

Utilization of electrical power and traction

Electric heating

- Electric heating is a process which convert electric heating into heat energy .
- Electric heating some common applications include space heating , cooking , water heating etc .
- A electric heater is a device which can change the electric current into heat and the electric heater is an electrical resistor and working principle Joule heating .
- In electric heater current current passing through a resistor and convert electrical energy into heat energy.
- Heating element is made of nicrome wire.

Merits of electric heating

- It is economical
- low maintenance cost
- Saving in space
- Free from pollution
- Temp control can be easily
- Free form flue gases
- It is free from dirt

Resistance heating

Resistance heating divided into two categories

1.Direct Resistance heating

2.Indirect Resistance heating

Direct Resistance heating

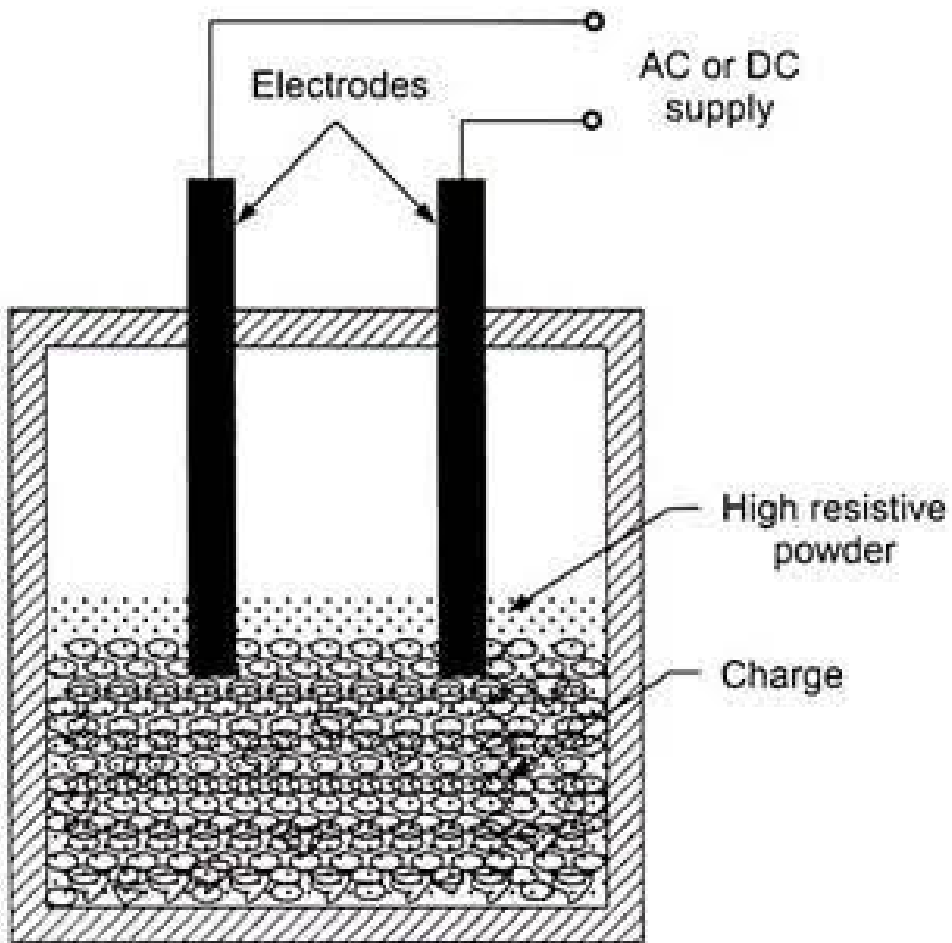


Fig. 3.1 *Direct Resistance Heating*

- In th direct Resistance heating electric current passing through the charge it self .the current produces in the form of heat with in the body it self.
- The principle is made used in Resistance welding and heating water by means of electrode boiler .
- In case of electrode boiler the electrodes are lowered into the tank filled with water.
- Ac supply is used having voltage varies from 2 to 20 volt and current upto 2500 Amp.
- Automatic stirring action produced in the change to be heated and no external method is required to get uniform heating .

Indirect Resistance heating

- Electric current is passing through the wire in the form of element and transferred heat by radition .
- In this method Resistance does not pass through the change hence natural stirring action is not there.
- So required some external stirring apparatus are employed to get uniform heating.
- It's various types applications used such as electric iron , cooking oven , electric kettles etc.

