

LESSON PLAN

Date _____

Trade:- Welder

Name _____

Unit/Lesson:-Forty two

Subject:- Friction Welding process, equipments and application. Laser beam welding and electron beam welding.

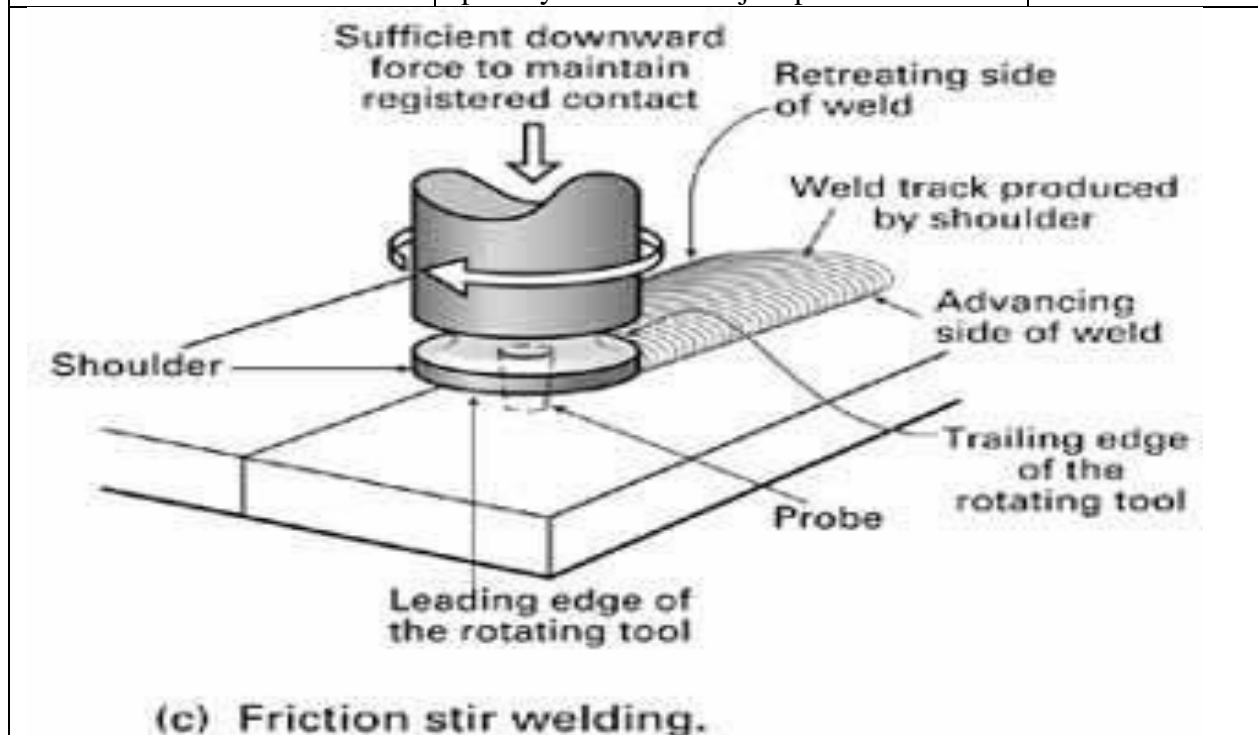
Motivation:- In previous lesson we discuss argon and helium gases properties and their uses. We also study about GTAW defects their causes and remedies.

