

# MOMENT OF SCIENCE



*Most people understand the concepts of weight and size. We can feel how heavy something is by picking it up (or trying to) and we can see how large something is just by looking at it.*

*This is usually enough information when the object is stationary, but what happens when we try to move it?*

*Contractors are always looking for the simplest, most cost-effective equipment to ensure a successful, safe and profitable move. This often means weighing the pros and cons of several load-moving methods—cranes, gantries, trailers or slide systems—and oftentimes combining several methods in one project.*

*Cranes are one of the most common and useful pieces of equipment on a construction site but may not always be the best choice for rotating a load or moving it horizontally.*

## A CASE FOR SKIDDING SYSTEMS: FRICTION AND STABILITY

### Friction is your friend

- Friction is defined as the force between two surfaces that resists relative movement. The coefficient of friction gives this friction force as a percentage of the perpendicular force between the surfaces (which is often the weight of the object).

On first glance you might assume that the lower the coefficient of friction is, the better, because it will take less force to move the object. Air casters and rollers have a very low coefficient of friction and it is very easy to get the load moving, but the direction of movement must be controlled and you must be able to stop the load once it starts moving.

In many cases, however, the conditions are not perfect and we need to allow for other factors such as slight out of levelness or uneven ground conditions. We still need to maintain precise control over direction and speed of movement and always have the ability to stop it precisely. This is where a higher friction coefficient is actually beneficial.

With a known friction factor, we can plan for how much force will be needed to move the object, while still maintaining precise control over its direction and speed and most importantly prevent it from running away.

Skidding systems use a lubricating material at the sliding surface and generally operate in the range of 0.10 - 0.20 coefficient of friction. This provides for safety in resisting possible load run away, even on unexpected minor gradients. Hydraulic cylinders provide the relatively high forces required to move the load and keep the speed of movement slow and under control. The track acts as a guide ensuring that the load always goes where it is intended to.

### A stable relationship

- An object is said to be stable when all forces acting on it are in equilibrium and when righting moments exceed any overturning moments.

In general, the lower the centre of gravity is and the wider the base of support is, the more stable the load is. This is a subjective assessment, so generally we look at situations as being more or less stable than each other. The more stable it is, the safer it is assumed to be.

The combined center of gravity is usually that of the load itself and therefore at its minimum height.

With the skid system set up at the widest possible points, the base of support is at its maximum width.

The relative stability is about as good as it can get.

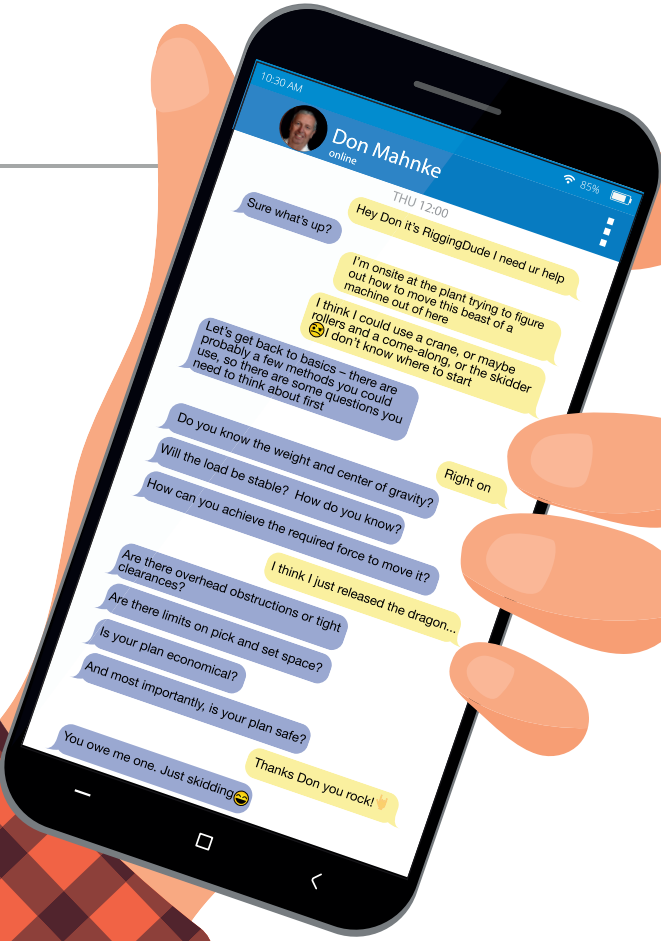
### Let it slide

Cranes are often used to move loads horizontally, but crane stability can be a complex issue, with many factors at play.

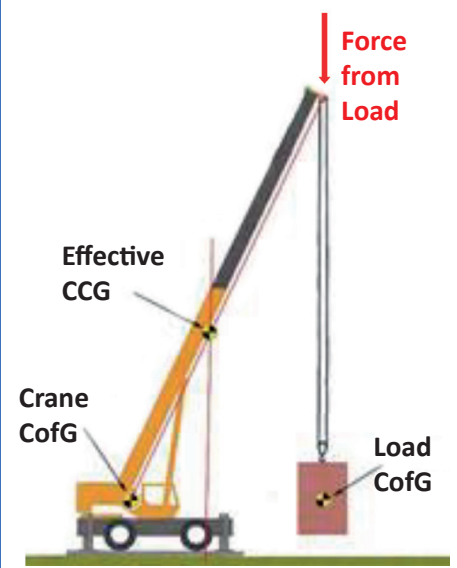
Crane manufacturers provide detailed load charts for each particular model that are based on such things as configuration, load weight, lift radius, structural limitations, overturning moments and wind speeds.

One of the benefits to using a skidding system for horizontal load moving is that the weight, center of gravity and footprint of the load are less critical, as long as they stay within the structural track capacity and push capacity of the cylinders. In comparison, the weight, size and center of gravity of a load is crucial information when choosing a crane.

# DID YOU KNOW?



Since the load is not securely affixed to the crane, it is not totally valid to consider a combined center of gravity when looking at the stability of a loaded crane. The load is, however, attached to the crane via the load line with the weight of the load and rigging acting at the boom point of the crane. It could therefore be possible to consider an "effective" combined center of gravity of the crane and the load, to determine relative stability.



Even though the crane center of gravity is fairly low and the load center of gravity also being low, the resulting "effective" combined center of gravity is quite high.

