# 9.- Center of Gravity



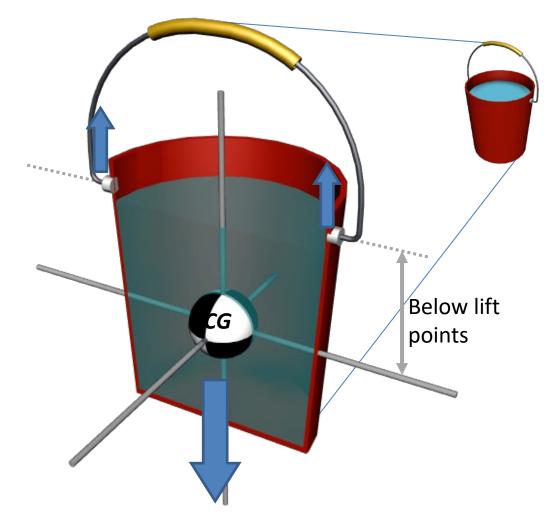
### Center of Gravity (CG)

The point at which the entire weight of an object may be considered as concentrated.



Graphical representation of the Center of Gravity (CG)

In this water bucket example, the center of gravity is illustrated by a black and white checkerboard sphere and it is below the lift points of the bucket.



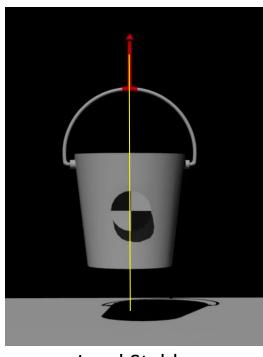
Gravity pulls down object



## Center of Gravity (CG)

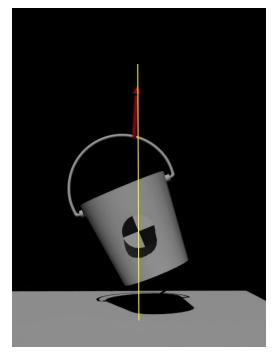
The point at which the entire weight of an object may be considered as concentrated.

Lift point over CG



**Load Stable** 

Lift point to the right of CG



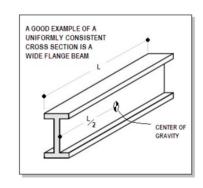
Load Unstable

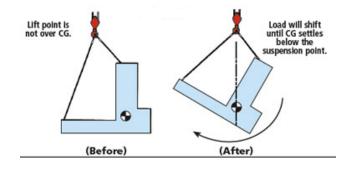
Loads naturally move to put center of gravity below the point of support.



## Center of Gravity (CG)

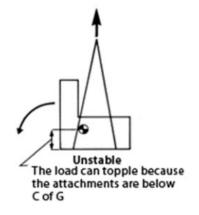
The center of gravity is the point at which the entire weight of an object may be considered as concentrated.





Loads naturally move to put center of gravity below the point of support.

Attachments below the CG can become unstable and topple the load



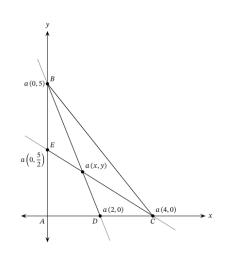
The higher the center of gravity is in the load, the wider and more stable the base of support needed to maintain the static equilibrium.

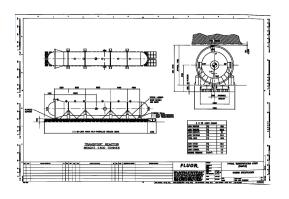




## Methods used for calculating Center of Gravity (CG)

- Engineering Weight Reports
- Drawings and Blueprints
- Manufacturer's Label
- Calculating It
- Estimating using Trial & Error or Stick Method



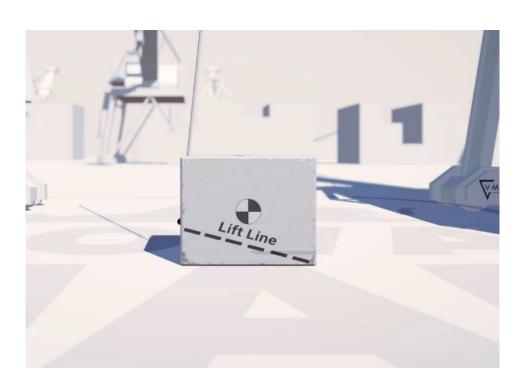






#### What is "Surge"?

 The condition that exists when the load moves in an uncontrolled manner during a turning operation when the CG gets outside the lifting/support points





#### Surge Demonstration

 In the animation below we can see that as the object is lifted from the ground, there is an 'uncontrolled motion' (surge) that occurs when lifting the object below the center of gravity.







#### Rollout Example



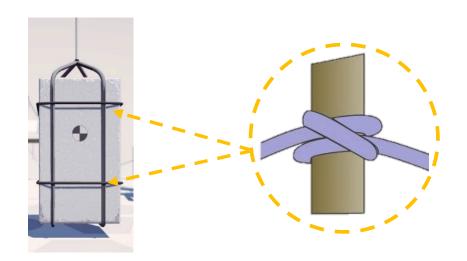
When your lift points are below the center of gravity it is important to add base hitched to prevent rollout as the example above demonstrates.



#### Backlashing

- Lashing installed between the legs of the rigging gear or the rigging gear and the load to prevent movement of the rigging gear or the load during lifting.
- Backlashing will help prevent the load from rolling out of the rigging.





To maintain the position of both the load and the rigging gear in basket hitches, use Clove Hitches to secure the backlashing to each sling leg.