

A better crane tie-down design

USA specialists Liftech Consultants have announced a new tie-down link concept for the next generation container cranes. Kenton Lee, Principal, Structural Engineer, Liftech Consultants Inc. explains...

Tie-downs are often used to keep container cranes from overturning in high wind events such as typhoons / hurricanes. The tie-downs are connected to the wharf when a high wind event is predicted. As cranes are getting bigger tie-down systems are also getting larger. Current tie-down systems typically consist of a turnbuckle mounted on the crane and an anchorage system in the wharf. To connect the crane's turnbuckle to the wharf, a connecting link plate is typically rotated out of the wharf and fastened to the crane's turnbuckle with a large pin. In some instances, the wharf link plates are so heavy that forklifts are necessary for handling. Also, due in part to the constraint of the link plate size, more than one tie-down can be required at one crane corner, leading to load equalisation problems and increased time to engage the tie-downs. "A crane tie-down system typically consist of a series of links: link(s) to the crane, a turnbuckle, link(s) to the wharf socket, a link in the wharf pit, and the pin connecting the wharf link to the crane," explains Kenton Lee. "These components are heavy and difficult to handle. Even with an experienced team of 5 to 6 workers, installing eight tie-downs can still take an hour or more per crane."

The new concept

Now there is a different system, with no wharf links or pins to lift and improved pin alignment. "The new concept was inspired by a tie-down system used on some cranes at the Jebel Ali Container Terminal in the United Arab Emirates," Lee added. The concept eliminates the wharf link, so it is no longer necessary to move this heavy piece. The wharf pin does not need to be lifted; instead, it slides into place. The turnbuckle and its links hang as they are. There is no need to move them.

Instead of raising the wharf link and inserting the pin into the link, the crane tie-down lower link is lowered into the recessed wharf pit. Counterweights balance and stabilise the weight of the tie-down lower link. Aligning the tie-down lower link and wharf anchor is easier, since the link is simply lowered instead of using the turnbuckle. Once aligned, the pin is slid into place. The pin is stored in the recessed pit - there is no need to lift it. The

tie-down lower link pin hole is designed for easy insertion. The turnbuckle is still used to tighten. The tie-downs can easily be installed by only one worker. For easy pin insertion, the pit will need to be well maintained and kept free of debris prior to the storm. If more than one tie-down is used per corner, equalisation methods should be used, but this is the same as for a conventional tie-down. [Liftech](#)

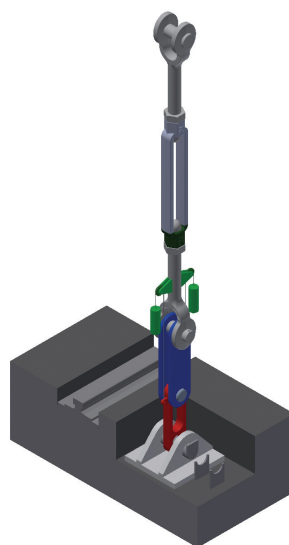


Figure 1: Tie-down (left) and showing lower links engaged (right)

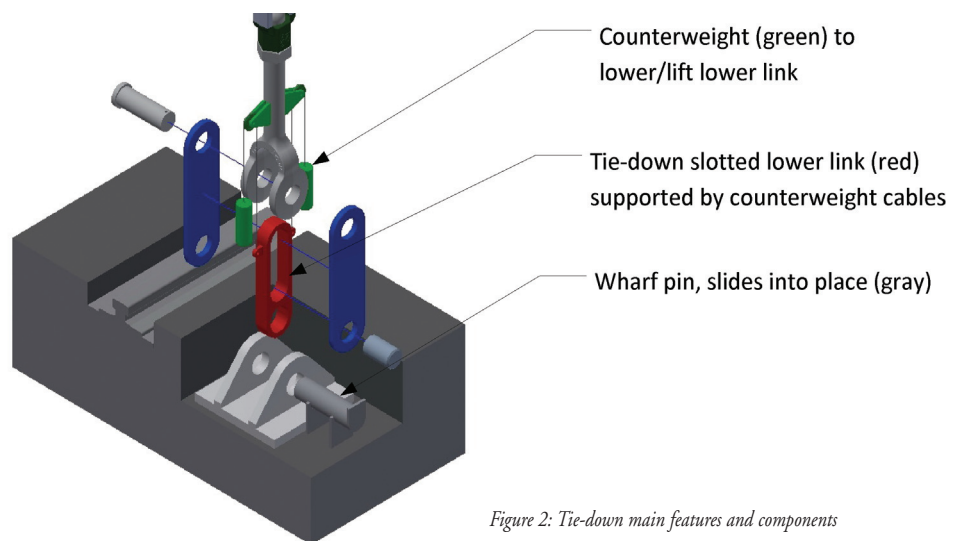
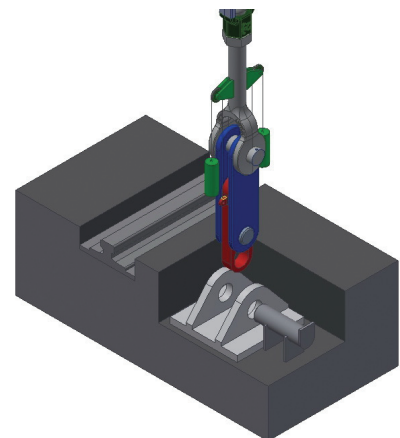


Figure 2: Tie-down main features and components