Level playing field

Kevin Dare, managing director, FACE Consultants Ltd and a member of the Concrete Society working group on floor regularity, looks at the new flatness standards for concrete floors.

Floor flatness has a significant impact on efficiency and safety when materials are handled by fork lift trucks. Although the Concrete Society Technical Report TR34 published in 1988 was a pioneering step and indeed contains the principal standards used to determine floor flatness in warehouses, construction methods and operators' demands have left it behind in some important respects.

Back in the 1980s, when the original survey investigation work was carried out as the basis for the new floor flatness standards, most floors – particularly those for narrow aisle operations – were constructed using the long strip method. This method of construction virtually always produced very good longitudinal characteristics, in respect of both short wave length and long wave length.

Occasionally a floor would fail in the transverse direction, but only marginally.

Presumably, because the original working party found so few problems with longitudinal flatness, the original standard covered this aspect in a fairly cursory fashion. The weakness of TR34 in this respect has been highlighted by the replacement of the traditional long strip method of construction with laser screeding, followed by grinding to achieve a reasonably flat finished surface.

However, as the standard only applied to the transverse measurement and the short wave-length characteristics of the outer two wheel tracks, warehouse operators and truck manufacturers often found the trucks could not be operated as specified, particularly as they were increasingly expected to lift higher and travel faster. In addition, with many VNA trucks now incorporating sophisticated computer systems and even being guided down the aisle by low frequency cables in the floor, the standards of floor flatness actually achieved has become increasingly important.

It was against this background that the Concrete Society set up a special working group in 2001 to consider the issue of floor flatness in defined movement areas such as warehouse aisles. The outcome of this working group's deliberations are new standards which include for the first time measurement of the positions of all wheels and a long wave-length control.

Appendix C of the third edition of TR34 includes maximum values for differences in levels laterally and longitudinally for all wheel tracks within defined movement areas and also stipulates the rates at which levels change. Values are specified for three fork truck lift heights – up to 8m, 8-13m, and over 13m.

A face consultant operative using a profileograph to measure floor flatness

The new specification is based on a similar set of standards that has been in use in the USA since the late 1970s and has been introduced as the basis for a possible future European CEN standard.

TR34 edition 3 also proposes a new method for surveying defined movement areas, using a profileograph that simulates the dimensions of the trucks to be used. The profileograph produces a continuous profile of the floor surface in relation to the specification as it travels along the wheel paths of the lift truck, effectively recording the regularity of the floor as a truck would experience it.

The latest TR34 edition closes a significant loophole in the standards relating to floor flatness. Warehouse owners and operators should now be able to get the standard of flatness they require for safe, efficient operation of lift trucks without any ambiguity.

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The specialist joint repair division of Concrete Grinding (UK) Ltd has successfully repaired the two main 24m transverse construction joints in a 2,000 sq.m concrete floor slab in a single weekend and at a much lower cost than alternative methods.

Uneven joints between the three sections of the floor slab in the warehouse at Milton Keynes run by furniture fittings distributor Blum UK Ltd were causing the wire-guided man-up trucks to frequently malfunction. CG (UK) confirmed that localised sub-base compression relating to the failure of the load transfer system between the slabs was the fundamental cause of the uneven joints. Originally Blum UK had considered carrying out major structural repairs to the slabs, which would have taken at least six week-ends and been very disruptive and expensive. CG (UK)'s solution was to stabilise the joint edges by pumping a high-strength resin foam into the void beneath them, cutting back the joint arrises to a depth of 50mm and then re-building the joints with a high-performance epoxy mortar. Finally, the joints were re-cut in the same position as before, filled with a semi-rigid compound, ground to ensure a completely even surface and sealed.

The whole contract was successfully completed in one weekend, which was much quicker, cheaper and less disruptive than the alternative procedure being considered, according to Blum's warehouse manager Craig Johnson.