

Panel Analysis

When a tilt-up panel is lifted from the casting surface to a vertical position, the panel is subjected to compressive and tensile stresses that must be resisted by the concrete, reinforcing steel and/or strongbacking. Correctly placed lifting inserts will reduce the bending moments between pick up points and will help reduce the compressive and tensile stresses in the concrete.

The concrete must have sufficient strength for the panel to be erected without cracking. Two methods are available to test the actual concrete strength, i.e., Test Beam Break (modulus of rupture) and Split Cylinder Test. Dayton Superior recommends a minimum concrete strength of 2,500 psi in normal weight concrete at time of initial lift.

At the time of the initial lift, there is a suction force that must be overcome. Panel size, bondbreaker used, care taken in bondbreaker application, interface texture and water in between the panel and the casting bed all contribute to the additional force. Estimates of this force vary from negligible to 20 psf of panel area, experience has shown that the allowable bending stress is sufficient to absorb the additional stresses without cracking the panels.

Panels are analyzed for stresses at zero degrees and at various angles during the lifting sequence. The resultant stresses are compared to the allowable stress and if exceeded, additional reinforcing steel or strongbacking is added to the panel.

Erection Details Service

Dayton Superior Technical Services Departments provide erection details for tilt-up projects. Correct insert selection, insert locations, bracing requirements, brace anchor locations and calculations for additional reinforcing steel and/or strongbacks are included in this important service.

Computers are utilized to provide fast and accurate analysis of the stresses involved on a project.

Erection Detail Booklets are furnished to the contractor, showing pick up locations, wall brace insert locations, crane rigging and cable lengths, reinforcing steel and strongbacks, and specific assumptions relating to concrete strength and wind loads used in the bracing design. The *Tilt-Up Erection Details* are furnished at a nominal fee.

Computer Service

Part of the tilt-up services offered by the Dayton Superior Technical Services Department include computer related functions, such as:

1. Computer analysis of panels,
2. Positioning of lifting and bracing inserts, relative to the center of gravity,
3. Analysis of lifting insert loading and panel flexural stresses. Bending moments and stresses are constantly changing as a panel rotates from 0° to 90° for most panels, the critical stress occurs between 20° and 50° of rotation (see

Figures 1 and 2). The range is due to the varying geometric shapes of panels and the number of inserts needed to handle them. These calculations, though complex are accomplished efficiently by computer,

4. Calculation of bending moments and analysis of stresses at various degrees of rotation from 0° to 90° ,
5. All pertinent information concerning panels presented in clear, uniformly drafted detail.

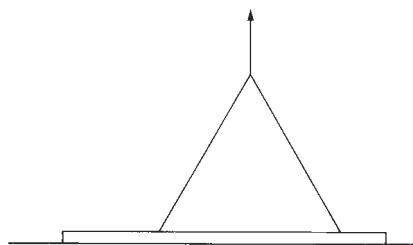


Fig. 1

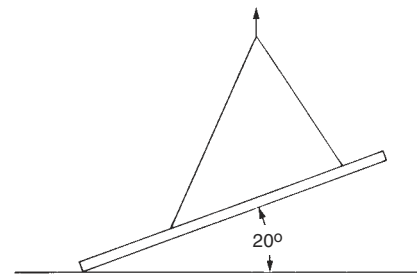


Fig. 2

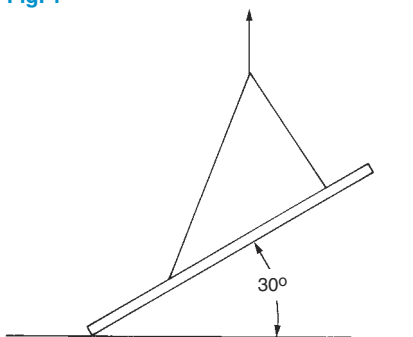


Fig. 3

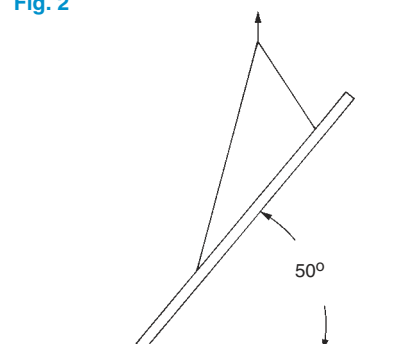


Fig. 4