Concrete and reinforcing

These notes are based on the seminar on Concrete and reinforcing led by Tom Cutting and Andy Richardson at the WRG Training Weekend. They are not comprehensive but are designed as an update to the "Concrete" chapter in the Practical Restoration Handbook (available on www.wrg.org.uk)

One point made was that on any "professional site" the shuttering would be prepared, reinforcing installed, etc. and then inspected by an independent engineer before pouring. Generally speaking we don't have this luxury, indeed the chap that did the design is often not even there. **So it is doubly important we understand the principles of both concrete and reinforcing so as to avoid the habit of saying "that can't be right, lets move that steel into the middle a bit" or "surely it will be easier to shovel if we add more water".**

Concrete can be divided into two types - mass concrete and reinforced concrete (RC). Mass concrete is just that - large quantities of concrete placed behind walls or similar to remove voids and to remove any uncertainty of what is behind there.

Reinforced concrete however is much more of a designer's job. It will involve lots of calculations and be very specific. We shouldn't play with this once the designers have done their work. Both the concrete mix and the steel design will be intentional.

So what is the purpose of putting the steel into the concrete? Well it's not just "it will be stronger", it is to combat a specific weakness. Concrete is very strong in compression as anybody who has tried to crush a concrete block will know. But it is really rather poor in tension.

"So what?" you may say, "whoever tries to stretch a concrete block?". Well the answer is quite a lot of structures we build ***do*** have concrete in tension at some times.

Consider a simple concrete wharf wall – it is 6 inches thick and has soil behind it and water in front of it. Soil pushes forward, water pushes back - all is fine. But then take away the water and you now just have the soil pushing forward. The front three inches of the concrete are being compressed (which is fine) but the back three inches are being stretched (which is not). So where we put the reinforcing is critical. It needs to be as close to the back as possible (allowing for minimum cover of the concrete). If we put it towards the front of the wall, or even in the centre of the pour then it does no good at all.

Concreting

MKP tells you where you can stick your reinforcing

So that is why it is essential to put the steel where the designer tells you.

Some other points regarding reinforcing:

- Reinforcing steel should be rusty but not so rusty that flakes are falling off it.
- The British Standard for reinforcing steelwork is BS8666- however it was suggested that of the 140 pages you will only ever need to read the section on shape codes, which tells you how the designers describe each various bend and twist of the steel.
- When overlapping steel bar to tie it together, if no other specification is given, then a good rule of thumb is 40 times the diameter of the bar.
- Also when tying it together make sure that you bend back the twists of wire (or cut offs of tyraps or whatever you are using), so as to ensure they do not stick out of the surface of the concrete thus allowing water to creep into the structure.
- These days there are a number of systems to ensure that you can place the steel in exactly the right place in the concrete pour – it makes sense to use them – they will result in a better job.

The age-old discussion of hand-mix versus ready-mix has had a change of late: these days more effective methods such as concrete pumps and conveyor lorries have become much more cost effective as they are becoming more and more mainstream.

If you are placing more than three loads of ready mix then you should investigate these possibilities.

Coming in the next *Navvies* – what exactly do all those code numbers mean when engineers talk about reinforcing mesh?

Bet you can't wait!

Mike Palmer