

ANNA UNIVERSITY, CHENNAI-25



DEPARTMENT OF MECHANICAL ENGINEERING

QUESTION BANK

2013 Regulation & 2017 Regulation

Subject Code : ME 6004

Subject Name : Unconventional Machining Process

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Author



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SYLLABUS

ME6004

UNCONVENTIONAL MACHINING PROCESSES

L T P C

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OBJECTIVS:

- ❖ To learn about various unconventional machining processes, the various process parameters and their influence on performance and their applications

UNIT I INTRODUCTION

Unconventional machining Process – Need – classification – Brief overview.

UNIT II MECHANICAL ENERGY BASED PROCESSES

Abrasive Jet Machining – Water Jet Machining – Abrasive Water Jet Machining - Ultrasonic Machining.(AJM, WJM, AWJM and USM). Working Principles – equipment used – Process parameters – MRR- Applications.

UNIT III ELECTRICAL ENERGY BASED PROCESSES

Electric Discharge Machining (EDM)- working Principle-equipments-Process Parameters-Surface Finish and MRR- electrode / Tool – Power and control Circuits-Tool Wear – Dielectric – Flushing – Wire cut EDM – Applications.

UNIT IV CHEMICAL AND ELECTRO-CHEMICAL ENERGY BASED PROCESSES

Chemical machining and Electro-Chemical machining (CHM and ECM)-Etchants – Maskant - techniques of applying maskants - Process Parameters – Surface finish and MRR-Applications. Principles of ECM- equipments-Surface Roughness and MRR Electrical circuit-Process Parameters-ECG and ECH - Applications.

