

# Providing a floor slab fit for Rolls-Royce

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When Rolls-Royce decided to relocate its aero-engine production facility to Inchinnan, west of Glasgow, all the tendering parties were fully aware of the scale, complexity and quick response required for a project of this type. The AMEC Group were appointed as design-and-build contractor for a 50,000m<sup>2</sup> construction, designed according to the requirements of Rolls-Royce. Due to the scale and complexity of the project, a procurement process based on partnering and supply chain management was chosen for selection of the specialist flooring contractor. AMEC appointed A J Clark Concrete Flooring as the design-and-build specialist flooring installer. The Sprigg Little Partnership was selected as the floor slab designer.

## Laser-screed installation

Due to problematic geotechnical conditions, the building required two types of ground improvement. These were in-situ bored concrete piles and vibro-compaction. The entire super-structure was designed to be supported by concrete load bearing piles. Following discussions with URS, design-and-build engineer for AMEC, A J Clark proposed the

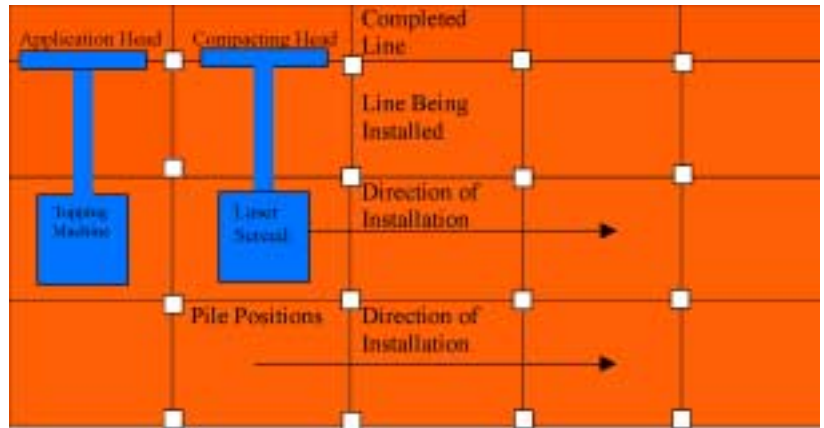


Figure 1: Laser-screed installation sequence for a pile layout of approximately 3000x3000mm.

construction of a steel-fibre-reinforced suspended concrete floor slab for the piled areas, installed using a laser-screed (see Figure 1). A ground-bearing steel-fibre-reinforced concrete floor slab was used for the remainder of the building envelope. Design and details for the slabs were provided by Sprigg Little Partnership using Bekaert steel fibres.

## Floor design

Rolls-Royce also specified a jointless floor slab design with an enhanced abrasion resistance. This was achieved using a Sika-Armorex dry-shake topping. This also acted as a steel-fibre suppressant. Key design elements included:

- the ability to withstand facility loadings
- specifications for ground conditions after remediation.
- pile size and centres
- incorporation of machine bases and pits into the joint arrangement
- position of formed contraction day joints using Permaban Steel aris strip and Diamond Dowels with no requirements for any intermediate joints.

## Internal slab

Early consultation between the Sprigg Little Partnership and URS allowed the ground beams around the building perimeter to be designed and detailed to incorporate an edge support to the internal slab. This eliminated the requirement for a line of support piles and effectively incorporated specific machine bases and pits within the floor slab design, whilst optimising the day jointing arrangement. The design had to remain flexible enough to incorporate the many late changes required by Rolls-Royce.

## Steel-fibre reinforcement

The Bekaert design system applied the strength of steel fibres to produce a reinforced concrete slab capable of spanning in two directions between beams, which are integral to the depth of the slab. The beams in turn span between piles, and are reinforced with prefabricated mesh strips. These are installed directly ahead of the laser-screed (see Figure 2). The reinforcement strips were manufactured by ROM Ltd.



Figure 2: The laser-screed in use on the suspended floor slab.

Photos: A J Clark Concrete Flooring