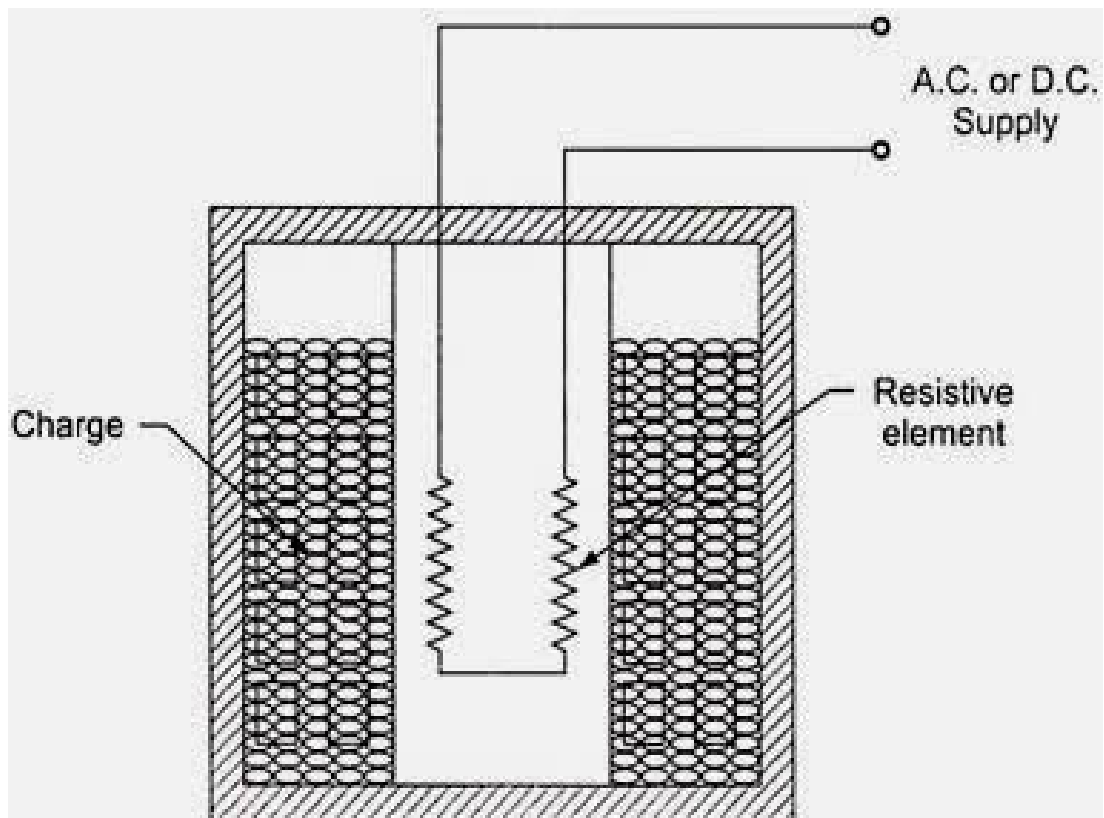


Fig. 3.2 *Indirect Resistance Heating*

References

ater". Britannica.com. The Editors of Encyclopædia Britannica.

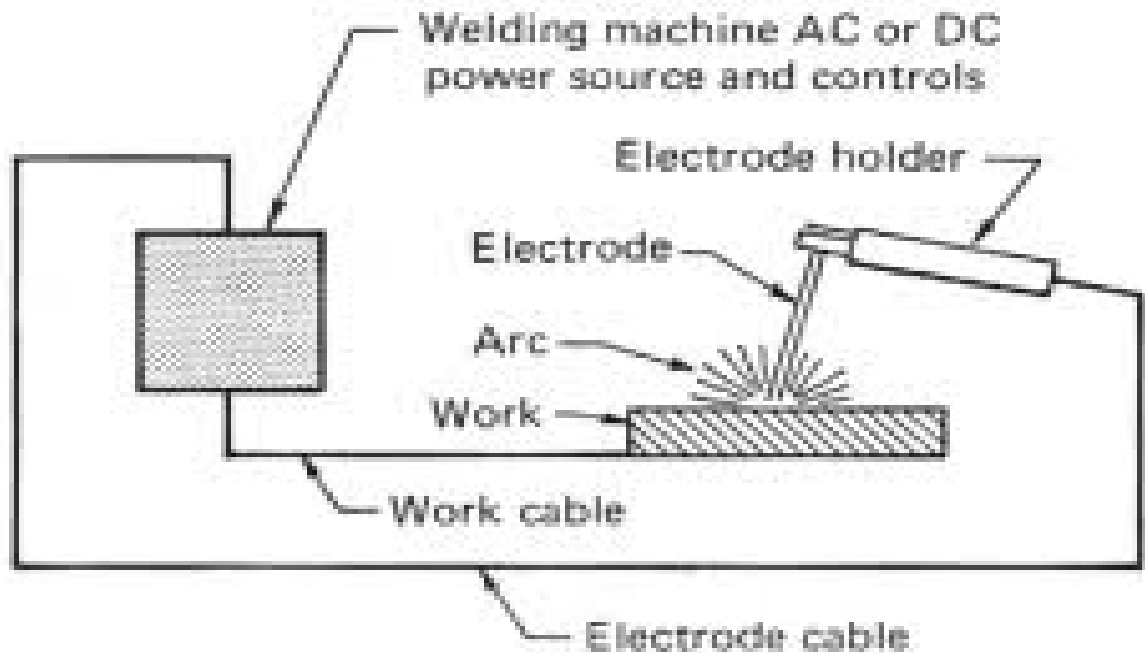
"Energy Efficient Lighting | WBDG Whole Building Design Guide". www.wbdg.org. Retrieved 18 December 2017.

