International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 03 | Mar 2019 www.irjet.net p-ISSN: 2395-0072

"DESIGN AND FABRICATION OF ABRASIVE JET MACHINING"

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Abstract - *Abrasive Jet Machining (AJM) is the process of material removal from a work piece by the application of a high speed stream of abrasive particles carried in a gas medium from a nozzle. The material removal process is mainly by erosion. The AJM will chiefly be used to cut shapes in hard and brittle materials like glass, ceramics etc. the machine will be automated to have 3 axes travel.*

The different components of AJM are Horizontal motion module (X-Y Table), Vertical motion module (Z- motion), Vibrator, dehumidifier, Pressure Regulator, and Dust filter etc. The different components are selected after appropriate design calculations.In this project, a model of the Abra sive Jet Machine is designed using CAD packages like AutoCAD, CATIA etc taking into conside ration of commercially available components. Care has been taken to use less fabricated components rather than directly procuring them, because, the lack of accuracy in fabricated components would lead to a diminished performance of the machine.

Key Words: Nozzle,Air Compressor, Cylinder,Motor.

1.INTRODUCTION

Abrasive jet machine:

Abrasive jet machine is device which specially made for the purpose of it utilization to remove the material from the w/p which is very brittle & make a hole or any design on it and at very high accuracy.

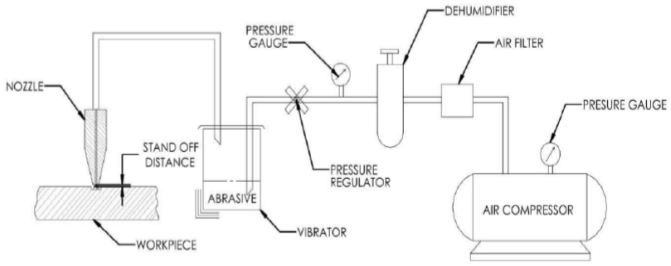


Fig.1.1: Layout of abrasive jet machine

Major components:-

1. Air compressor.
2. Air filter.
3. Dehumidifier.
4. Pressure Gauge.
5. Pressure Regulator.
6. Vibrator or Mixer.
7. Nozzle.
8. Horizontal and Vertical motion module (for xyz motion).
9. Arrangement to hold the work piece.

2. OBJECTIVE AND AIM OF WORK

Abrasive Jet Machining (AJM) is the process of material removal from a workpiece by the application of a high speed stream of abrasive particles carries dinagasmedium from a nozzle.

The major field of application of AJM process is in the machining of essentially brittle material sand heat sensitive materials like glass, quartz, sapphire, semi conductor materials, mica and ceramics. It is a lsousedin cuttings lot, thin sections, countering, drilling, debarring, for producing integrate shapes in hard and brittle materials.

1) Ability to cut intricate holes shape in materials of any hardness and brittleness.

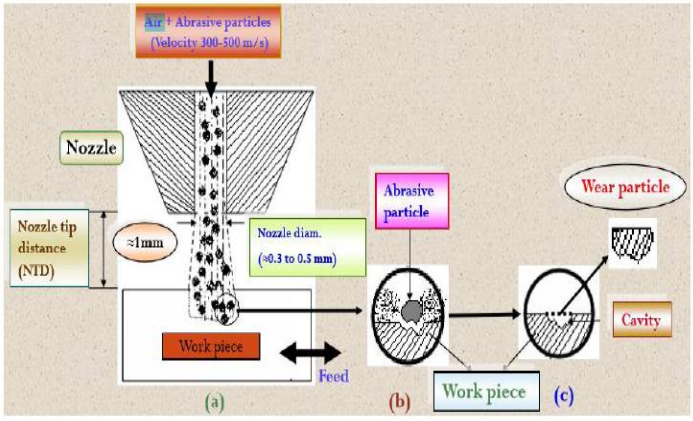
2) Ability to cut fragile and heat sensitive material without damage.

3) No change in microstructure as no heat is generated in the process.

4) Low capital cost.

3. MECHANISM OF MATERIAL REMOVAL

Flaring of the Jet:- Cavity dimension changes with a change in NTD. Abrasive particles repeatedly hit on the work surface. Brittle fracture separates out tiny particles (wear particles) to produce a cavity. Cavity width ≥ Nozzle inner diam. (Depends on NTD). Cavity Depth depends on work piece feed rate, abrasive particle mass (or density) and pressure (or velocity of the jet).



4. RESULT DISCUSSION

4.1 Effect of parameters:

1) Stand of distance.

2) Abrasive flow rate.

3) Abrasive grit size.

4) Nozzle distance.

4.2 Discussion:

1) Effect of -S.O.D on MRR

2) Effect of flow rate on MRR

3) Effect of size of partial on MRR

5. CONCLUSION

In our country even today abrasive machine is relative unknown process. So much so, people often consider it similar with grinding, which is traditionally branched as finishing operations usually, proceeded by planning, milling, turning. But in many cases it has been proved that the abrasive machining process as primary as well as final process replace non abrasive process and compare favorably productivity and economy wise.

In great majority of cases well fine abrasive machining is useful to cut down cots. • Due to low capital and operative cost the ajm is compatible to other processes. In future with slight modifications, ajm will become a important machine tool on shop floor.

6. REFERENCES

1) Matthew w. chastagner and albert j.shih mechanical Engineering " abrasive jet machining for edge generation" Transactions of NAMRI/SME Volume 35, 2007.

2) Krushna prasad pradhan, " design and fabrication of abrasive jet machine " department of mechanical engineering national institute of technology rourkerla 2009.

3) NPTEL introduction and abrasive jet machining, version 2 ME, IIT kharagpur.