



Quantum Readymix Concrete

WELCOME

Welcome to this, the first of 12 technical information pamphlets we will be producing at 3-4 monthly intervals as a service to inform contractors about those aspects of concrete we give little thought to until we encounter a problem.

These pamphlet or TIPS as we will be calling them are intended to give contractors useful concise practical tips on concrete and its correct use. Aspects we will address will be placing, curing, vibration, and even abuse. Concrete is truly an exceptional product mainly due to one thing and that is its ability to continue gaining strength indefinitely. Tests have been done on concrete as old as 100 years and the product continues to gain strength indefinitely. This allows it to withstand the continued increased stresses that concrete is exposed to over its working life. As an example think of how well the concrete pavement on the M1 has stood up to the increased traffic loads it has been exposed to in a few short years.

Another interesting comment from a technical article endorsed by The Concrete Institute states:

- An increase of 25mm of any floor slab will double the life/workload of the slab.

We intend to source gems like these and discuss their merits via these TIPS. It is hoped that they will help you produce a better finished concrete product be it building, civil, or precast.

The first one herewith attached will discuss the effect of air on the strength of concrete.

As little as 5% air can reduce strength of concrete by as much as 20-30% under adverse circumstances and we certainly do not pay enough attention to the vibration of concrete at the best of times, do we?

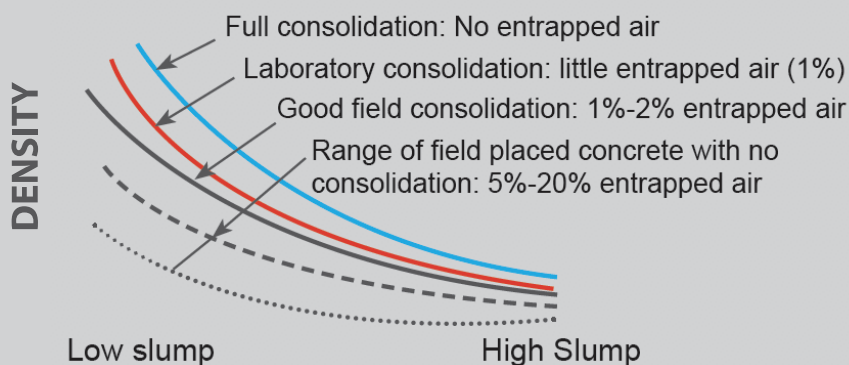


FIGURE 1

Degree of consolidation can have as much effect on compressive strength as water-cement ration.

Thereafter the next three articles (TIPS) we produce will discuss the issues of;

- A quick easy way to determine quantities supplied by your RMC supplier.
- The effect of non-curing on the strength of concrete under typical Highveld conditions.
- The effect of cold weather on concrete with special reference to extenders.

THE EFFECT OF AIR IN CONCRETE

As stated 5% air can reduce the strength of concrete by as much as 20% or more.

Some 10% of concrete is made up of water and air and they in no way directly contribute to the physical strength of concrete. Whilst the water is certainly important to have the cement hydrate, it together with the air is a source of voids which, if excessive will have a detrimental effect on concrete durability and shrinkage.

Low slump concrete will entrap as much as 20% air and whilst high slump concrete will entrap far less, this is done at the expense of a far wetter mix and other associated disadvantages namely increased evaporation and shrinkage.

Heavy reinforcement will also tend to entrap more air as the concrete speed and self-compacting ability by shear weight is slowed down by reinforcement.

All too often one sees too little of the use of vibrators (never mind the correct use.) When watching a poker vibrator expel air on site take note of the air bubbles that you see rising to the surface. All are a source of a poorer (porous) class of concrete being eliminated from the mix so to speak.

Unvibrated concrete floors will be far more susceptible to abrasion than a vibrated floor, particularly in heavy trafficked areas or where solid pneumatic tyres are used on a fork lift for instance. A single poker having a diameter of 50mm will have a radius of action of some 200mm allowing it to work about 5 cubic metres of concrete per hour.

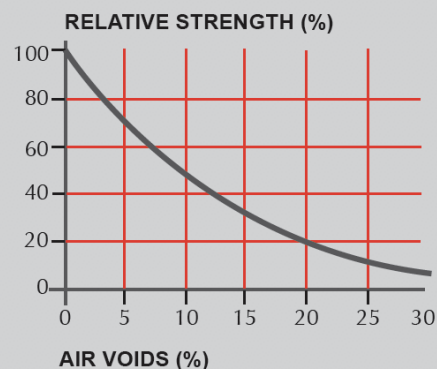


FIGURE 2

Loss of strength through incomplete compaction. Concrete may contain up to 20% entrapped air when placed.