"Comparison of efficiency of air source heat pumps and ground source heat pumps". icax.co.uk. Retrieved 20 December 2013.

"Choosing and Installing Geothermal Heat Pumps - Department of Energy". Energy.gov. Retrieved 16 April 2017.

Electric welding

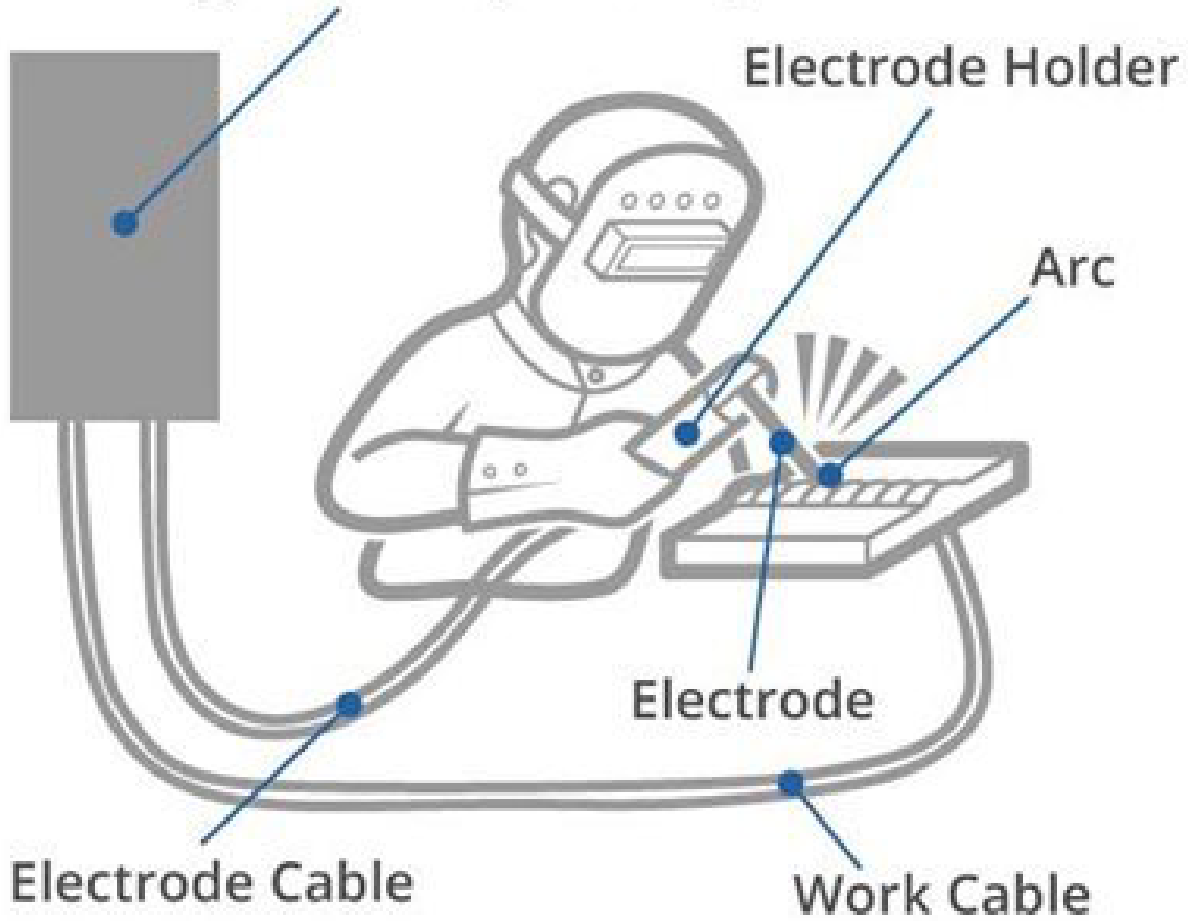
Electric welding is a process which joining two or more than same or different metal pieces are formed together by heating a suitable temp so that they fuse together at the desire place



Electric Arc welding

- Arc welding is a process which is used to joint metal to metal by using electricity to produce enough heat to melt metal or fillers jointing or binding of the metals.
- It is used to repair of the damaged casting , welding of steel plates , manufacturing ofships , pipeline , bridges etc .
- Arc welding can use either dc or ac current and consumable or non consumable electrodes .

