
Low-wear crawling

Crawler cranes

LIEBHERR

Mobile and crawler cranes



Travelling with Liebherr crawler cranes

Basics

The construction of the Liebherr crawler cranes is calculated in accordance with DIN EN 13000, for assembly operation, category A1 according to ISO 4301-1, and it is designed for a limited number of load cycles.

Crawler cranes are primarily lifting units, but they are also ideal for manoeuvring on site. However, if the crane is moved frequently or with heavy equipment on uneven terrain, signs of wear will obviously occur more quickly. In the worst case scenario, cracks may even appear on load-bearing components and the travel gear may suffer permanent damaged.

The chassis on the crawler track consists of a travel drive with sprocket, cast ground plates and hardened track rollers. Due to the high loads on the steel-steel contact surfaces, wear at the above mentioned components cannot be avoided.

The service life of the components mainly depends on the following factors:

- Ground conditions of the site track: Is the track even or uneven? Is it made of concrete, timber, gravel or sand?
- Length and direction of the distance to be covered: Is the route straight or does it include curves?
- Weight (basic machine/equipment/load) and centre of gravity of the crane
- Maintenance and cleaning of the crane's travel gear

The decision how the crane is operated has therefore a large effect on the service life of the components and ultimately on the service life of the entire crane!

During the travel

Steering

The crane cannot be steered with every load. Here, a combination of load, ground conditions and centre of gravity is always decisive.

If the maximum possible force or the maximum pressure in the hydraulic system is reached with this combination, the crane stops.

Temperature

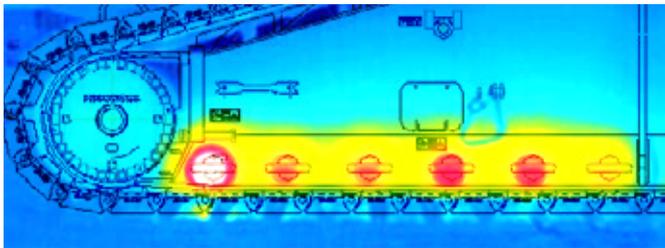
An important factor to avoid a damage is monitoring the temperature on the travel drive and on the track rollers of the track carrier. Special attention should be given to the outer track rollers hereby.

Monitoring or measuring e.g. with a thermal imaging camera or an infrared thermometer during travelling is recommended!

Hereby applies:

- Max. permanent temperature 90 °C for the travel drive. The place to measure the temperature is between the gearbox and brake.
- Max. permanent temperature 100 °C for the track rollers. Optimum lubrication of the track rollers is indispensable here (see also lubrication on page 7)

If the specified temperature is exceeded, the crane must be stopped immediately. A continued travel is only possible after the crane has cooled down accordingly.



Monitoring with thermal imaging camera



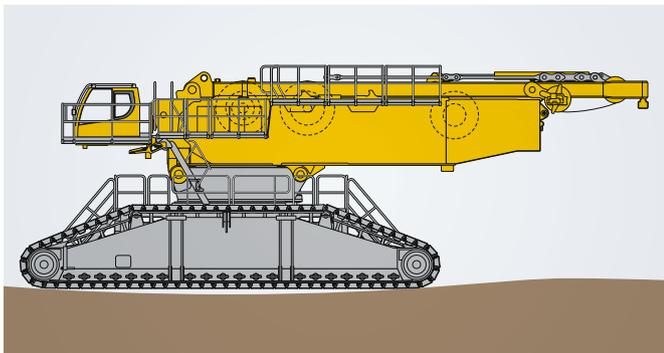
Influence of the ground conditions

The crawler crane should always be moved on a horizontally levelled surface with adequate load bearing capacity. Delves, bumps, ruts, tracks that fall away to the side and other types of unevenness must be avoided. The cost of levelling tracks may be significant, but it is always a worthwhile exercise.

Concave or convex terrain profile in longitudinal direction

If the surface to be travelled has a convex longitudinal profile, the entire crane weight can only be carried by the rollers in the centre of the track carrier. The load and wear on the track rollers and ground plates are significantly increased.

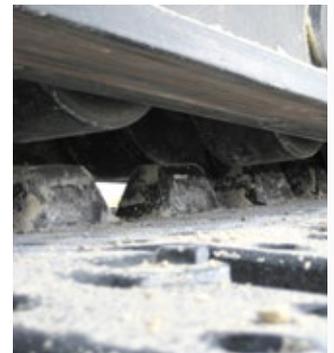
If the surface has a concave longitudinal profile, the crawler track will sag in the middle. The cams of the ground plates are no longer optimally guided by the track rollers. When leaving the terrain profile or during steering movements, the cams will be damaged. In extreme cases the cam will not find its way back into the gap between the track rollers. The crane travels then on the cams. The following also applies here: The front and rear track rollers must support the entire crane weight. The load and wear are increased accordingly.



