

Internal Assessment Test - I

Sub:	Non Traditional Machining	Code:	10ME665
Date:	30 / 03 / 2017	Duration:	90 mins
		Max Marks:	50
		Sem:	VI
		Branch:	Mechanical
Answer Any FIVE FULL Questions			

	Marks	OBE	
		CO	RBT
1.(a) State the advantages, disadvantages and applications of Electron Beam machining (EBM).	[05]	C02	L1
(b) Write a short note on abrasive slurry.	[05]	C01	L1
2. Distinguish between conventional and non-conventional machining process.	[10]	C03	L2
3 (a) Explain the basic needs of modern machining process.	[05]	C01	L1
(b) List out the commonly used gasses in Laser beam machining (LBM).	[05]	C02	L1
4. Explain the effect of process parameters on machining performance in Ultra Sonic machining (USM).	[10]	C01	L1
5. With a neat sketch explain Electron beam machining.	[10]	C01	L1
6 (a) What are the advantages and limitations of laser beam Machining (LBM).	[05]	C02	L1
(b) Explain the different feed mechanism in Ultra Sonic machining (USM).	[05]	C01	L1

Non-Traditional Machining (NMT) (DOME665)

I AT-1 \Rightarrow Solution

1.a)

Advantages of Electron beam machining.

1. Very small sized holes can be produced.
2. Surface finish produced is good.
3. Highly reactive metals like Al & Mg can be machined easily.

Disadvantages

1. MRR is low compared to other thermal NTM processes.
2. Maintaining perfect vacuum is difficult.
3. Work piece material should be electrically conducting.

Applications

1. Used for producing very small sized holes in diesel injection nozzles, air breakers etc.
2. Used for circular holes.

1b) Abrasive slurry

- * Large variety of abrasives are available for using in USM.
- * The abrasive selected should be harder than the material being machined.
- * The abrasive grain size used are from 200-2000 depending upon the finishing desired.
- * The abrasive suspended in liquid with 30 to 60% of volume.
- * The liquid acts as acoustic bonding between abrasive and w/p during machining.
It also acts as coolant.
- * Most commonly used abrasives are Al_2O_3 & Boron Carbide as it's harder than Silicon Carbide.

2(a)

Conventional

- * The cutting tool and the w/p are always in physical contact with relation with each other.
- * MRR is limited by mechanical properties of work material.
- * Relative motion B/w the tool & w/p is typically rotary or reciprocating.
- * Machining complex design is difficult.
- * Use relative simple & inexpensive machinery.
- * Capital cost & maintenance cost is low.

Non-Conventional Machining

- * There is no contact between cutting tool & w/p.
- * NDM can machine difficult to cut and hard to cut materials like titanium, ceramics, composites.
- * Most of NDM are capable of producing complex 3D shapes & cavities.
- * Any complex shapes can be machined.
- * NDM requires expensive tools.
- * Comparatively maintenance & capital cost is high.

* Traditional processes are well established & physics of process is well understood.

* Mechanics of material removal of some of NTM processes are still under research.

* Conventional process mostly uses mechanical energy.

* Most NTM uses energy in direct form for example laser, Electron beam.

* Surface finish and tolerances are limited by machining inaccuracies.

* High surface finish & tolerances can be achieved.

* High metal removal rate

* Low metal removal rate

3(a)

Need for Non traditional machining

- * New materials which are having high strength to weight ratio, heat resistance & hardness are difficult to machine by the traditional methods.
- * MRR reduces with increase in the hardness of the material.
- * Hence non traditional machining is required.

3(b) The Commonly used gasses are:-

1. Carbon dioxide.
2. Helium - Neon gas
3. Xenon gas.
4. Carbon Monoxide.
5. TEA Gas (Transversely excited Atmosphere)
6. Nitrogen Gas.

