



Research Paper

ANALYSIS OF POLISHING IN GRANITE TILES

B Nageswara Rao^{1*} and J E B Nelson²

*Corresponding Author: B Nageswara Rao, ✉ bnrao44@gmail.com

Polishing is done by various abrasive blocks such as numbers 1, 2, 3, 4, 5 (generally used in granite workshops) or numbers 36, 80, 120, 220, 400, 800, 1200 (number indicates the grit size). These abrasives are available in different sizes and shapes depending upon the type of the machines. The abrasssive grit number 36 is generally used for rough polishing or initial polishing. The abrasive grit number 80, 120, 220 are also used for some-what rough polishing less than number 36 abrasive grit numbers 400 and 800 are for smooth polishing and 1200 size is used for very high smooth surface finish. Generally abrasives are made by emery powder and calcium. The grit sizes are obtained by adding the emery power with calcium in the required proportions. Various experiments are conducted by using two coolants 1) Water, 2) Water with oil, each time for polishing the granite slabs. Each time the different abrasive grits (abrasives grit number 36, 80, 120, 220, 400, 800) are used. The area polished and corresponding power consumed are measured. each experiment is carried for four trails.

Keywords: Abrasive, Grit number, Coolants, Polishing

INTRODUCTION

Dimensional stones form a major economic commodity in India. The current consumption of natural stone in index exceed Rs. 1,000 cores per annum. The stones sector also provides employment to over a million people. India is one of the few countries in the world processing a wide spectrum of dimensional stones viz., granite, marble, sand stone, limestone, quartz in the world market, in the Dimensional stones marketing. India has a

market share of over 10% and it is the top exporter in sand stones.

Mans insatiable desire to get better of the best has brought in sea change in dimensional stone production as well as in its applications with time. His taste and esthetic behave acquired a new dimension with the development and innovation in technology. Techniques for high precision stone production are available to meet the world demand and to satisfy deserving customers.

¹ GNIT, Hyderabad, AP, India.

² Director, Paulraj College of Engineering, Bhadrachalam, AP, Inida.

Figure 1: Type of Abrasive Stones



Figure 2: Auto Polisher



MACHINES FOR POLISHING

The polishing machines are for polishing rough cutting tiles, slabs, monuments of different shapes and crafts at the end of process. The exact colour may obtain in the polishing operation. Number of grades of abrasive is used for polishing pieces.

Auto Polisher for Slab

It can be used for polishing slabs, monuments, etc., in this machines compressors are frequently used for producing polished products.

- Spindle motor - 15 HP
- Longitudinal travel motor - 1.5 HP
- Cross travel motor - 1.5 HP
- Total power - 1.8 HP

Slab size "5 x 8" thick

Approximate floor space 5 m x 6 m x 3 m height by switching the machine it can automatically calibrated and moving the heads to and fro cross wide automatically. The auto polisher is shown in the following Figure 2.

Hand Polisher for Slab

In this polishing the pressure applied on the pieces for polishing is obtained a compression. This pressure is helpful for the workers increasing the production of pieces and for ease of operation.

Specification

- Spindle motor - 5 HP
- Down motor - 1 HP
- Total power - 6 HP

Slab size (LXWXH) mm LXWXH mts: 2750 x 1220 x 203

Approximate floor space LXWXH mts: 3.3 x 3.2 x 2.6 the hand polisher for slabs using pneumatic pressing

Hand Polisher for Tile

Specifications of the hand polisher for tile are given below.

- Spindle motor - 5 hp
- Total size - 1300 x 680 x 10 to 75 mm

App floor space - 1.7 m x 2.1 m x 2.0 m height

These machines are used as same as hand polisher for slabs except only sizes are used for granite tiles of regular sizes.

POLISHING WITH WATER AS COOLANT

In the first step, water is used as coolant for polishing the granite slab and measured the area of polishing and corresponding power consumed. The experiments were conducted

S. No.	Area Polished (sq-feet)	Power Consumed KWH
Trial-1	60	8
Trial-2	64	10
Trial-3	58	7
Trial-4	62	9
Average	61	8.5

S. No.	Area Polished (sq-feet)	Power Consumed KWH
Trial-1	80	12
Trial-2	84	14
Trial-3	82	13
Trial-4	80	12
Average	81.5	12.75

S. No.	Area Polished (sq-feet)	Power Consumed KWH
Trial-1	86	15
Trial-2	88	16
Trial-3	84	14
Trial-4	82	12
Average	85	14.25

for four times (trials) for each abrasive grit size and the average value is calculated. The results are tabulated in the following Tables 1-5.

