



# Mini Cooling Tower using Capillary Tube

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**Abstract:**

Cooling tower is a heat rejection device. It is used to dissipate waste heat into the atmosphere. This paper is all about the developing a cooling tower that cools the hot water coming from the condenser. Due to hotness the water is not suitable for experimentation. So the hot water is directly released into the ground without being re-circulated. This necessitates the development of cooling tower to cool the water. For this purpose a tank used where the hot water coming from the condenser gets collected. The hot water is then supplied to the capillary tube for cooling by the use of motor pump. The cooling effect is obtained by allowing the hot water into the capillary tube and comes out in an cold water. After the water is cooled it gets collected in another tank which is kept at the bottom or at the other end of the tube of the cooling tower. The cooled water is re-circulated into the condenser for conducting.

**Keywords:** Component, formatting, style, styling, insert.

**I. INTRODUCTION**

**I.** A cooling tower is a heat rejection device which extracts waste heat to the atmosphere through the cooling of a water stream to a lower temperature. Cooling towers may either use the evaporation of water to remove process heat and cool the working fluid to near the wet-bulb air temperature or, in the case of closed circuit dry cooling towers, rely solely on air to cool the working fluid to near the dry-bulb air temperature. In energy conversion lab there are five different engine in which experiment is conducted. These engine require cold water for conducting the experiment. After successfully completion of experiment hot water comes out from the engine as bi product.

**II.** Since the water coming out from the engines are hot, so this water is not suitable to use in the experiment. So this water is discharged in the ground as a waste behind the lab. To utilize the water again or to overcome from the water problem, a cooling tower is developed. This cooling tower will do the work of reducing the water temperature. The water coming from the different engine will be supplied into the cooling tower and after cooling is done again it is supplied into the main stream. The tower provides a horizontal air flow as the water falls down the tower in the form of small droplets. The fan centered at the top of units draws air through two cells that are paired to a suction chamber partitioned beneath the fan. The outstanding feature of this tower is lower air static pressure loss as there is less resistance to air flow.

**III.** The evaporation and effective cooling of air is greater when the air outside is warmer and dryer than when it is cold and already saturated. Originally, cooling towers were constructed primarily with wood, including the frame, casing, louvers, fill and cold-water basin. Sometimes the cold water basin was made of concrete. Today, manufacturers use a variety of materials to construct cooling towers. Materials are chosen to enhance corrosion resistance, reduce maintenance, and promote reliability and long service life. Galvanized steel, various grades of stainless steel, glass fiber and concrete are widely used in tower construction, as well as aluminium and plastics for some components.

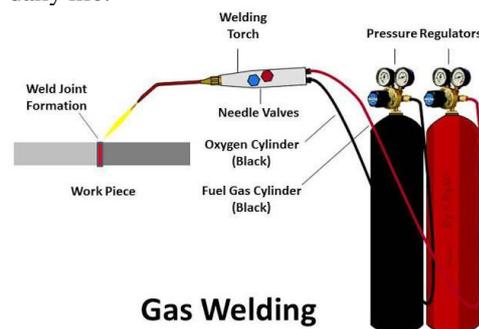
**COMPONENTS USED:**

1. Collecting tank

2. Water pump
3. Temperature measuring indicator
4. Nozzle
5. Capillary tube
6. Bolt and nut
7. Wooden Cardboard

**II. MANUFACTURING PROCESS****1. GAS WELDING**

Gas welding is a most important type of welding process. It is done by burning of fuel gases with the help of oxygen which forms a concentrated flame of high temperature. This flame directly strikes the weld area and melts the weld surface and filler material. The melted part of welding plates diffused in one another and create a weld joint after cooling. This welding method can be used to join most of common metals used in daily life.

**2 DRILLING**

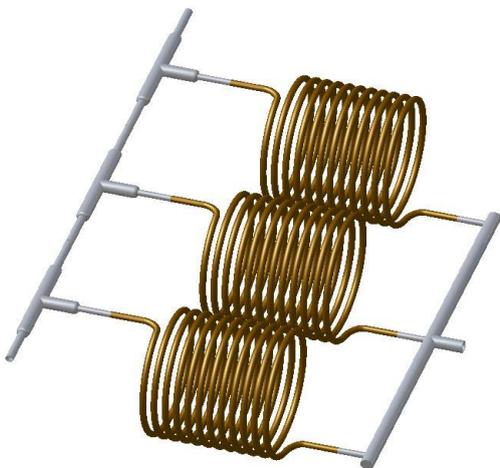
Drilling is a cutting process that uses a drill bit to cut a hole of circular cross-section in solid materials. The drill bit is usually a rotary cutting tool, often multi-point. The bit is pressed against the work-piece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the work-piece, cutting off chips (swarf) from the hole as it is drilled. In rock drilling, the hole is usually not made through a circular cutting motion, though the bit is usually rotated. Instead, the hole is usually made by hammering a drill bit into the hole with quickly repeated short movements. The hammering action can be performed from

outside the hole (top-hammer drill) or within the hole (down-the-hole drill, DTH). Drills used for horizontal drilling are called drifter drills.



### 3 METAL CUTTING

Machining is any of various processes in which a piece of raw material is cut into a desired final shape and size by a controlled material-removal process. The processes that have this common theme, controlled material removal, are today collectively known as subtractive manufacturing, in distinction from processes of controlled material addition, which are known as additive manufacturing. Exactly what the "controlled" part of the definition implies can vary, but it almost always implies the use of machine tools (in addition to just power tools and hand tools).



### DESIGN DIAGRAM

#### 6 WORKING PRINCIPLE

The working principle of mini cooling tower using capillary tube, capillary tube is one the most commonly used throttling devices. It is a copper tube of very long length and it is coiled

to several turns so that it would occupy less space. The hot water from the condenser are collected and allowed to the capillary tube. The capillary tube its pressure drops down suddenly due to very small diameter of the capillary, that it reduces the pressure and temperature. Due to drop of temperature the hot water converted into the cold water. The cold water are collected to the tank and its it recalculated for condenser or any other purpose

#### ADVANTAGES

- Reduces the cost
- Efficiency increases
- Effective cooling of water is possible
- Low construction cost
- Simple in construction
- Operation cost is low
- Easy to operate

#### APPLICATION

- It is used in chilly industry

### III. CONCLUSION

Experiments were conducted on a cooling tower. Performance of the cooling tower was analyzed with capillary tube. The experiments show the effects of the water and air on the tower characteristic, the air to water contact is more in cooling tower, so better heat transfer has been occurred and the cooling water outlet temperature is reduced. The range of cooling tower can be increased by using capillary tube. The increase in inlet temperature of water decreases the effectiveness as same quantity of air is available for cooling for all operating temperatures of cooling tower. As L/D ratio decreases the cooling rate increases. For optimum utilization of capillary tube the flow rate of cooling water should be increased.

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