

Greased Dowels

In the field, grease is often applied to round dowels in an uncontrolled manner resulting in a too-thick coating. We have observed many slabs where the grease was thick enough to create a void such that the round dowel was able to move without transferring wheel loads between adjacent panels. A loose-fitting or soft dowel sleeve can have the same effect. Even with a controlled thin coating, as was used in Reference 5, the initial dowel looseness ranged from approximately 0.004 to 0.002 inch, depending on the diameter of the dowel. This initial dowel looseness can be a significant portion of the total allowable movement—we have estimated the initial looseness for the plate dowel to be 0.002 inch for a dowel with a very thin bond breaker coating. If

an uncontrolled thickness of grease is used, the initial dowel looseness can easily exceed the total allowable movement. Also, we have observed that when grease

is used, the dowel creates a high bearing stress at the face of the concrete joint, thereby causing this area to erode further and to increase the slab-joint dif-

ferential movement. Using the thinnest concrete bond breaker possible is therefore very important in order to minimize the initial dowel looseness.

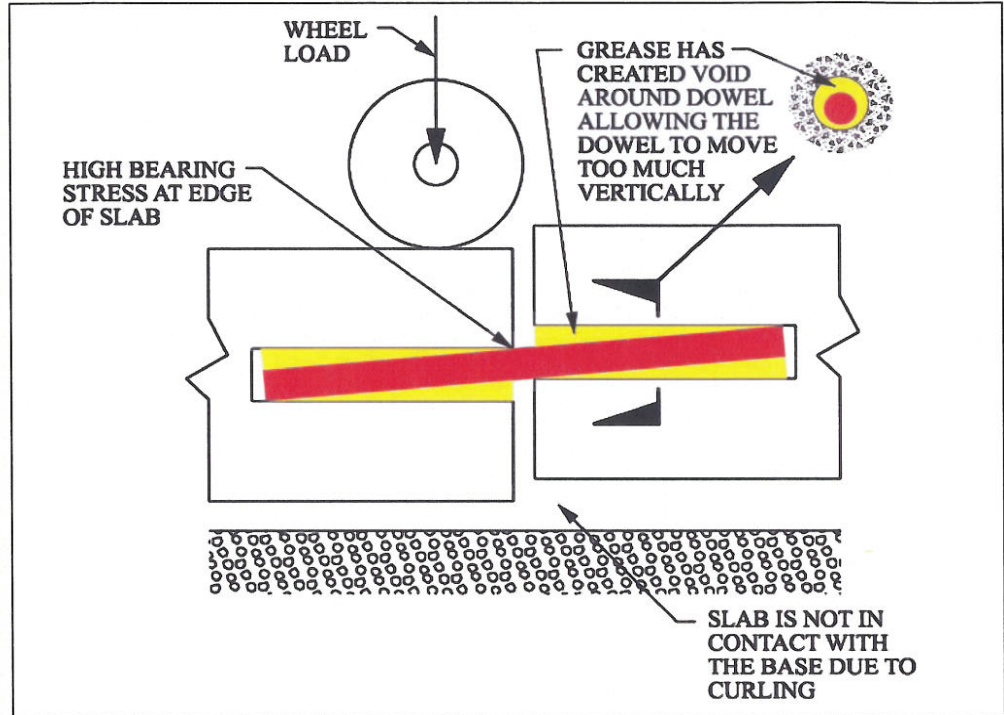
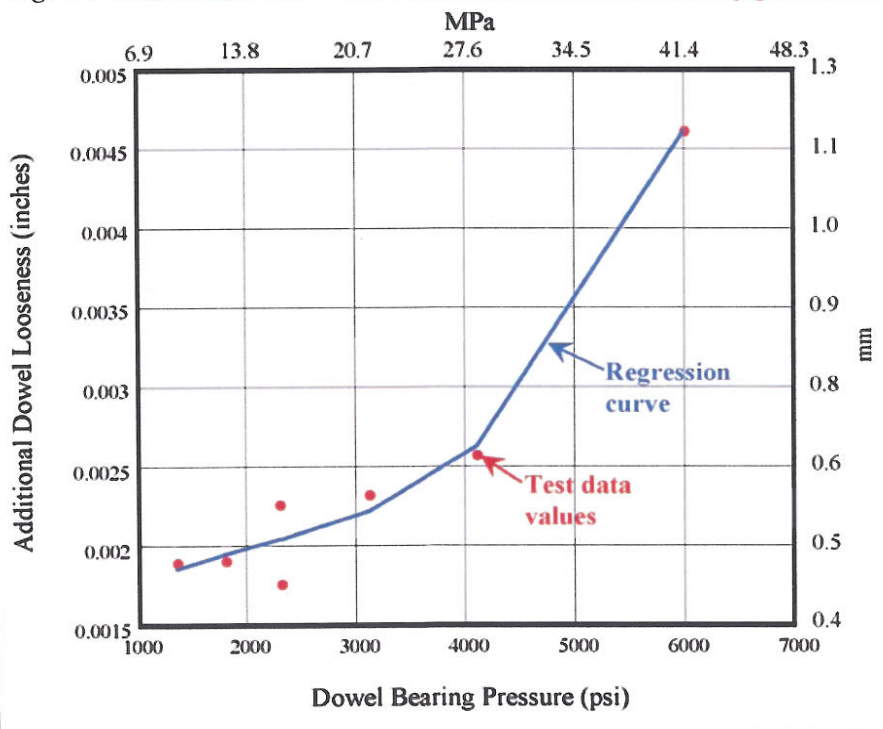


Fig. 7—Additional dowel looseness versus dowel bearing pressure.



600,000 load cycles, and no failures occurred. In one special test to produce a steel flexural fatigue failure, two dowels were loaded to produce a flexural stress of 18,800 psi and 22,800 psi for 600,000 load cycles, and then loaded to produce a flexural stress of 24,300 psi and 28,200 psi, for an additional 892,000 load cycles before failure occurred. The maximum flexural stress for the tapered load plates occurs for the $\frac{3}{8}$ -inch plate and is approximately 18,000 psi. As shown by the testing done above, this stress is well below the value that would cause a steel flexural fatigue failure.

Results

Using the analytical approach, and the tapered load plate dowel design values noted above, we have developed design graphs so the slab designer can easily select and evaluate different dowel plate sizes and spacings for the expected slab thickness and maximum lift truck