Re-Vibration of concrete

Re-vibration of concrete were done after putting the concrete, but before hardening. It has been found that the best time to re-vibrate the concrete after (1-2) hours from putting the concrete in the molds. The advantages of this process are:

1. Decrease the cracks resulted from differential settlement caused by present of aggregate and reinforcement that prevent settlement process.
2. Decrease the effect of plastic shrinkage.
3. Decrease the effect of bleeding.
4. Make better bond between the concrete and steel reinforcement.
5. Increase the concrete strength.

Ready mixed concrete:

Concrete is made ready in the central factory then transported to the work site. Ready-mixed concrete is particularly useful on:

1- Congested sites or in road construction where there isn't enough space for mixing.

2- ready-mixed concrete used when only small quantities of concrete are required or when concrete is placed only at intervals.

Benefits of Ready mixed concrete:

1- It is made under better conditions of control.
2- Reduce the responsibility of the supervisors on the site.
3- Although the high cost of ready mixed concrete but it will be high quality control.

Hot Weather Concrete:

There are some special problems involved in concreting in hot weather:

1- effect of temperature rise on fresh concrete

a- Increasing amount of water required for suitable workability

b-Increasing loss in workability due to rise in temp

c- Increasing plastic shrinkage due to increasing evaporation rate

d-Difficulty in controlling air entraining agents specially in dams and roads works.

e- Increasing setting which cause difficulty in transporting, handling and finishing of concrete.

2- Effect on hardened concrete

1.Decreasing strength of hardened concrete after 7 days as the early strength became high and the final is low because of:

a- Rising in temperature during pouring and setting of concrete increases early strength but, it affects inversely on strength after 7 days. This is due to increasing initial hydration which lead to formation of hydration products with weak physical structure and high porosity (gel/space ratio is low) therefore, the final strength is low.

b- Reducing the time required to arrange the distribution of hydration products inside capillary porous, hence they will be in some places more than others and (gel/ space ratio) will be reduced and cause decreasing final strength.

2. High temperature causes reducing concrete durability.

3. High temperature causes reducing bond between concrete and reinforcement.

4. As the setting and hardening happened quickly, there will be no time for good finishing of concrete surface.

5. Increasing creep of concrete.

6. Increasing permeability which leads to corrosion of reinforcement.

Prevention of hot weathering concreting:

1- Reduce the cement content in the mixture to reduce the heat of hydration or use low heat cement or use additives like blast furnace slag or pozollana.

2- cooling the concrete contents by:

a. using ice with mixing water (it's necessary to be sure of melting all the ice before starting mixing).
b. Cooling aggregate particles by cold water.

It can calculate the concrete temperature after mixing by using the following relation:

$$T = \frac{0.22(\mathrm{TaWa} + \mathrm{TcWc}) + \mathrm{TwWw}}{0.22(\mathrm{Wa} + \mathrm{Wc}) + \mathrm{Ww}}$$

Where:

Wa, Wc, Ww: The weight of aggregate, cement, and water in the mix. Ta, Tc, Tw: The temperature of the components of mix aggregate, cement, and water respecively.

T: Temperature of the freshly mixed concrete (°C, °F).

• It is necessary to pay attention to some observations during the steps of making concrete in hot weather:

1- It is preferable that the temperature of the used cement does not exceed 75 ° C, because if the hot cement is moistened with a small amount of water before mixing it with the solid components of the concrete, it may freeze quickly and clumps in the form of cement balls.

2- After pouring concrete, it must be protected from the sun, otherwise cracks may occur when the weather is cold at night due to the temperature difference.

3- Do not allow water to evaporate when curing concrete in hot weather to avoid cracks.