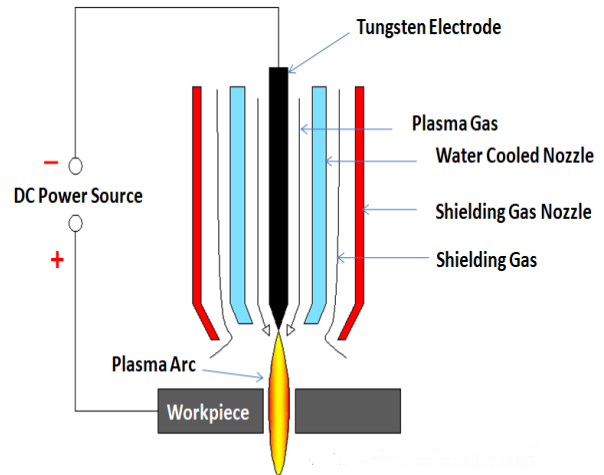
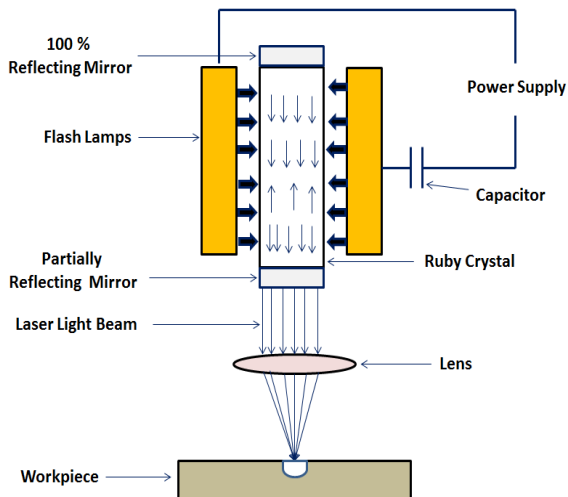
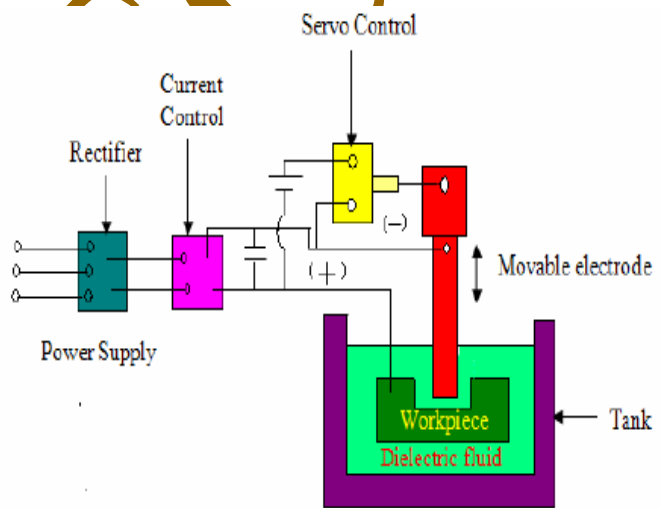
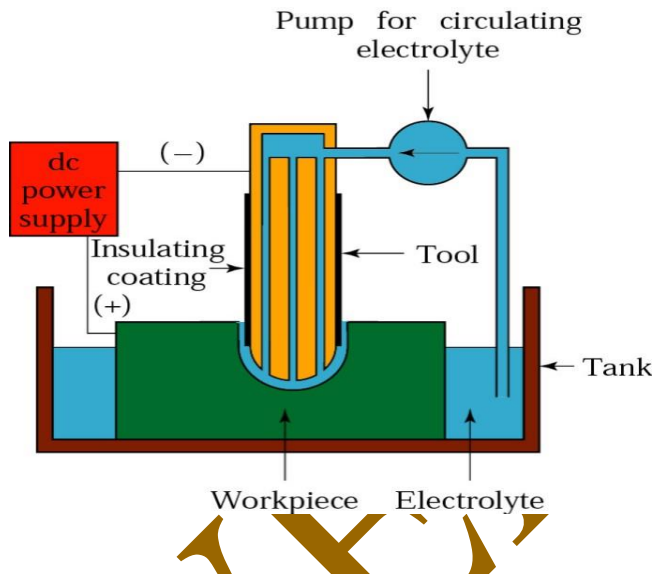
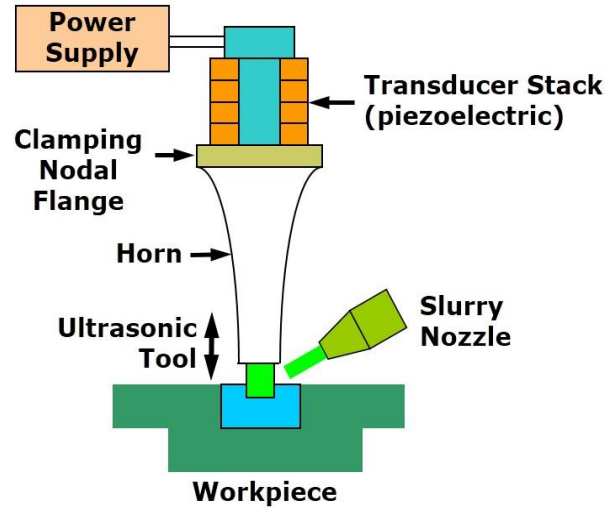
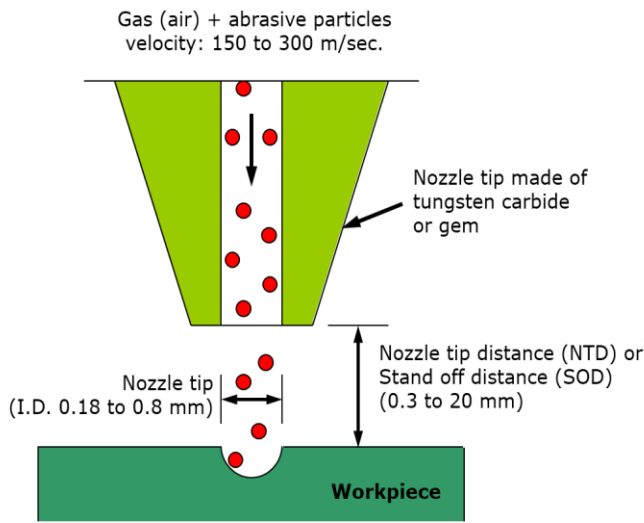
UNIT V THERMAL ENERGY BASED PROCESSES

Laser Beam machining and drilling (LBM), plasma Arc machining (PAM) and Electron Beam Machining (EBM). Principles – Equipment –Types - Beam control techniques – Applications.