4. Process parameters on machining performance
(COSM)

* Grain Size



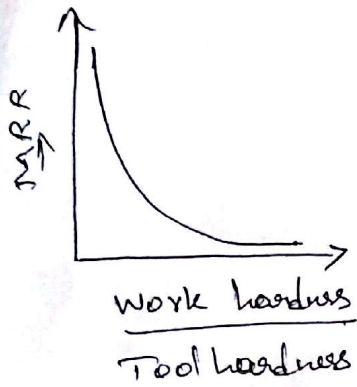
As the grain size increases, the MRR also increases. Usually for Rough finishing grain size of 200-400 are used. For good finish use use 800-1000 grit size.

* Frequency



Higher the frequency more will be the metal Removal Rate.

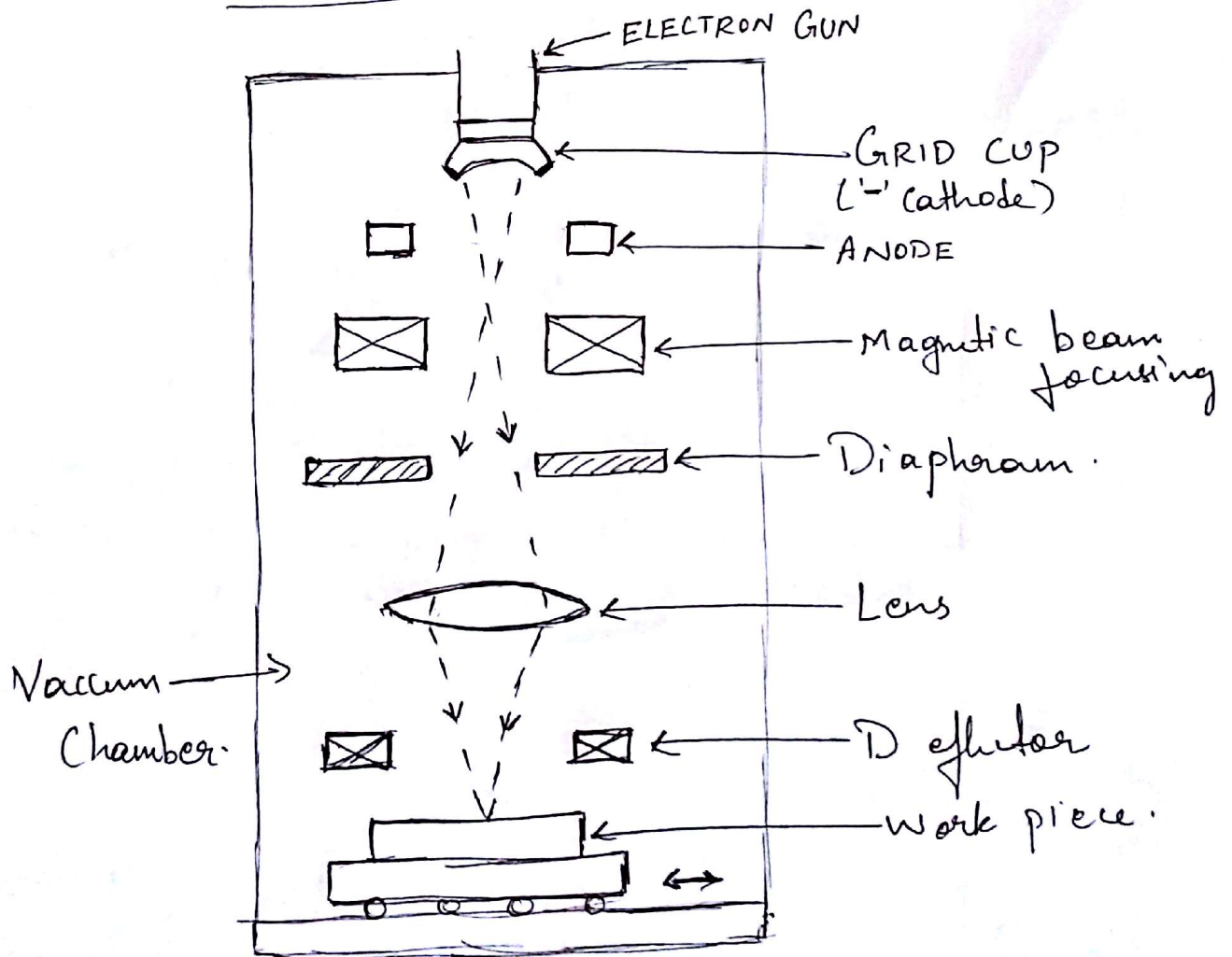
Hardness



The hardness of the cutting tool should be more comparatively. To get a good metal removal rate, we see that hardness value of tool is more cause its wear rate reduces.

