

Greetings all. Today's topic is: how articulated steering cranes behave and feel different from other vehicles.

The three 'touch points' in a vehicle from where a driver receives feedback are the steering wheel, the accelerator, and the brake. During driving, the driver modulates or adjusts to the driving conditions based on this feedback.

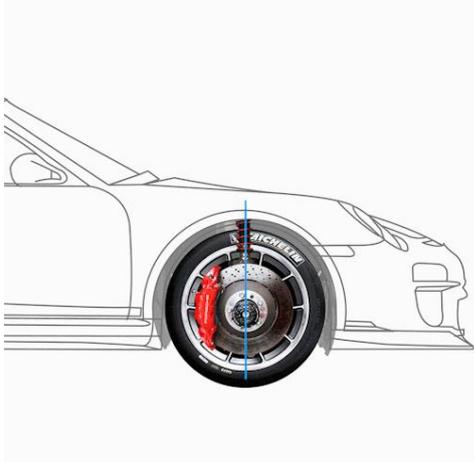
The feedback that a driver receives from the steering system differs in an articulated steering crane. This must be understood because if a crane driver tries to drive an articulated steering crane as they would a motor vehicle, bus, or truck, expecting and responding to the 'feedback' in the same way, they will be at risk of overcorrection and having an incident.

[CICA Crane Safety Bulletin #310](#) looked at the Coronial findings from a devastating articulated steering crane accident in Queensland in 2013.

So this Bulletin will look a little more closely at the unique characteristics of articulated steering cranes and how they differ from other vehicles.

The front wheels of trucks, buses, and cars have caster angle. Caster angle affects the camber of the wheel during steering.

This means that they tend to act like the caster wheels on a shopping trolley. When the steering wheel is released after a turn is completed, the caster effect tends to bring the wheels back into a straight line.



1. Steering returnability

A steering system is one of the major subsystems for vehicle operation. It rotates the front wheel plane in the desired direction set by the driver's steering input. When the front wheels are steered, the caster angle creates a restoring torque which returns the wheels to their original position if the driver releases the steering wheel. This is called steering returnability or aligning torque (the wheels realign straight ahead).

Articulated cranes are fitted with a hydraulic steering system driven by a hydraulic pump, valves, and hydraulic circuit, so when the steering wheel is released, the steering does not tend to naturally straighten up. By design, the hydraulic system holds the steering cylinders in position until the driver turns in the opposite direction.

Therefore, the driver must always remain in control and active with their steering.

2. Steering effort or gain

Speed is the greatest factor in determining how much assistance Power Steering provides. In a car, truck, or bus, a steering wheel is very easy to turn at low speeds, such as during parking, high assistance makes manoeuvring simpler. At higher speeds, more resistance through the steering wheel due to aligning torque provides greater stability and helps maintain straight-ahead driving.

The steering effort of an articulated steering crane doesn't change at different speeds because there isn't any aligning torque from the caster geometry. The steering effort is the same at all speeds because it is controlled by the pressure in the hydraulic system.

3. Frame steering results in the driver rapidly rotating in the direction of steering.

Mobile articulated cranes have 'frame steering'. They steer by pivoting (articulating) the crane in the middle, which in effect turns the front wheels in relation to the rear wheels. The two wheels at the front turn independently of the two wheels at the



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back. This type of design has been employed to improve steering response, increase vehicle manoeuvrability while moving at a certain speed, or decrease turning radius at low speed.

A driver of a mobile articulated crane does not steer with the front wheels. The driver is physically rotated with the front half of the cabin in the direction of steering. This leads to a different sensation by the crane driver.

It is easy to see why it is so important for those driving a mobile articulated steering crane to understand the differences.

Current driver training on offer for heavy vehicles (prime movers and trailers) is the opposite of a safe response with an articulated steering crane.

The NHVR has recognised that this is a matter of concern and has subsequently conducted an investigation of its own, to formally understand how mobile articulated cranes respond on the road, and to identify ways to mitigate their risk.

Crane safety is serious, the fact that under the current heavy vehicle licencing scheme most pick and carry crane operators have never been properly trained or assessed is a matter that CICA is working hard to rectify.

CICA has developed a two-part training program that can assess the operator's familiarity with the driving behaviour of articulated cranes.

This course accurately assesses what the driver knows, and covers the knowledge gaps in a format that is as least disruptive to your business as possible.

To find out more about the CICA On-road Course, click [here](#). To receive your code for the free sign up send Paul an email (paul@cica.com.au). To start the course, [click here](#).

Stay Safe - CICA