Concrete Batching

Batching of concrete means measuring different ingredients of **concrete** (i.e. **cement**, sand, coarse aggregate and water) before mixing it. When this measurement is done on the basis of volume, we call it **Volume Batching**.

Weigh batching of concrete is the correct and preferred method of measuring **concrete** ingredients which leads to more uniform proportioning. **Weigh batching** is done in a very modern **batching** plants or mixing plants.

Concrete Batching

Volume Batching

Measurement Box (Farma)

Weigh batching

Concrete Batching

Batch mixer

The usual type of mixer is a batch mixer, which means that one batch of concrete is mixed and discharged before any more materials are put into the mixer. There are four types of batch mixer.

Tilting drum mixer:

A tilting drum mixer is one whose drum in which mixing take place is tilted for discharging. The drum is conical or bowl shaped with internal vanes, and the discharge is rapid and unsegregated so that these mixers are suitable for mixes of low workability and for those containing large size aggregate.

Non tilting drum mixer:

A non tilting drum is one in which the axis of the mixer is always horizontal, and discharge take place by inserting a chute into the drum or by reversing the direction or rotation of drum. Because of slow rate of discharge, some segregation may occur.

Pan type mixer:

A pan type mixer is a forced–action mixer, as distinct from drum mixer which relies on the free fall of the concrete inside the drum. The pan mixer consist of a circular pan rotating about its axis with one or two stars paddles rotating about vertical axis of pan.

Dual drum mixer:

A dual drum is sometimes used in highway construction. Here there are two drums in series, concrete being mixed part of the time in one and then transferred to the other for the remainder of the mixing time before discharging.

Concrete Batching

Continuous mixers:
These are fed automatically by a continuous weigh-batching system.

Charging the mixer:
There are no general rules on the order of feeding the ingredients into the mixer as this depend on the properties of the mixer and mix. Usually a small quantity of water is fed first, followed by all the solids materials. If possible greater part of the water should also be fed during the same time, the remainder being added after the solids. However, when using very dry mixes in drum mixers it is necessary to feed the coarse aggregate just after the small initial water feed in order to ensure that the aggregate surface is sufficiently wetted.

Concrete Placing and Compaction

The operation of placing and compaction are interdependent and are carried out simultaneously. They are most important for the purpose of ensuring the requirements of strength, impermeability and durability of hardened concrete in the actual structure. As for as placing is concerned, the main objective is to deposit the concrete as close as possible to its final position so that segregation is avoided and the concrete can be fully compacted. The aim of good concrete placing can be stated quite simply.

It is to get the concrete into position at a speed, and in a condition, that allow it to be compacted properly.

•To achieve proper placing following rules should be kept in mind:

•The concrete should be placed in uniform layers, not in large heaps or sloping layers.

•The thickness of the layer should be compatible with the method of vibration so that entrapped air can be removed from the bottom of each layer.

Concrete Placing and Compaction

•The rate of placing and of compaction should be equal. If you proceed too slowly, the mix could stiffen so that it is no longer sufficiently workable. On no account should water ever be added to concrete that is setting. On the other hand, if you go too quickly, you might race ahead of the compacting gang, making it impossible for them to do their job properly.

•Each layer should be fully compacted before placing the next one, and each subsequent layer should be placed whilst the underlying layer is still plastic so that monolithic construction is achieved

•Collision between concrete and formwork or reinforcement should be avoided.
•For deep sections, a long down pipe ensures accuracy of location of concrete and minimum segregation.

•You must be able to see that the placing is proceeding correctly, so lighting should be available for large, deep sections, and thin walls and columns.

Concrete Placing and Compaction

Why is compaction of concrete necessary?

- It is important to compact the concrete fully because:
- Air voids reduce the strength of the concrete. For every 1% of entrapped air, the strength falls by somewhere between 5 and 7%. This means that concrete containing a mere 5% air voids due to incomplete compaction can lose as much as one third of its strength.
- Air voids increase concrete's permeability. That in turn reduces its durability. If the concrete is not dense and impermeable, it will not be watertight. It will be less able to withstand aggressive iquids and its exposed surfaces will weather badly.
- Moisture and air are more likely to penetrate to the reinforcement causing it to rust.
- Air voids impair contact between the mix and reinforcement (and, indeed, any other embedded metals). The required bond will not be achieved and the reinforced member will not be as strong as it should be.
- Air voids produce blemishes on struck surfaces. For instance, blowholes and honeycombing might occur.

Concrete Placing and Compaction

- Summing up, fully compacted concrete is dense, strong and durable; badly compacted concrete will be porous, weak and prone to rapid deterioration. Sooner or later it will have to be repaired or replaced. It pays, therefore, to do the job properly in the first place.

- Stiff mixes contain far more air than workable ones. That is one of the reasons why a low-slump concrete requires more compactive effort than one with a higher slump - the compaction needs to continue for a longer time, or more equipment has to be used.

- Even air-entrained concrete needs to be compacted to get rid of entrapped air voids. The difference between air voids and entrained air bubbles should be noted at this stage. The air bubbles that are entrained are relatively small and spherical in shape, increase the workability of the mix, reduce bleeding, and increase frost resistance. Entrapped air on the other hand tends to be irregular in shape and is detrimental to the strength of the mix. It is to remove this air that the concrete must be properly compacted. There is little danger that compaction will remove the minute air bubbles that have been deliberately entrained, since they are so stable.