWH)	TOOL WEAR (MM)
1.	5	1.1	
2.	6	1.2	
3.	7	1.3	
4.	8	1.4	0.5
5.	9	1.45	mm
6.	10	1.4	

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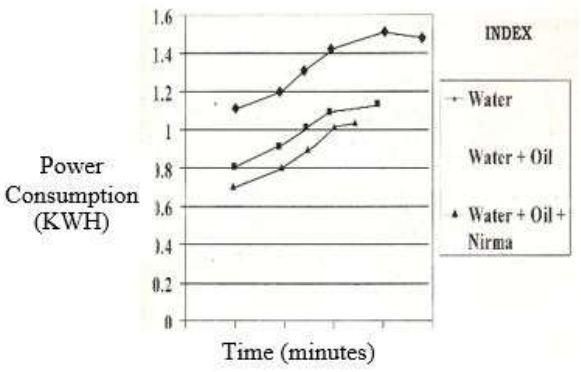
TABLE – 2: (Water + Oil) as Coolant

S.NO	TIME CONSUMED(MIN)	POWER CONSUMED (KWH)	TOOL WEAR (MM)
1. 2. 3. 4. 5.	5 6 7 8 9	0.8 0.9 1.0 1.01 1.1	0.45

TABLE – 3: (Water + Oil + Nirma) as coolant

S.NO	TIME CONSUMED(MIN)	POWER CONSUMED (KWH)	TOOL WEAR (MM)
1. 2. 3. 4. 5.	5 6 7 8 8.5	0.7 0.8 0.9 1.0 1.0	0.4mm

Graph is drawn for the above results on x-y plot and is shown in the following figure



Double blade slicing machine

Results & conclusions

1. The tool life is 0.5mm the coolant is water, 0.45 mm the coolant is (Water + Oil), and 0.40mm the coolant is (Water + Oil + Nirma)
2. The tool life is increased, when the coolant is (Water + Oil + Nirma) as compared to (Water + Oil). The tool life is also high when the coolant is (Water + Oil) as compared to water only.
3. The time taken is 10min to cut the piece when the coolant is water and 9 min in case of (Water + Oil) and 8.5 min incase of (Water + Oil + Nirma). Hence time taken to cut piece is in the decreasing order, when the coolant are water, (Water + Oil) and (Water + Oil + Nirma)
4. The power consumed is 1.45 KWH in case of water as coolant and 1.1 KWH when the coolant is (Water + Oil) and 1.0 KWH when the coolant is (Water + Oil + Nirma). Hence the power is considerably reduced when the coolant is (Water + Oil + Nirma) as compared to (Water + Oil). The power is also less when the coolant is (Water + Oil) as compared to water.

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