

- Objective: To study the effect of rise in temperature and clay content on the hardness of clay bounded sand.
- Apparatus required: Dry sand (clay free), bentonite, water, Weighing Machine, Rammer, Specimen Tube, Heating Oven, Universal Sand strength testing machine.
- Theory: The essential difference between dry sand and green sand moulding is that the moisture in the moulding sand is removed prior to pouring the metal. Dry sand moulding is more applicable to medium and large sized castings than to small sized castings. In dry sand practice, the sand moulds are dried to  $\sim 100^{\circ}\text{C}$  or above before being cast. Dry sand strength is the maximum strength of a moulded sand specimen that has been thoroughly dried at  $100^{\circ}\text{C}$  to  $105^{\circ}\text{C}$  and cooled to room temperature. Some of the features of dry sand mould are:
  - a) Dry sand moulds are stronger and more rigid than green sand moulds.
  - b) They can withstand more handling.
  - c) Dry sand moulds can resist more static pressure of molten metal which may cause green sand moulds to deform and swell.
  - d) These moulds may be exposed to the atmosphere without any detrimental effect. Such exposures may be necessary for placing large number of cores.

- e) Shelf life of these moulds is better than green sand moulds.
- f) Castings made from dry sand moulds have generally lesser gas related defects than castings made by green sand practice.
- g) However the cost of castings made by dry sand practice is more compared to castings made by green sand practice.

### ● Experimental Procedure:

- ① 800 gm of dry, clay free sand was weighed.
- ② 32 gm of bentonite was added to it (for 4% clay mixture)
- ③ The clay and sand were mixed for 2 minutes.
- ④ 40 ml (5%) of water was added.
- ⑤ sand, clay and water were mixed for 3 minutes.
- ⑥ 5 standard test specimens were prepared with the sand mixture.
- ⑦ 4 specimens were placed in the oven at  $\sim 150^{\circ}\text{C}$ .
- ⑧ The green compressive strength of 1 specimen was tested in universal sand strength testing machine.
- ⑨ The dry compressive strength of the 4 specimens were tested after heating for
  - a) 5 minutes
  - b) 10 minutes
  - c) 15 minutes
  - d) 20 minutes
- ⑩ The experiment was repeated with 48 gm (6%) and 64 gm (8%) clay mixture.

(11) Strength vs Heating Time were plotted and the results were discussed.

• Observations:

Compressive strength vs Heating Time for different mixtures

% CLAY MIXTURE	COMPRESSIVE STRENGTH				
	GREEN	5 min.	10 min.	15 min.	20 min.
4%	0.15 kg/cm <sup>2</sup>	0.38 kg/cm <sup>2</sup>	0.69 kg/cm <sup>2</sup>	0.99 kg/cm <sup>2</sup>	1.53 kg/cm <sup>2</sup>
6%	0.23 kg/cm <sup>2</sup>	0.84 kg/cm <sup>2</sup>	1.14 kg/cm <sup>2</sup>	1.37 kg/cm <sup>2</sup>	1.99 kg/cm <sup>2</sup>
8%	0.30 kg/cm <sup>2</sup>	0.92 kg/cm <sup>2</sup>	1.22 kg/cm <sup>2</sup>	1.76 kg/cm <sup>2</sup>	2.10 kg/cm <sup>2</sup>

• discussions :-

- 1) As the time of heating increases for specimens, their compressive strength increases. This can be easily seen from the readings and graphs.
- 2) Also, as the percentage clay in the given mixture increases, compressive strength of the specimen increases. Above readings show these things in detail.
- 3) If we compare the compressive strength of dry sand and green sand, dry sand has higher compressive strength.

Compressive strength vs Time of Heating for different clay mixture