OUTCOMES:

- ❖ Upon completion of this course, the students can able to demonstrate different unconventional machining processes and know the influence of difference process parameters on the performance and their applications.

GRAPHICAL REPRESENTATION



UNIT-1

INTRODUCTION OF UNCONVENTIONAL MACHINING PROCESS

PART-A [2Marks]

1. Define Non Traditional machining process
2. Discuss hindering traditional and nontraditional machining process
3. Write the Limitations of Unconventional Machining process
4. Why unconventional machining process required for materials machining process
5. Write the significant of surface finishing in machining operations
6. Enlist the selection parameters consider to unconventional machining process
7. Discuss the characteristics of unconventional machining process
8. Classify unconventional machining process based on the mechanism
9. Discuss the energy sources required for nontraditional machining process
10. List out the Merits of unconventional machining process

PART-B-[16&8Marks]

- Explain details about unconventional machining process
2. Discuss the process selection parameters of unconventional machining process
 3. Briefly classify the unconventional machining process
 4. Distinguish between traditional and nontraditional machining process
 5. Illustrate benefits of unconventional machining process
 6. Discuss the basic limitations of conventional machining process and justify the need of conventional machining process in now a days
 7. Explain Modern machining process and why the unconventional machining process not completely taking over the conventional machining process
 8. Write the short notes about recent development of unconventional machining process
 9. Briefly Explain under the classification of type of energy and mechanism involved unconventional machining process

UNIT-2

MECHANICAL ENERGY BASED UNCONVENTIONAL MACHINING PROCESS

PART-A [2Marks]

1. Classify different type of mechanical energy based unconventional machining process
2. Write the principle of abrasive jet machining
3. Mention the carries gases properties and abrasive particles used in abrasive jet machining
4. Write the process parameters of abrasive jet machining
5. Define mixing ratio in AJM
6. State the characteristics of Abrasive Jet Machining
7. List out the advantages and disadvantages of AJM
8. Mention the few application of AJM
9. State the Principle of Water Jet Machining
10. Enlist the process parameters of WJM
11. Define Metal Removal Rate
12. List out the factors involving the Nozzle Wear rate in WJM
13. State the Merits and demerits of Water Jet Machining
14. List the characteristics of Water jet machining
15. State the principle of Ultrasonic Machining Process
16. Define Transducer and mention its types
17. List out the limitations of USM Process
18. Define the Piezoelectric Effect
19. State the inverse piezoelectric effect
20. Define the feed mechanism and mention its types
21. Define Tool Wear Ratio

PART-B-[16&8Marks]

1. Explain the principle and equipment, mechanics of metal removal rate (MRR), Applications, advantages, disadvantages and Limitations of Abrasive jet machining (AJM)
2. Describe the principle and equipment, mechanics of metal removal rate (MRR), Applications, advantages, disadvantages and Limitations of Water jet machining (AJM)
3. Discuss the principles, equipments, transducer, tool holders, tools, abrasives, application, advantages and limitations of Ultrasonic Machining Process (USM)
4. Explain the variables affecting the material removal rate and precise quality of abrasive jet machining process
5. Write Short Notes on the following related to USM
 - Functions of slurry and oscillator in USM
 - Types of abrasives used in USM
 - Grain size vs machining rate
 - Importance of Transducer in USM
6. Describe Metal removal rate, Tool Materials, Tool Wear Rate and surface finish of ultrasonic machining process (USM)
7. Compare USM Process and traditional machining process

UNIT-3

ELECTRICAL ENERGY BASED UNCONVENTIONAL MACHINING PROCESS

PART-A [2Marks]

1. Enlist Electrical energy based unconventional machining process
2. Define Electro chemical machining process
3. State the working principle of ECM Process
4. Describe Dielectric fluids. Mention common dielectric fluids and its functions
5. Mention the factors the material removal rate affecting ECM
6. Define Break down Mechanism
7. List out the few advantages and limitations of ECM
8. Give the applications of Electro Chemical Machining Process