DENSITY VS STRENGTH

Figure 3 depicts a summary of test results from Quantum's laboratory. It plots cube strength against crushing strength and clearly there is a direct correlation between the two. It must also be emphasized that the most variable component would be vibration and this variability would be so much more pronounced on site where controls are much poorer.

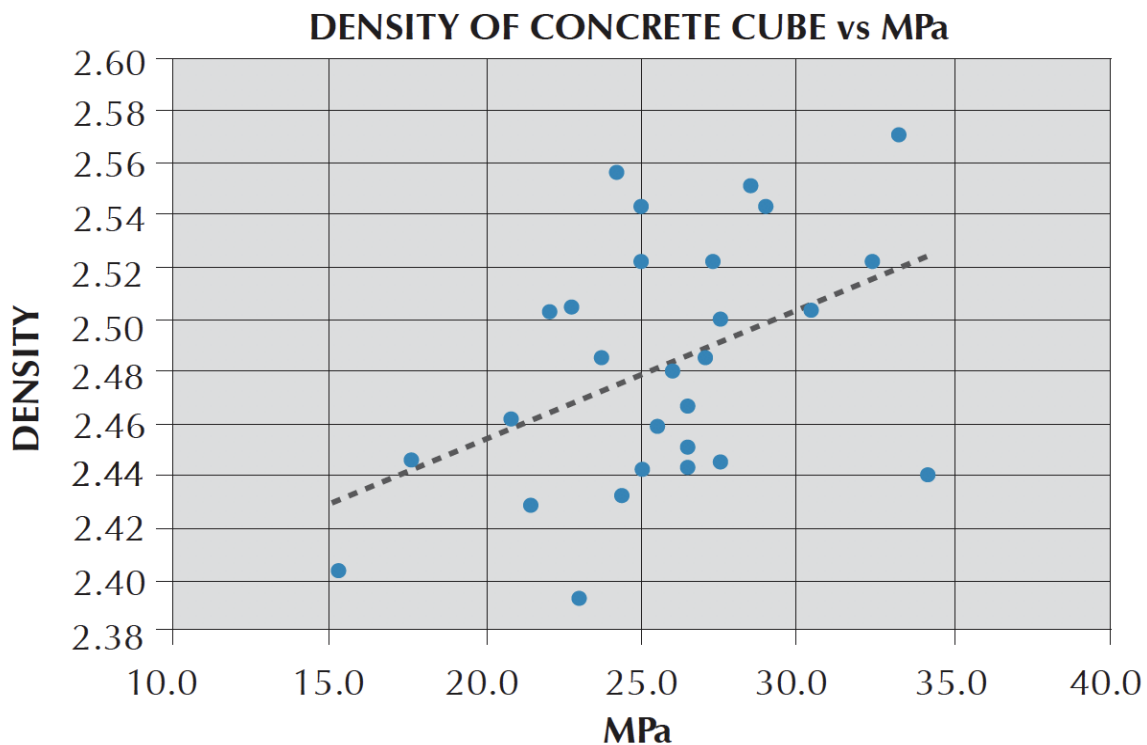


Figure 3 Density vs strength

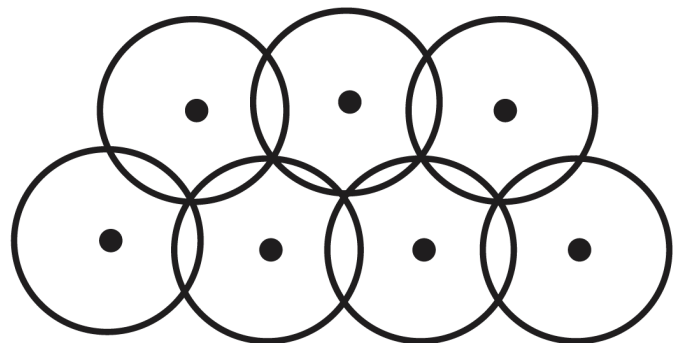
REVIBRATION

Under hot dry conditions when plastic shrinkage cracks become visible the revibration of the plastic concrete will have a beneficial effect on both strength as well as the elimination of the plastic shrinkage cracks. This if done normally within 1 to 2 hours of the concrete being placed.

The following are good principals to apply when vibrating concrete:

- Vibration should be systematically carried out. The diameter of the poker vibrator will determine the intervals between successive poker immersions (see sketch on the right).
- Always keep the poker vertically immersed for best results.
- Remove the poker head slowly as to ensure the closing up of the poker void.
- Do not allow the poker to touch the forms a maximum distance to the form would be about 100 mm depending on the size of the poker head.

- The poker should be fully immersed for its whole length. This will also increase the life of the equipment.
- Neither too long nor too short a duration. Keep the poker immersed until all bubbles are expelled, longer than this and segregation will occur within the concrete.



Always ensure that the vibrated areas overlapped