PREPARATION

- 1) (Materials, Tools, Models, Charts and other aids)

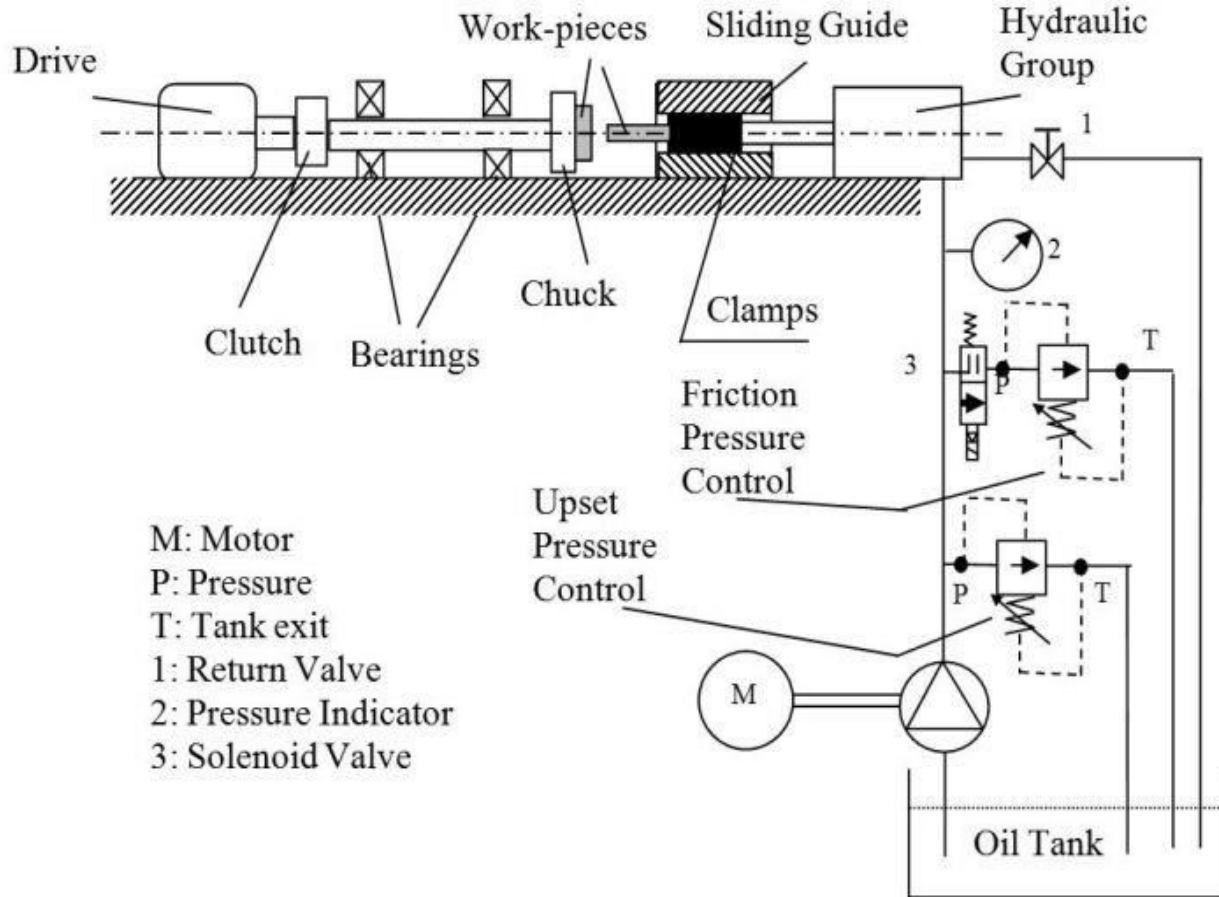
INTRODUCTION:- Argon and helium gases are inert gases and use for shield the weld area. GTAW defects are causes due to wrong selection of electrode , positions and filler metals.

Topic	Information Point	Spot Hint
Friction Welding	.Friction welding is a solid state welding process. In this process weld joint completed by friction.	
Process	Job fixed in a rotating jaw and second part fixed in fix jaw , rotating jaw rotate speedily and strike fix jaw part with brake.	