5.

Electron Beam Machining



* Grid cup

Grid cup contains tungsten filament which helps to transfer the heat to grid cup which generates electrons.

- * The generated electrons are made to flow out of the Grid cup, through anode.
- * Electrons flow to work piece through lens focusing
- * Deflector increase the velocity of flow of electrons.
- * Work is made to move to change the position of machining.

6(a) Advantages and limitation of LBM

Advantages

- * It can machine any kind of material.
- * MRR is high in LBM.
- * Its completely automated process.
- * Can obtain good accuracy in cutting.

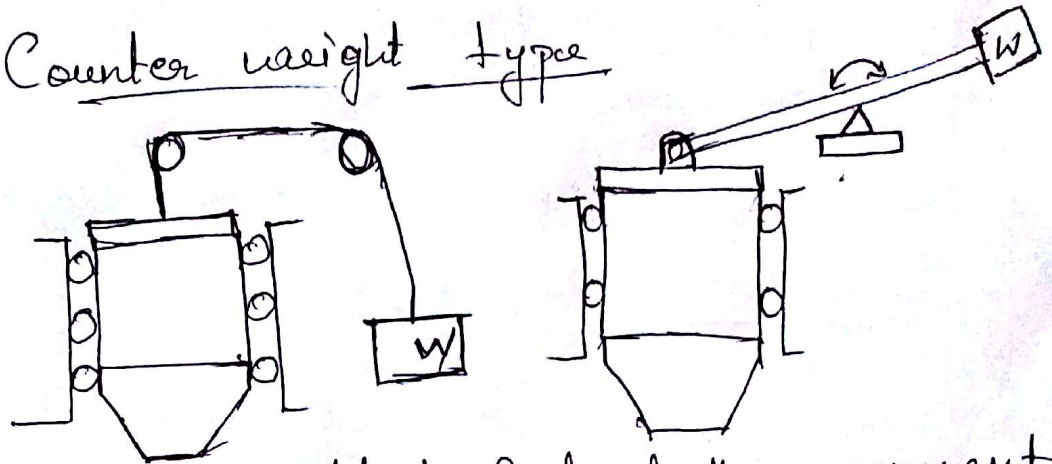
Disadvantages

- * Initial investment is high.
- * Maintenance Cost is high.
- * The laser generated is harmful to humans hence care should be taken during machining.

6(b)

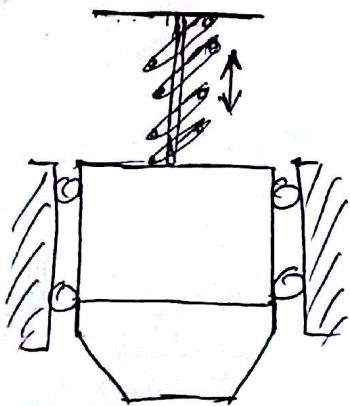
Different feed Mechanism in VSM

Counter weight type

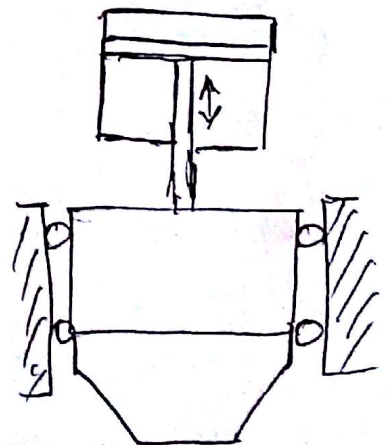


* We use pulley and weight to control the movement of the transducer which in turn connected to the horn, tool holder and work piece; So as the machining continues the tool is made to move down using counter weight.

Spring loading.



Hydraulic & Pneumatic loading



The spring load and hydraulic & pneumatic are the other types of feed system in VSM.