

MEASURE TWICE – CUT ONCE

It may sound rather obvious, but it really pays dividends to make sure that your measurements are correct, as the following tale will relate.

Sometimes an incorrect measurement may just be frustrating or time-consuming, but frequently it can result in a truly monumentally expensive cock-up (just ask NASA about the difficulty of working with fully metricated Europeans when all your US colleagues are using Imperial measure! Even their gallon is one sandwich short of a picnic). My second full time job after leaving university was as a research engineer. It was in the late sixties, when economic times were still fairly hard. I worked in a large division of one of the global electrical/electronics companies. I suppose there were some 150 engineers – and I do mean engineers, not technicians – working in my division. So you would expect them to be more than usually careful about making and recording measurements. The deputy divisional head, whom we will call Bob for reasons of anonymity, a very competent and senior engineer, had planned to build a new garage. In view of the economic strictures he had decided to undertake as much as possible of the preparatory work himself. You need to know a bit about foundations at this point. Depending upon the type of subsoil it may be necessary to make a fairly substantial excavation in preparation for the building proper. Conventionally one excavates a “footings” trench upon which the foundation walls will be built; then a 30 or 40 cm thick layer of concrete footings, and finally the foundation walls. The centrally enclosed area is dug out and backfilled with well-consolidated hardcore to avoid buying too much concrete. Finally all is ready to lay a solid concrete floor on top of the rammed hardcore. Now Bob had undertaken all the work up to this point, so it was time to fill the central area with concrete. Concrete mixing is back breaking work, which can be alleviated to some extent by hiring a concrete mixer. But there was another way – Readymix. You just needed to order the right amount and get it delivered directly to site at an agreed time. OK, it's a little more expensive, but think of your back and all the time that can be saved. So ran Bob's thoughts. He carefully measured the dimensions of his would-be garage floor and calculated how much depth of concrete he would need. Thus armed he was able to place an order. But hang on: it would be disastrous if he under-ordered, so he allowed a sensible 10% margin. There are three other things to note at this point. Firstly, you need to ensure that the concrete can be physically delivered to exactly the point you need it. Secondly you need an army of volunteers to spread it and ensure that it is flat and level and has filled all the voids in the underlying

hardcore. Finally you need to remember that concrete starts to harden and is workable only for an hour or so. Bob had arranged for the concrete to be slurped into a heap as close as possible to his new garage, so he already needed his volunteers to barrow it to the garage site proper. He had indeed organised an army of volunteers from his department. But remember the third point: concrete goes off quickly. The Readymix vendors are able to add so-called retarders or accelerators to concrete so that when it arrives on site you have just about enough time to do the job, and you can be sure that they will deliver on time because the driver isn't going to get many brownie points for turning up with his extra large concrete mixer filled with near solid concrete!.

It was a sunny Saturday morning and all seemed set fair for the job. The Readymix had been ordered and the load of concrete was delivered on time as promised. The army of volunteers had arrived with shovels at the ready, and Bob had briefed everyone for their various tasks. All was going as planned and the team worked quickly under Bob's competent direction. But Bob seemed to be worrying about something, as well he might. The job was nearly completed; the concrete had filled all the voids and was flat and level; the sun was rising in the sky and the team was looking forward to a well-earned beer or two. But the mountain of concrete had not diminished quite as much or as far as expected. Indeed it seemed almost as large as when delivered. Remember now my dire warning about concrete going off! Naturally Bob had expected to have some left over, and as a precaution he had placed a polythene sheet on the road to accommodate the left overs. Some left over! Bob suddenly exclaimed "Oh, my God, there are 27 cubic feet in a cubic yard, not 9!". He had inadvertently ordered just three times what he needed, and allowing for the fact that he had also legislated for an additional ten percent, there was even more than that. Faced with a rapidly setting pile of concrete in the road, and aware that it was threatening to turn into a rock within an hour or so he needed to employ his management skills – fast. First step. All workers were despatched up and down the road to see if by any remote chance any neighbours needed a yard or two of rapidly setting concrete for the odd building job. No luck of course. Second step. Planks of wood destined to be part of the garage construction had to be sacrificed and were furiously cut into short lengths and nailed together to fabricate open topped cubes – many of them. The concrete was shovelled into the cubes and left to set. You can imagine the scene. Row upon row of foot cube boxes (remember – there are 27 of them in a cubic yard, Bob – not 9. And even a cubic foot of concrete is extremely heavy to manipulate).

To this day I am told that there is an interesting rockery at the bottom of Bob's garden

and that it bears more than a passing resemblance to a set of tank traps designed to impede Hitler's progress across the South East. So if some right wing white Anglo Saxon supremacist ever thinks about rolling an armoured column through Reigate he would be well advised to avoid rolling through Bob's back garden.

Once more, there are several lessons to be learnt from this little anecdote:

- ❖ Measure twice – only then order the materials
- ❖ Brief your workers thoroughly
- ❖ Prepare for the unexpected
- ❖ Ensure that you have ordered enough beer
- ❖ Make sure that you will be able to face your subordinate engineers next week!

Footnote:

All this happened fifty years ago. Since then an enterprising individual came up with the idea of Mixamate. The concrete delivery truck turns up with sand, aggregate, cement and water in different compartments – unmixed. On the back of his truck is an enormous concrete mixer. So you now have the advantage of ready mixed concrete delivered exactly when and where you want it and in the right proportions. No waste - no problems!

John Wells