Types	Friction welding and inertia welding	
Steps for complete operation	<ol style="list-style-type: none"> 1. Power required 2. Peripheral speed of rotating part 3. Pressure applied 4. Duration of time for complete process 	

Equipment



Parameters for Welding

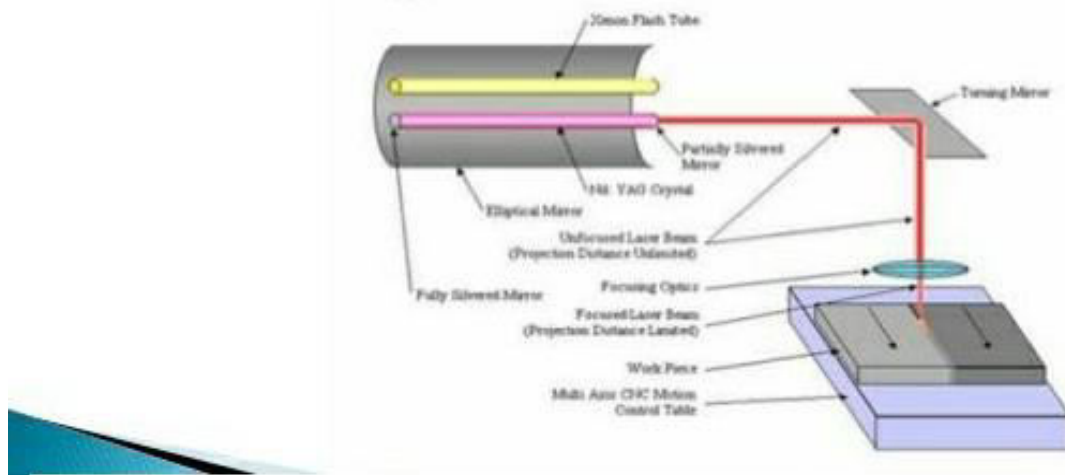
Materials	Diameter mm	Rotational speed	Contact heating phase kg/cm ²	Pressure forging phase kg/cm ²	Total time in second
Carbon steel	25	1500	525	525	15
Stainless steel	25	3000	840	1120	7
SS to CS	19	3000	525	1050	10
Aluminum	19	3800	280	455	6

Applications	Approximate all metal would be weld	
Advantages	<ol style="list-style-type: none"> 1. No skill welder required 2. No need edge preparation 3. No filler materials required. 4. Useful in mass production. 	
Limitations	<ol style="list-style-type: none"> 1. Costly machine. 2. Only butt joint of round rod job.. 3. Mild metal not weld by this process. 4. No outdoor welding 	
Types of equipments	<ol style="list-style-type: none"> 1. Direct drive friction welding machine. 2. Linear friction welding machine. 	