9. Describe the Wire cut Electro discharge machining process
10. Mention the features of Electro Discharge Machining process
11. Write Limitations and application of EDM
12. List the differences between Wire Cut EDM and EDM Process
13. State recent development of EDM Process
14. Give the characteristics of Electrochemical Machining Process
15. Mention the basic requirement of tool materials for EDM
16. Name the common tool materials used in EDM Process
17. Describe overcutting in EDM process
19. Mention the temperature, voltage and amperes involved in EDM Process
20. Define Servo Mechanism in EDM

PART B-[16&8Marks]

1. Briefly explain the principles, equipments, chemistry of process electrolytes, tools, accuracy and surface finish, process capabilities, applications and advantages of Electrical discharge Machining Process
2. Discuss details about process principles, construction and working of EDM, also explain EDM servo system for automatic electrode refeed concept
3. Explain the following Electrical Discharge Machining with neat sketch
 1. Electrode Feed Control System
 2. Factors to be considered for EDM Machine tool selection
4. Write short notes in following EDM Technology
 - i. Dielectric system
 - ii. Wire drive system
 - iii. Positioning system
5. Explain the working principle, elements and characteristics of wire EDM process
6. Describe the types of pulse generator used in Electro discharge machining process

7. Explain how the stratified wire works and Discuss about Recent developments in Wire cut Electrical Discharge machining process
8. With the help of neat sketch explain the mechanism of material removal rate in EDM
9. Identify the condition for maximum power delivery to the discharging circuit in EDM
10. Write the short notes about
 1. Characteristics of spark eroded surface
 2. Working principle of Wire EDM Process

UNIT-4

CHEMICAL AND ELECTRO-CHEMICAL BASED UNCONVENTIONAL MACHINING PROCESS

PART-A [2Marks]

1. Define the Chemical Energy based Material Machining process
2. State the principle for Chemical machining process
3. Mention the role of etchants in chemical machining process
4. State the use of maskant in chemical machining process
5. Name the etchants and maskant used in chemical machining process
6. Write the principle of Electro chemical machining process
7. State the requirements of tool materials in ECM Process
8. Write the Name and function of electrolyte used in ECM process
9. List out the essential characteristics of an electrolyte used in ECM Process
10. Mention the tool materials and why it is used for electro chemical machining process
11. List out the process parameters of electro chemical machining process
12. Write the advantages and limitations of ECM
13. Enlist the applications and disadvantages of ECM
14. State the principle of Electro chemical grinding process
15. List the application and advantages of ECG

PART-B-[16&8Marks]

1. Explain the Electro Chemical Machining process and explain how a replica of the tool is obtained
2. Explain the principles of electro chemical Deburring process
3. Discuss Chemical Machining process with neat sketch and also list out the advantages, disadvantages, applications
4. Write Details about types of maskant used in chemical machining process
5. Explain the basis of why surface finish of a chemically machined of an alloy is poor
6. Describe the chemistry involved ECM Process
7. Discuss about economics of ECM Process
8. Briefly Discuss about the effect of high temperature and pressure of electrolyte on ECM Process
9. Describe the working principles and element of chemical machining process what are the factors on which a selection of resist for use in chemical machining
10. Identify the specific advantages of chemical machining process over an electro chemical machining process and mention the practical application Chemical Machining process
11. Briefly explain maskants and its types in chemical machining process. Write importance of maskants in CMP
12. Briefly explain the principles, equipments, chemistry of process electrolytes, tools, accuracy and surface finish, process capabilities, applications and advantages of Electro Chemical Grinding Process
13. In chemical machining process what are the factors by which the selection of etchants in governed
14. Briefly explain the principles, equipments, tools, accuracy and surface finish, process capabilities, applications and advantages of Electro chemical honing and deburring Process
15. Explain the following on electro chemical machining process with suitable sketches
 1. Cathode tool
 2. Corrosion of tool

