



Erection design engineering: Lifting

When something goes wrong involving the installation of precast and tilt-up wall panels, the spotlight tends to shine on lifting systems and QA procedures. Two incidents in particular in recent times - one in Western Australia and the other in Victoria - occurred when lifting inserts broke away from the panels, causing the panels to fall.

Initial reports indicate that both incidents were attributed to the incorrect installation of the anchoring systems and poor rigging practices. In the two instances, both of the anchoring systems required tension bars to achieve their rated capacities. In one of the incidents a straight bar was used rather than the specified 'V-shaped' tension bar and in the other, the tension bar wasn't installed at all.

The incidents raised questions about lifting systems generally and the quality control on their installation during manufacture. They have also emphasised the requirement for an Erection Design Engineer to be engaged for all building projects - as required by the current National Code of Practice for Precast,

Tilt-Up and Concrete Elements in Building Construction. As defined in the Code, the Erection Design Engineer "will usually be responsible to the builder, the precaster or the shop detailer or may also be the project design engineer". Contract conditions should clearly state to whom the Erection Design Engineer reports.

The importance of the Erection Design Engineer is often overlooked, or alternatively, the role is undertaken by a number of different people. This fragmented engineering approach can be confusing and often some important tasks are overlooked or forgotten during the construction process.

The Erection Design Engineer has a role to play in the manufacture, handling, transport and erection of prefabricated concrete elements, and must be engaged before any element is manufactured. With an understanding

of all the construction loads, it is the role of the Erection Design Engineer to ensure the structural integrity of each element during manufacture and erection and also to ensure the stability of the prefabricated elements within the building during construction.

With an understanding of all the construction loads, the Erection Design Engineer approves the selected engineered lifting system with the published technical data from the manufacturer, and approves shop drawings in which the system is installed. Alternatively, reputable engineered lifting system suppliers will provide certified lifting designs, on which the Erection Design Engineer can sign-off for a project. If the specified engineered lifting system is unable to be installed in accordance with the certified lifting point design, then the Erection Engineer must approve and record any proposed changes.

The next step is to communicate the various rigging designs (which will include the manufacture and erection drawings, showing any special rigging diagrams) to everyone who will handle the concrete elements. The erection documentation must be given to the erection crew on site before any erection work is undertaken. If, for whatever reason, the specified rigging details cannot be achieved, the Erection Design Engineer must be contacted so that the proposed changes can be verified and approved in light of the selected engineered lifting system.

Indeed, the role of the Erection Design Engineer is integral to the whole process, however it is also crucial to use a reputable precast manufacturer who has

a documented QA system in place. This will minimise any likelihood of incorrect lifting systems being used or of systems not being installed correctly.

Critical to safe lifting and erection of panels is that:

- An Erection Design Engineer undertakes the 'erection design' (refer to the National Code for definition of 'erection design')
- All chosen lifting systems must be engineered (and approved by the Erection Design Engineer as part of the erection design)
- Lifting systems must be correctly installed by a reputable precaster who has a documented QA system (such as a National Precast Member)
- All rigging diagrams ('erection documentation') must be included in the erection design and communicated to the erection crew
- All rigging practice must be in accordance with the erection design and appropriate Australian Standards
- Any changes to any of the above must be approved by the Erection Design Engineer.