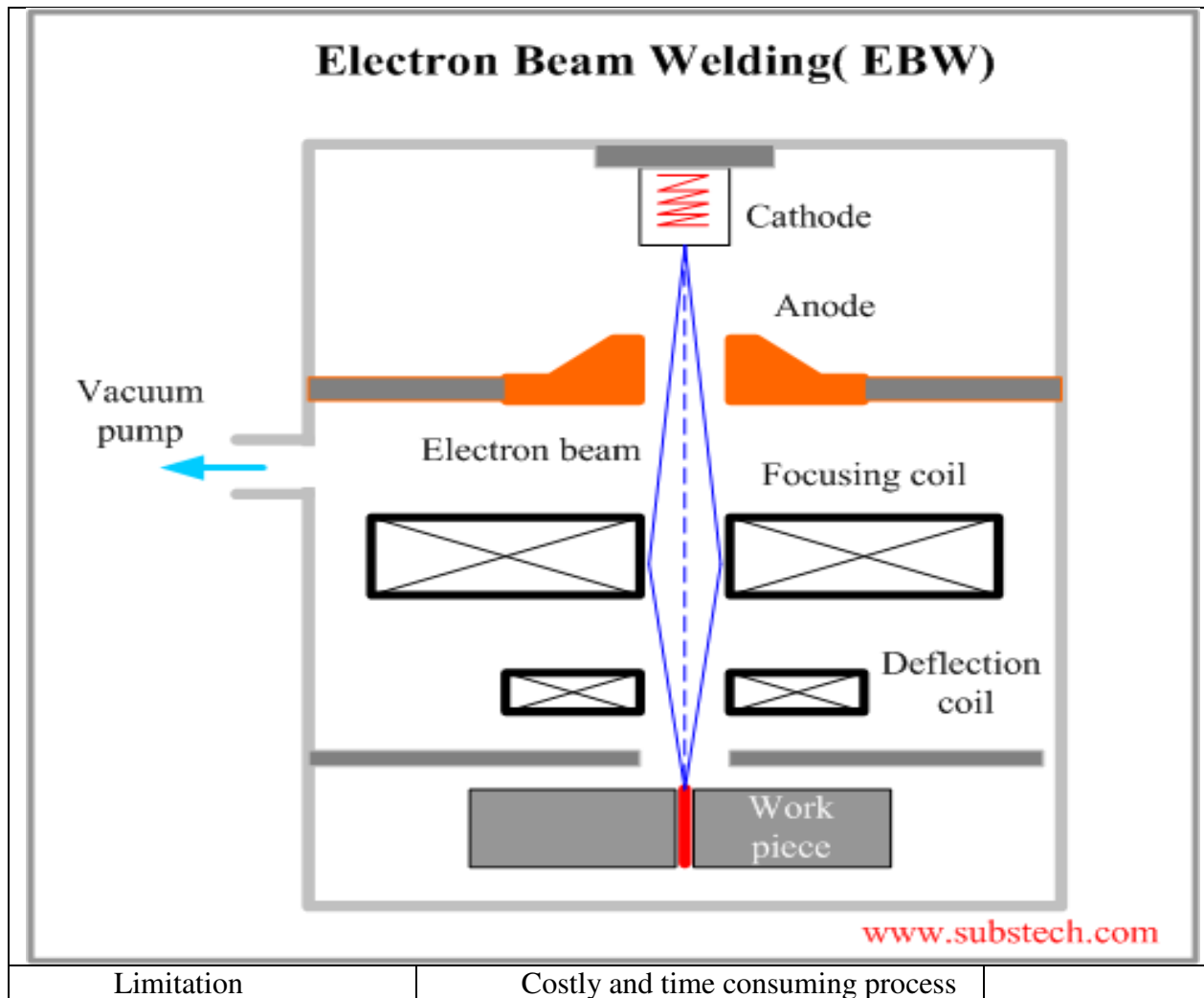
	3. Radial friction welding machine.	
Laser beam welding	This process completed through focus laser on a narrow spot as like pin tip. Laser beam forming many lac KW energy in centimeter square.	

Principle of Laser Welding

The laser beam is focused onto the workpiece by a set of mirrors. These are used because they are much easier to cool than lenses, which are commonly used in lower-power cutting applications. When the laser beam is moved relative to the workpiece, the energy of the focused laser beam melts the metal so that a joint is formed.



Types of laser	<ol style="list-style-type: none"> 1. Ruby laser. 2. Gas laser. 3. Liquid laser. 4. Semi conductor laser. 	
Advantages	Weld insulated wire without damage insulation. It is very pure welding process.	
Limitations	Low welding speed and time consuming. 1.5 deep welding only.	
Electron beam Welding	In this process emitted electron flow focusing by electro magnet and create high power electron beam for welding.	
Equipments	<ol style="list-style-type: none"> 1. Vacuum chamber – used for welding. Job weld only in this chamber. 2. Vacuum pumping system- for pump the chamber to vacuum. 3. Electrical controls- for control and focus the beam. Adjustment of high voltage ,filament activation ,focusing control . 4. Power unit-for power supply to all unit 	



Questions:-

1. Write the process of friction welding.
2. Write the process of laser Beam welding.
3. Write the process of electron beam welding.

Next Lesson:- Plasma arc welding and cutting process ,equipments, and principle of process.

Types of plasma arc and advantages ,applications.

Assignments:-

Friction Welding process, equipments and application. Laser beam welding and electron beam welding.

Checked by.....

Instructor.....