16. Compare the Chemical machining (CHM) and Electro Chemical Machining with respect to their process parameters
17. List the advantages and limitations of Chemical Machining process
18. Discuss the high temperature and pressure of electrolyte on ECM Process

UNIT-5

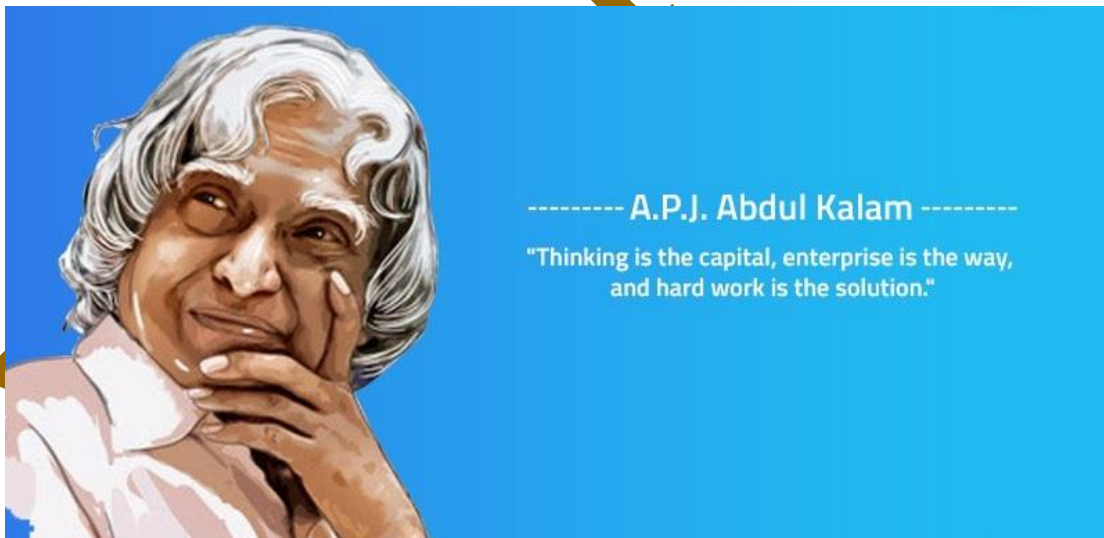
THERMAL ENERGY BASED UNCONVENTIONAL MACHINING PROCESS

PART-A [2Marks]

1. Narrate the working principle of Electron Beam Machining
2. Why is the deflection coil provided for electron beam machining
3. List the advantages and limitations of Electron Beam Machining
4. State the Laser Beam machining principle
5. Write the examples of solid state laser and gas laser
6. List out the basic requirement of Laser Welding
7. Mention the materials can be machined by using laser beam machining
8. Write the functions of electron beam gun
9. Describe the principle of Plasma arc machining
10. List out the applications of Laser Beam Machining
11. List out the advantages and applications of Plasma Arc Machining
12. It is possible to the electrical non conductive materials used EBM Process. If possible justify you answer
13. Why tungsten is not used electrode material in plasma arc cutting
14. in EBM Process why high vacuum created in the apparatus
15. Mention affected stages of plasma arc machining
16. List the advantages of magnetic abrasive finishing
17. What is abrasive flow finishing

PART-B-[16&8Marks]

1. Discuss the principles machining system and process capabilities, applications and advantages of Electron Beam Machining with neat sketch
2. Explain the principles machining system and process capabilities, applications and advantages of Laser Beam Machining
3. Describe the principles, equipments, solid state laser; gas laser thermal features applications and advantages of Plasma Arc Machining
4. Explain production and working principles of laser beam
5. Compare the operation of transferred and non transferred arc mode in plasma machining
6. Explain under water plasma cutting
7. Describe the unique characteristics of laser machining techniques possesses that make it the only choice for the job
8. Discuss about plasma arc machining process parameters and list the disadvantages of PAM
9. Explain any one method of producing laser
10. Write comparison between LBM,EBM and PAM



*****Wish you All the Best My Dear Students*****

*****Happy New Year-2019 Have a Bright Future *****

By

Prof.S.Sathishkumar