

FORKLIFT STABILITY

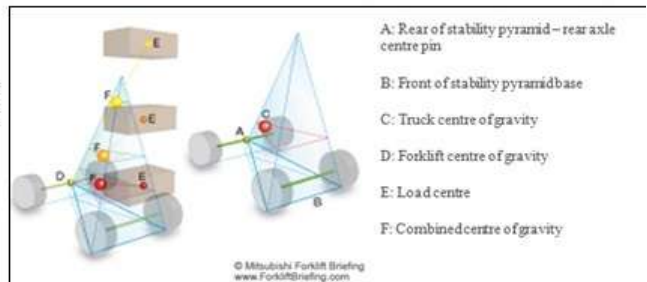
Why Forklifts Fall

There are many situations that can lead up to a tipping accident, but in all cases the truck's stability has been compromised by poor understanding of the basic principles of forklift stability.

At the heart of truck stability is the so-called Stability Pyramid. Forklift trainers recognise the pyramid as one of the most difficult yet important concepts to teach. A major problem- recognised by health and safety regulators- is that there is not enough training time to ensure this principle is actually understood.

How does the centre of gravity move?

The point that must be kept within the triangle/ pyramid is the combined centre of gravity (CCOG). The truck itself has its own centre of gravity, typically about 20cm below the driver's seat. In addition, the load has a centre of gravity- the load centre- typically 500mm forward of the fork backrest. These two forces form the combined centre of gravity: a new, moving, centre of gravity that must stay inside the Stability Pyramid. If this point moves beyond the front of the pyramid, the truck will tip forward. If it leaves the pyramid to left or right, the truck will tip sideways.



Why is it a triangle?

Many forklift drivers struggle with the idea of the base of their Stability Pyramid being a triangle and not a square with a wheel on each corner- especially on a four wheel forklift. In fact, the pyramid's base joins the front two wheels on the ground with the pivot point on the rear steer axle- so even on a four wheel truck, it is a triangle, with one point over the rear axle pivot.

Most people think of a 'pyramid' as having a square base, like those in Egypt. A triangle- based pyramid is actually called tetrahedron. Keeping the CCOG inside a triangle is even harder than a square, because it is smaller.

More height, more danger

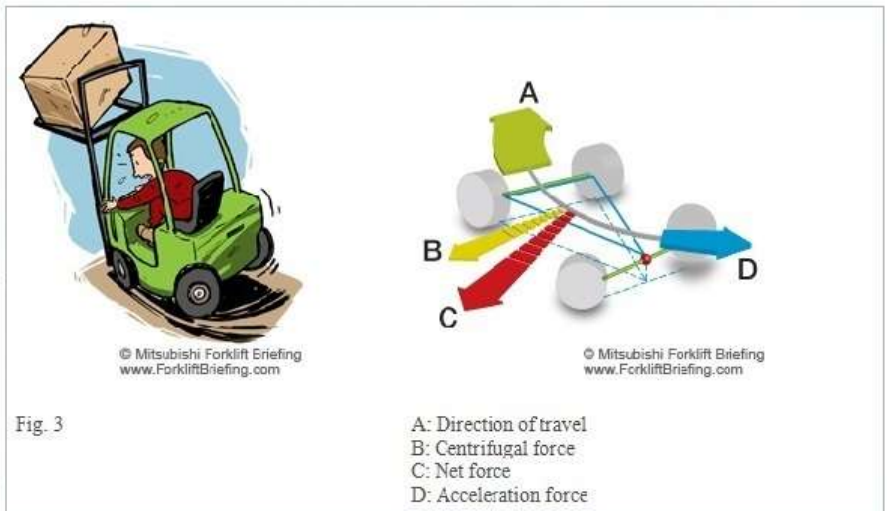
Because the pyramid rapidly narrows to a point, loads that are very stable at low lift height quickly become unstable at higher lift- as the CCOG must be kept in a smaller and smaller triangle. At high lifts, this triangle can be surprisingly small with very little margin of error.

More speed, more danger

Unfortunately, the centre of gravity is not the only force at work. In a moving truck there are additional forces- caused by the truck's acceleration and deceleration. Even quite gentle braking can move the effective CCOG forward- out of the triangle- creating the risk of tipping.

Worse still are the dynamic forces caused by turning- which push the truck sideways in the opposite direction of the truck's turning direction. See figure 3.

These forces may be small at low speeds, but they do move the CCOG and with an elevated load there is a very small triangle to keep the CCOG within. This is why properly trained drivers will never manoeuvre or travel with an elevated load.



Other factors influencing stability

Driving without a load, operating on a gradient, operating outdoors on an uneven surface and using load handling attachments will reduce stability,

therefore high importance must be placed on the driver fully understanding the changed stability performance characteristics of a forklift.

For more on this topic, please contact MLA Holdings on 131 652 or www.mlaholdings.com.au.

Information for this article was sourced from news.forkliftbriefing.com