Fresh Concrete: Batching, Mixing, Transportation, Placing

Lecture No. 07
Process of Manufacture of Concrete

- It is interesting to note that the ingredients of good concrete and bad concrete are the same.

- If meticulous care is not exercised, and good rules are not observed, the resultant concrete is going to be of bad quality.

- With the same material if intense care is taken to exercise control at every stage, it will result in good concrete.

- The various stages of manufacture of concrete are: (a) Batching (b) Mixing (c) Transporting (d) Placing (e) Compacting (f) Curing (g) Finishing.
**Batching:**

1. **Volume Batching:**
   - Volume batching is not a good method for proportioning the material because of the difficulty it offers to measure granular material in terms of volume.
   - Volume of moist sand in a loose condition weighs much less than the same volume of dry compacted sand.
   - The effect of bulking should be considered for moist fine aggregate.
   - For unimportant concrete or for any small job, concrete may be batched by volume.
Batching : Volume Batching

1. Volume batching:
**Table 6.3. Volume of Various gauge boxes**

<table>
<thead>
<tr>
<th>Item</th>
<th>Width cm</th>
<th>Height cm</th>
<th>Depth cm</th>
<th>Volume litres</th>
<th>Quantity number</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>33.3</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>33.3</td>
<td>30</td>
<td>25</td>
<td>25</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>33.3</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>D</td>
<td>33.3</td>
<td>30</td>
<td>35</td>
<td>35</td>
<td>2</td>
</tr>
</tbody>
</table>

**Table 6.4 Batch volume of materials for various mixes**

<table>
<thead>
<tr>
<th>Cement kg.</th>
<th>Sand, litres</th>
<th>Coarse aggregate, litres</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 : 1 : 2 (M 200)</td>
<td>50</td>
<td>35</td>
</tr>
<tr>
<td>1 : 1 1/2 : 3 (M 200)</td>
<td>50</td>
<td>52.5</td>
</tr>
<tr>
<td>1 : 2 : 3</td>
<td>50</td>
<td>70</td>
</tr>
<tr>
<td>1 : 2 : 4 (M 150)</td>
<td>50</td>
<td>70</td>
</tr>
<tr>
<td>1 : 2 1/2 : 5</td>
<td>50</td>
<td>87.5</td>
</tr>
<tr>
<td>1 : 3 : 6 (M 100)</td>
<td>50</td>
<td>105</td>
</tr>
</tbody>
</table>
Batching:

1. Weigh Batching:

   - Weigh batching is the correct method of measuring the materials.
   - Use of weight system in batching, facilitates accuracy, flexibility and simplicity.
   - Large weigh batching plants have automatic weighing equipment.
   - On large work sites, the weigh bucket type of weighing equipment's are used.
Batching : Weigh Batching
Batching : Weigh Batching
Mixing

- Thorough mixing of the materials is essential for the production of uniform concrete.
- The mixing should ensure that the mass becomes homogeneous, uniform in colour and consistency.
- There are two methods adopted for mixing concrete: (i) Hand mixing (ii) Machine mixing
Mixing: Hand mixing

- Hand mixing is practised for small scale unimportant concrete works.

- As the mixing cannot be thorough and efficient, it is desirable to add 10 per cent more cement to cater for the inferior concrete produced by this method.

- Hand mixing should be done over an impervious concrete or brick floor of sufficiently large size to take one bag of cement.

- Spread out the measured quantity of coarse aggregate and fine aggregate in alternate layers.
Mixing: Hand mixing

- Pour the cement on the top of it, and mix them dry by shovel, turning the mixture over and over again until uniformity of colour is achieved.

- Water is taken in a water-can fitted with a rose-head and sprinkled over the mixture and simultaneously turned over.

- This operation is continued till such time a good uniform, homogeneous concrete is obtained.
Mixing: Hand mixing
Mixing: Machine Mixing

- Mixing of concrete is almost invariably carried out by machine, for reinforced concrete work and for medium or large scale mass concrete work.

- Machine mixing is not only efficient, but also economical, when the quantity of concrete to be produced is large.

- They can be classified as batch-mixers and continuous mixers.

- Batch mixers produce concrete, batch by batch with time interval, whereas continuous mixers produce concrete continuously without stoppage till such time the plant is working.
In normal concrete work, it is the batch mixers that are used. Batch mixer may be of pan type or drum type.

The drum type may be further classified as tilting, non-tilting, reversing or forced action type.

As per I.S. 1791–1985, concrete mixers are designated by a number representing its nominal mixed batch capacity in litres. The following are the standardized sizes of three types:

- a. Tilting: 85 T, 100 T, 140 T, 200 T
- b. Non-Tilting: 200 NT, 280 NT, 375 NT, 500 NT, 1000 NT
Mixing: Machine Mixing
Mixing: Machine Mixing
Mixing: Machine Mixing
Mixing: Machine Mixing