S. No.	Area Polished (sq-feet)	Power Consumed KWH
Trial-1	90	18
Trial-2	92	20
Trial-3	94	22
Trial-4	90	15
Average	91.5	18.75

S. No.	Area Polished (sq-feet)	Power Consumed KWH
Trial-1	102	26
Trial-2	104	27
Trial-3	100	25
Trial-4	106	28
Average	103	26.5

POLISHING WITH (WATER OIL) AS COOLANT

In the next step, water oil is used as coolant for polishing the granite slab and measured the area of polishing and corresponding power consumed. the experiments were conducted for four times (trials) for each abrasive grit size and the average value is calculated. The results are tabulated in the following Tables 6-10.

S. No.	Area Polished (sq-feet)	Power Consumed KWH
Trial-1	70	12
Trial-2	72	14
Trial-3	74	16
Trial-4	70	12
Average	71.5	13.5

S. No.	Area Polished (sq-feet)	Power Consumed KWH
Trial-1	86	14
Trial-2	88	15
Trial-3	84	13
Trial-4	82	12
Average	85	13.5

S. No.	Area Polished (sq-feet)	Power Consumed KWH
Trial-1	92	15
Trial-2	94	16
Trial-3	96	18
Trial-4	90	14
Average	93	15.75

S. No.	Area Polished (sq-feet)	Power Consumed KWH
Trial-1	110	24
Trial-2	108	23
Trial-3	112	25
Trial-4	114	26
Average	111	24.5

S. No.	Area Polished (sq-feet)	Power Consumed KWH
Trial-1	120	28
Trial-2	124	26
Trial-3	118	25
Trial-4	116	24
Average	119.5	25.75

COMPARISON OF POLISHING METHODS:

The results shown in Tables 1 to 5 (with water as coolant) and Tables 6 to 10 (with water oil

as coolant) are consolidated and shown in Table 11.

Avrasive Grit No.	Area of Polishing (sq-feet)		Power Consumed KWH	
	Coolant (Water)	Coolant (Water Oil)	Coolant (Water)	Coolant (Water + Oil)
36	61	71.5	8.5	13.5
80	81.5	85	12.75	18.5
220	85	93	14.25	15.75
400	91.5	111	18.75	24.5
800	103	119.5	26.5	25.75

CONCLUSION

From the above experimental results, the following points are observed

- The polished area in square feet is less with the entire all the abrasive grit sizes using water coolant when compared to the results obtained with the water with oil as coolant.
- The power consumed in KWH is more with all the abrasive grit sizes using water with oil as coolant whereas same is lessen the processes where coolant is water.

REFERENCES

1. Albaum G, Duerr E and Strandkov J (2005), *International Marketing and Export Management*, Pearson Education Limited, England.
2. Chakrabarti A and Bhaumik P (2009), "Internatinalization of Technology Development in India", *Journal of Indian Business Research*, Vol. 1, pp. 26-38, Emerald.
3. Chithirai Pon Selvan M and Mohana Sundara Raju N (2011), "Assessment of

- Process Parameters in Abrasive Waterjet Cutting of Granite”, International Conference on Trends in Mechanical and Industrial Engineering (ICTMIE’2011), December, Bangkok.
4. Gandhi G P (1999), *Market Survey in Granite Takes a New Turn*.
 5. Gilat Amos (2004), *MATLAB: An Introduction with Applications*, 2nd Edition, John Wiley & Sons, ISBN: 978-0-471-69420-5.
 6. Granitoids (2001), “Granite and the Related Rocks Granodiorite, Diorite and Tonalite”, 2010-02-06, Geology.about.com
 7. Nilanjan Dasgupta and Taritwan Pal (2003), *Characteristics of Pegmatoidal Granite Exposed*.
 8. Quarteroni Alfio and Fausto Saleri (2006), *Scientific Computing with MATLAB and Octave*, Springer, ISBN: 978-3-540-32612-0.