

Concrete Construction Design - Reducing Health Risks

The Problem / Challenge

On a landmark concrete frame building, traditional construction methods called for the construction joints to be prepared to expose the coarse aggregate. This would ensure that the shear resistance and water tightness of the joint was as close as possible to that of unjointed concrete. The design team were concerned to address the health hazards associated with the various methods of joint preparation:

- **Scabbling** – the use of a hand-held power tool to roughen the joint surface. This can be hazardous to carry out due to HAVS, noise, dust and can damage sound concrete behind the joint.
- **Water jetting** – the use of a pressurised jet to remove the surface of the joint. This can be messy to undertake and there is a danger of excessively eroding green concrete, or alternatively that it can be difficult to prepare the joint adequately on older concrete.
- **Brushing/washing** – the concrete is brushed while still green, and washed to expose the aggregate. Timing is critical.
- **Retarder/washing** – a retarder is applied to the joint surface (horizontal) or the stop end (vertical) to prevent setting of the concrete surface, which is subsequently washed off. There is a risk of getting retarder on surfaces where it is not wanted.
- **Expanded metal** – vertical stop ends are formed with expanded metal, which provides a key for the next pour. It can be difficult to ensure that loss of fines through the expanded metal does not cause voids in the concrete behind it.



Concrete wall joint after retarder was used and the joint then jet washed

The Risks

Irrespective of the method used, health risks existed, including Hand Arm Vibration Syndrome. If unnecessary joint preparation work could be omitted, then exposure would be reduced.

The Solution

The consulting engineers were asked to identify whether there were construction joints for which the need to expose the coarse aggregate could be omitted. Engineering judgement was applied and it was agreed that aggregate exposure was only needed in the basement slab, four key walls, all beams and one area of superstructure slab propping the retaining walls around service risers (ie. where it was required for sheer transfer). This was communicated to the contractor with the drawings.

The Benefits

- There was a considerable reduction in the number of joints requiring preparation.
- The exposure of operatives to serious health risks was reduced significantly.

Key points

As this was a design and build project, there was good co-operation and communication between the design team and the contractor, concentrating on buildability. This enabled the team to maintain a focus on health as well as safety hazards.

ORIGINATOR – ARUP EDITED – HSE – *For more information please post on the forum.*