Wherever you are, Whatever you are doing, Make Every Day a Safe Day

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The majority of on-road, mixer truck rollovers occur resulting from one of two possible scenarios: excessive speed while negotiating a turn; or by simply running off the road.

To better understand how these events take place; let’s examine some of the handling characteristics of a fully loaded ready mix truck.

Truck stability is dictated to a large degree by physics – below are five elements that influence how a mixer truck handles followed by an explanation.

**HIGH CENTER OF GRAVITY** - A definition for center of gravity is the point at which all of the weight of an object appears to be concentrated. A low center of gravity in a vehicle makes it more stable (think race cars) where a high center of gravity detracts from its road holding capability. So what is it that changes our mixers center of gravity? To answer that, let’s examine some average weights as they apply to our concrete mixers. An empty truck scales at around 28,000lbs. The estimated weight for one yard of concrete is 4,000lbs which constitutes a total of 40,000lbs for the load. Gross weight of the average 10 yard mixer is around 70,000lbs. So one can easily see the high center of gravity stems from the fact that the full 40,000lb load is carried above the frame rails of the truck.

**OFFSET CENTER OF GRAVITY** - While charging, the drum rotates in a clock wise direction (from the driver’s seat) which concentrates more of the 40,000lb load on the left side of the truck. This happens due to the slump or consistency of the concrete causes it to stick to the skin of the drum until it reaches a point where gravity causes it to pull away from the skin and recombines with the remainder of the load. Some refer to this Offset Center of Gravity as the “heavy side of the truck”. Now the Offset Center of Gravity doesn’t really come into play while you’re driving down the road in a straight line. It’s only significant when you negotiate a turn – Particularly a right hand turn. As you enter a right hand turn, centrifugal force combines with the Offset Center of Gravity increasing the potential for a rollover. This is also why a majority of mixer trucks that roll over come to rest on the driver’s side or the “heavy side” of the truck.

**INERTIA OR MOMENTUM** - Inertia as it applies to mixer truck handling is the resistance of an object to any change in its motion, including a change in direction. An object will keep moving at the same speed and in a straight line, unless it is acted upon by an outside force. Another way to look at it is like this; a 40,000lb load going down the road in a straight line wants to continue in a straight line. Much like Offset Center of Gravity, Inertia becomes a critical consideration as you approach a curve in the highway.

**WEIGHT DIFFERENTIAL** - Weight differential is a comparison of the weight of the load to the weight of the truck in that the load is considerably heavier than the truck. As the load is 1.5 times heavier than the truck, the load has a greater influence on the truck than the truck has on the load. Consider two unmatched Sumo wrestlers. One wrestler weighs 450lbs and the other weighs only 300lbs. Remember the objective is for one wrestler to push the other one out of the ring – Which wrestler do you think will prevail? I’m betting on the bigger one!
CONCRETE SLUMP - Thus far we've discussed concrete that has a relatively tight slump of 4-5 inches. Now let's talk about plasticized concrete that carries a much higher slump. The danger in hauling plasticized concrete is the unpredictability of the Offset Center of Gravity. With a tight mix, the heavy side of the truck will always be the driver's side but transporting plasticized concrete is similar to driving a tanker without baffles in it. When you take off quickly, the load will shift to the tail of the drum. Make a sharp left turn and it will shift to the right and vice versa during a right hand turn. Hard braking will concentrate the load in the head of the drum.

How plasticizer increases slump: A mixture of stone, sand and water without cement will not flow like concrete, no matter how much water you add. Cement gives concrete its flowing properties. By chemically dispersing the cement grains a plasticizer enables cement to become a more effective lubricant, thereby increasing the slump without adding additional water.

RULES TO LIVE BY
In order to drive a mixer truck safely, you must follow safe driving rules. Here are a few of these rules which are specifically related to rollover prevention:

✔ Start your day with a thorough pre-trip inspection. Pay particular attention to your truck's stopping ability as your only effective means of collision avoidance is being able to stop – Steering around an obstacle in a loaded mixer truck while at speed will likely result in a roll over.

✔ Don't make any sudden changes in direction - Don't over steer, over accelerate, or over brake. Due to the previously discussed truck handling characteristics, you must start slow, make gradual turns and lane changes and stop smoothly. Remember that if you steer quickly while braking, your vehicle will probably roll over.

✔ Slow down before curves and accelerate slightly when coming out of the curve. The posted and/or advisory speed for a curve is intended for automobiles. A good rule of thumb is to slow 10 mph less than the posted speed.

✔ Keep in mind how much space you need to stop your vehicle. Remember that wet roads double the normal stopping distance. An empty mixer truck may take longer to stop than when loaded.

✔ If you accidentally run off the road, hold your course and slow the vehicle down. Its human nature to jerk the steering wheel to bring the truck back on the road but that is the worst thing to do at highway speeds. Remember inertia wants to keep the truck moving in a straight line – Allow the truck to slow to a safe speed and then make a gradual, controlled return to the highway.

✔ Due to the extended wheel base, bridgemaster equipped mixer trucks have their own unique handling properties but the advice offered above remains appropriate.