

Press release

So cranes stand safely

Who makes sure that fasteners really hold?

Watching a crane at work on a windy day can easily make you queasy. How can you be sure that the gangly giant with its long arm can lift its heavy loads safely and withstand adverse weather conditions? A key part in crane safety is played by components that look very ordinary: the fasteners. But their reliability has to be guaranteed – and that's where ingenious inspection systems from Kistler come into the picture.

Fasteners – screws, bolts and the like – are based on a principle that dates back to ancient Rome, but their real success came much later with the advent of industrialization. There are plenty of other ways to hold things together, but fasteners have a decisive advantage over adhesives or rivets: they can be released without damaging the objects that they connect. On a car, for instance, this is especially relevant when a part has to be replaced. Shelving units and other items of furniture can also be moved easily from one home to another, and cranes can be dismantled and erected again between work assignments.

A threaded joint is actually held together by the friction under the head of the fastener and in the thread. The technical name for this parameter is the friction coefficient. How much does a fastener have to be tightened? The answer varies according to the size of the fastener and the purpose for which it is used. If you change your car tires yourself, you will experience how much force is needed: for a wheel bolt on a passenger car, you need to apply 100 to 110 Newton meters. But for the gigantic fasteners on a crane, the force required is sometimes about fifty times greater – and this can only be applied with the help of special tools.

Putting fasteners to the test

The first international standards for threaded joints were introduced by the Allies during the second world war. Nowadays, there are any number of standards to make sure that every fastener will do its job reliably. Quality requirements apply not only to the fastener itself, but also to screwdrivers, lug wrenches and other special-purpose tools; there are even standards that specify the force applied to tighten the fastener.

The leeway for deviations from the ideal values depends on the safety relevance of each threaded joint – and on what could happen in the worst-case scenario if the fastener were to fail. A loose screw on a bicycle mudguard will rattle: this is rather annoying, but it is not a really serious fault. However,

if the fasteners that secure the swiveling arm of a crane were to fail, people could be injured or even lose their lives. Thankfully, inspection systems from Kistler – the sensor technology expert – are available to make sure that this could never happen. In the first instance, fastener manufacturers use these systems to verify that their products comply with the relevant quality standards. These apply to the exact size of the fastener (including the head and the thread) as well as its surface, which may need to have a special coating. But a perfect fastener on its own doesn't automatically guarantee a successful outcome. Power tools must also undergo regular testing. When a crane is being built, fitters use a mobile test stand to verify that their tool applies the required torque reliably – and these checks are carried out every day. The fastening process itself is often verified, too: for fasteners with a very safety-critical function, a sensor positioned between the tool and the fastener monitors the process to make sure that nothing goes wrong. The more important it is for general safety that the fastener holds, the more rigorous the inspection procedure will be. And that's why we can rest assured that cranes stand safely.

Image material (please name the Kistler Group as picture source)



At Liebherr, the crane manufacturer, a technician uses a mobile test stand from Kistler to carry out daily checks that ensure the perfect functioning of a special tool used to tighten the gigantic fasteners on the crane. No crane leaves Liebherr's production line until its threaded joints have been perfectly tested – with inspection systems from Kistler.



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Test systems are already in operation for quality assurance of fasteners up to size M72, such as those used in wind turbines.

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