B2. Preliminary Slab Design

Before making a decision regarding which floor framing alternative to adopt, it is necessary to establish the maximum decking span corresponding to the spacing of the secondary beams.

Recall that a decision has been made to use the BlueScope Steel / Lysaght product Bondek for the purposes of this text, while acknowledging that on a real design project a decision could be made to use one of several similar alternative products from different suppliers.

A preliminary estimate of the maximum unpropped composite slab span has to be determined at this stage to enable finalisation of a floor framing plan including all beam centreline dimensions.

Refer to Appendix I for Theory and Discussion related to Composite Slabs.

As discussed in Appendix I, the design of composite slabs is complex and generally will be based primarily on reference to manufacturer's published recommendations or specialised proprietary design software. These recommendations may change from time to time due to changes in products and design requirements, and on the basis of ongoing research into product performance and design. For this reason it is essential to access the latest information concerning the product being used.

The current Lysaght Bondek User's Guide (June 2005) was accessed from http://www.bluescopesteel.com.au. This provides "formwork span tables" defining the maximum slab span with deflections limited to either Span / 240 or Span / 130 for single and multiple spans. To minimise the number of supporting beams the heaviest 1.0 mm Bondek is adopted. Referring to the floor framing alternatives, in both cases the Bondek will be continuous over at least 4 equal spans in all locations for both alternatives.

The formwork span tables are only intended for preliminary design and they do not consider the fire requirements or the superimposed loading on the floor. To achieve the required FRL of 120/120/120 a minimum 120 slab thickness is required (being the same as the minimum for conventional reinforced concrete). The superimposed loading will affect the detailed slab design including the amount of conventional reinforcement required. Generally it will not affect the maximum slab span, that is primarily dictated by the strength and stiffness of the Bondek at the time of the slab pour.

For this product the absolute maximum slab span for a 120 thick slab continuous over two spans and with deflections limited to Span / 130 is listed in the User's Guide as 3400. (For Span / 240 this reduces to 2850. For three span systems, perhaps unexpectedly and as a result of pattern loading, the maximum spans typically reduce by around 7%.)

It would generally be unwise to go right to the 3400 span limit without detailed checking. If a design were developed on this basis but subsequently it was found that the decking could not span this far then potentially time consuming design rework could be required. On the other hand, pushing the decking to its limit may allow the number of beams per floor to be significantly reduced. For the purposes of preliminary design a maximum span of 3000 will be adopted.

(A detailed check using the design software Bondek2003.xls gives a maximum span of just under 3100. As shown in the adopted floor framing system, the actual maximum span turns out to be 2800.)

ADOPT maximum composite slab span for preliminary design purposes of 3000 mm

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