Concave terrain profile



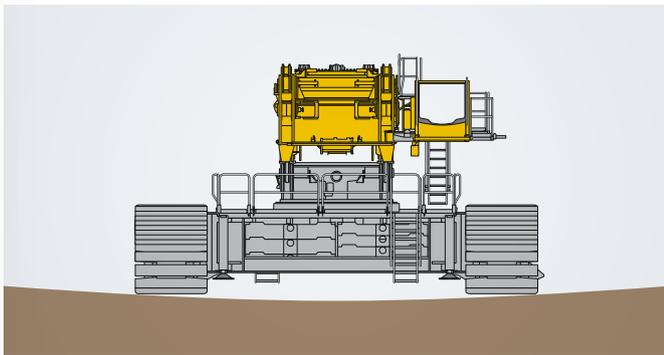
Crane on cams



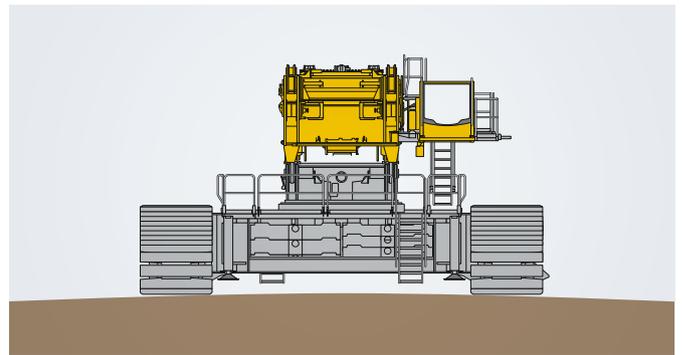
Convex terrain profile

Concave or convex terrain profile in transversal direction

If the terrain has a convex or concave profile in transversal direction, the ground plate is inclined and the rollers are only in contact with the ground plate on one side. The load on all components is one-sided and leads to high wear and damage on one side.



Concave terrain profile



Convex terrain profile

Narrow track crane

The narrow track crane is a particularity among crawler cranes due to the geometry of the undercarriage. For this reason, travelling with this crane places particularly high demands on the entire construction.

The service life and the finite life fatigue strength of the crane can be significantly improved by taking the following measures into account:

- Travelling with as little equipment and ballast as possible
- Avoiding of cornerings
- If curves, then with as large a radius as possible
- Avoiding of turning on the spot
- If it is necessary to turn, place the centre of gravity off-centre in the permissible range
- As short a way as possible
- Suitable even and load-bearing ground
- No turning of the track carriers against an obstacle or against the ground
- Proportion of travelling compared with the hoisting operation time must be relatively low

Crane components with wear due to travelling

Travelling with the crane generally leads to a wear of chassis components such as ground plates, sprockets and roller bodies. In any case, the respective operating instructions of the crane must be observed and the wear limits specified therein must be adhered to. The procedure for the correct replacement of wear parts can be found in the Liebherr repair instructions.

Wear on ground plates

Long and load-intensive travelling with the crane, or the influence of the terrain profile as described, can cause wear on the ground plates. Due to the fact that the rollers are hardened, the wear will occur on the ground plates. This rolling-ins or burr formation must be observed in accordance with the tolerance limits in the operating instructions. A replacement of the ground plates might be necessary.



Ground plates with wear

Wear of bearing eyes and pin of ground plate

Normal wear and correspondingly quicker wear due to improper loading can cause a widening of the eyes and a wear on the bolts. In order to counteract this wear, the best possible chain tension must be ensured. Furthermore, the wear limits specified in the operating instructions must be observed.



Widened bearing eyes

Damage on the ground plate cam

The cams can get damaged by steering movements when travelling with a heavy load and by a sagging chain on an unsuitable ground. This causes a lateral load, especially at the transition between the rollers and from the roller to the sprocket, which will lead to an increased wear. Also here, a replacement of the ground plates or procedure as mentioned in the Liebherr repair instructions might be necessary.

Wear of the sprocket

Excessive wear in the ground plates or a lack of chain tension will change the partition length of the drive train. This has a direct effect on the wear on the sprocket, as the cams no longer fit into the engagement surfaces. Therefore, an optimal chain tension as well as a compliance of the wear limits helps to ensure a longer service life of the components.



Wear on the sprocket

Maintenance and repair of the crawlers

A regular maintenance and cleaning of the crawler tracks reduces wear during crawling significantly and extends the lifetime of the components.

Cleaning

The crawler tracks should be cleaned regularly. Abrasive materials such as sand, sludge and stones have to be removed.

Lubrication

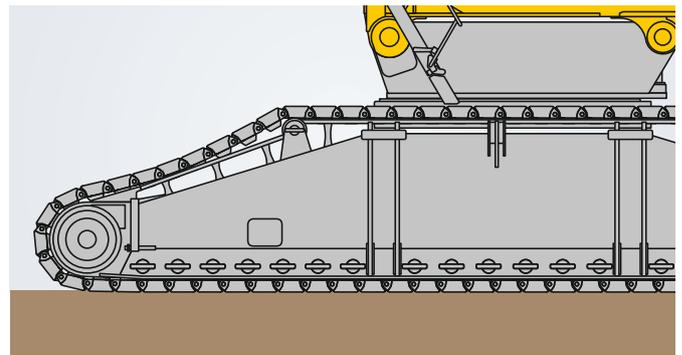
The track rollers and the sprockets are greased by the automatic lubrication system. Also here, a regular check of the filling quantity must be carried out and the system has to be checked for leakages and damages.



Automatic lubrication system

Tensioning of the chain

It is also important to check the chain tension at regular intervals. If the chain tension can no longer be adequately achieved using the chain tensioning cylinder, a base plate must be removed. Once this becomes impossible, components will have to be replaced.



Chain tension not sufficient

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Subject to modification

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