

## Ergonomic Analysis of the SIXTH WHEEL® Ratchet

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According to the Bureau of Labor Statistics, the trucking industry continues to be among the leading industries for the most lost work days per injury.<sup>1,2</sup> Raising and lowering the dolly legs of tractor trailers is one of the most hazardous tasks performed by truck drivers. When using high gear, forces required to perform this task may exceed 100 lbs with an unloaded trailer and increase significantly as weight is added to the trailer. This force requirement is at the upper limit of average strength capabilities.<sup>3,4,5</sup> When individuals are performing tasks at or above their safe strength capabilities injury risk increases significantly.

**Image A**



**Standard Crank**

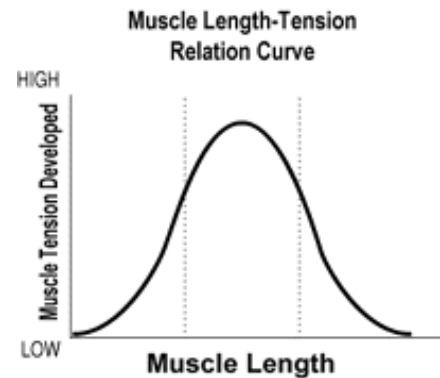
**Image B**



**Sixth Wheel  
Crank**

The standard crank operates by rotating in a complete circle. This requires the individual to exert extremely high forces in postures that are biomechanically inefficient, significantly increasing injury risk.

The Sixth Wheel® utilizes a ratcheting mechanism that allows the individual to position the crank in the position that allows for greatest force generation. Muscles have a range, or an angle, in which they perform most efficiently. By changing the orientation of the crank you are able to increase muscular force, or tension, production and dramatically decrease awkward postures associated with this task. The Sixth Wheel® eliminates the awkward horizontal positions, as seen in Image A, where it is difficult to generate force in the direction needed to initiate movement. Also, the ratcheting mechanism enables the use of body weight to exert force on the crank handle, reducing the amount of muscular exertion required.



The traditional crank system for raising and lowering the dolly legs presents several ergonomic risks. Using the Sixth Wheel reduces ergonomic risk factors associated with raising and lowering the dolly legs of tractor trailers.

<sup>1</sup> Bureau of Labor statistics, Workplace Injuries and Illnesses, 2002

<sup>2</sup> Bureau of Labor statistics, Workplace Injuries and Illnesses, 2003

<sup>3</sup> Nico, D., Haslegrave, C. and Chaffin, D., 2004. Working Postures and Movements, CRC Press, New York.

<sup>4</sup> Rodgers S., 1986. Ergonomic Design For People At Work, Volume 2, Van Nostrand Reinhold, New York.

<sup>5</sup> Snook, S.H. and Ciriello, V.M., 1991. The design of manual handling tasks: revised tables of maximum acceptable weights and forces. *Ergonomics*, 34(9), 1197-1213.