Welding Machine (AC or DC)



References

Cary, Howard B; Helzer, Scott C. (2005). Modern Welding Technology. Upper Saddle River, New Jersey: Pearson Education. ISBN 0-13-113029-3.

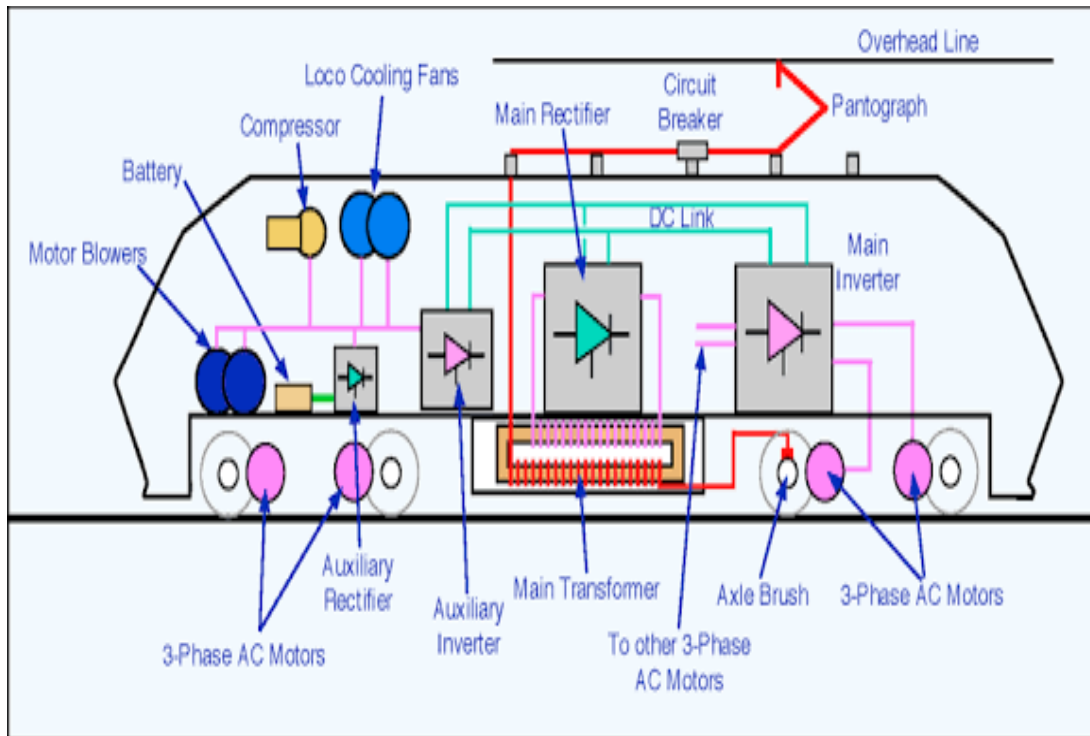
Kalpakjian, Serope; Schmid, Steven R. (2001). Manufacturing Engineering and Technology. Prentice Hall. ISBN 0-201-36131-0.

Lincoln Electric (1994). The Procedure Handbook of Arc Welding. Cleveland: Lincoln Electric. ISBN 99949-25-82-2.

Weman, Klas (2003). Welding processes handbook. New York, NY: CRC Press LLC. ISBN 0-8493-1773-8.

Electric traction

- The system use electrical power for traction system ie for delhi metro , railway, trams etc .it is called a electric traction .
- It can be ac or dc or a composite supply.
- Selecting the type of electrification depend on several factors like easily available or provide to supply type of an application area or on the service like urban and sub urban and main lines.



Merits of electric traction

- Free from smoke and dust
- Easily speed control
- High pick up speed
- Noise free
- It is not too be costly

Comparison b/w Ac & Dc traction system

Ac traction system

- It is preferred for a main line railway service .
- It is required more energy consumption for the same out put.
- The weight of ac locomotive is more and high maintenance cost.
- Capital , maintenance and running cost sub station is less.

- It causes interference in the communication lines .

Dc traction system

- It is suitable for sub urban line railway service e.g local trains , trolley buses and tram cars .
- It is less energy consumption.
- The weight of dc locomotive is less and less maintenance .
- Capital and investment on sub station is more .
- No interference in the communication lines.

References

"Traxx locomotive family meets European needs". Railway Gazette International. 2008-01-07. Retrieved 2011-01-01. Traxx MS (multi-system) for operation on both AC (15 and 25 kV) and DC (1.5 and 3 kV) networks