CICA – Vic / Tas Branch
Crane Safety Bulletin
204
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Greetings all. Today's topic is **Load Moments.**

If you are crane operator, you no doubt would have used a Load Moment Indicator - or LMI – as cranes these days are required to have them fitted.

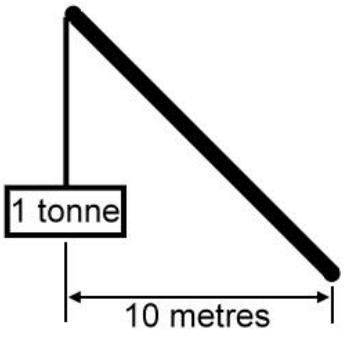
These are basically computers that monitor the crane for safety reasons. They can monitor things such as boom length, boom angle, load on the hook, outrigger position, counterweights fitted, slew position and accessories that may be fitted like fly jibs and 2nd winches. What they monitor and how complex they are will depend on the type and age of the unit being used.

But the question we pose today is **do you know what a load moment is?**

The term *load moment* is an engineering term which refers to the product of a force (the load) and its moment arm (the radius).

With cranes, the **force** is acting vertically through the centre of gravity of the load - and the **moment** arm is the horizontal distance from this centre of gravity of the load to the centre of rotation of the crane.

For example: With a one tonne force acting at a ten metre radius the *load moment* is the product of these two factors (**1 tonne x 10 metres**) or ten tonne metres as shown.



If the ***radius*** of the crane is ***doubled*** to 20 metres, the *load moment* would double to 20 tonne metres. Likewise, if the ***load*** was ***doubled*** to 2 tonne and the radius stayed at 10 metres, the load moment would be doubled to 20 tonne metres.

The load moment increases proportionally to the increase in load or radius.

An LMI monitors the load on the crane's hook. It also monitors the boom length and angle. Using the boom length and angle, it can then compute the radius at which the crane is working. With the radius and the load known, it can determine the load moment on the crane.

When manufacturers design a crane, they need to determine the load moment on the crane at any given position, so they can then determine if the crane is going to be stable or structurally sound.

How stable the crane will be will depend on the weight of the crane (including counterweights) and its' outrigger spread. Refer to Bulletin # 203.

But manufacturers need to consider more than just is the crane stable. They need to determine if the crane can support the load structurally, that is, without breaking - or exceeding the hydraulic capacity of the cylinders supporting the load.

For an operator of a crane, for any given load, the greater the radius of the crane, the greater the load moment on the crane. As you luff a boom **down**, the load moment **will increase** as the radius increases – and as you luff **up**, the radius and the load moment **decrease**.

Boom deflection increases the radius of a crane, thereby increasing the load moment on the crane.

Ideally, it is best to keep your crane's radius as short as possible - as this keeps the load moment as small as possible - meaning the crane will be more stable.

Cheers for this week and stay safe.

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