Track Service Manual

JS Machines

Publication No.

9803/3010-4

World Class
Customer Support

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Introduction

System Life and Components Wear

Life and wear are generally related to ground characteristics and the enviroment.

Ground Characterisitics

Abrasiveness Rating

- High abrasiveness rated grounds include wet soils containing high amounts of hard and sharp sand particles.
- Moderate abrasiveness rated grounds include slightly damp soils that contain a low portion of rounded sand particles or rock fragments
- Low abrasiveness rated grounds include dry silt and clay soils without any content of rocks and sands

impact

- impact can be described as the amount of grouser penetration in the ground.
- The effect can be reduced by decreasing machine speed and by using the smallest track shoes possible.
- The weight of the machine is also a determining parameter, even if it can not be modified.

Packing

- Packing materials are any material that stick to or pack around moving components.
- Packing materials can be classified as extrudable and non-extrudable.

Major effects:

- Incorrect engagement between the components causing tightening of the track chain, high loads on the undercarriage components, interference and dramatically increases the wear rate.
- Abnormal increase of the wear effect due to abrasive particles incorporated in the packed material.
- Moderate amounts of moisture contribute to packing.

Enviroment

Materials & Chemicals

- Natural and man-made corrosives such as salts and sulphurs, acids, and organic chemicals can eat away or crack hardened wear/contacting surfaces. Additionally, chemicals can cause swelling and failure of roller and idler O-rings within the sealing groups.

Temperature

- Temperature of both environment and materials could have detrimental effect on undercarriage components: a very high temp can soften hardened steel; a very low temp can increase steel brittleness and decrease oil lubrication.

Terrain

Terrain structure might shift the machine center of gravity increasing the loads on individual undercarriage components.

Up-hill

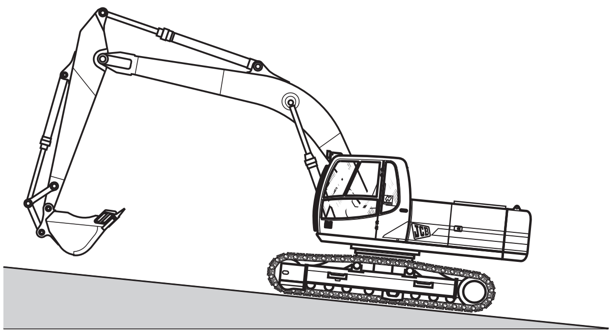


Fig 1.

– Increased wear rate on rear rollers and increasing forward drive wear of sprocket and bushing.

Down-hill

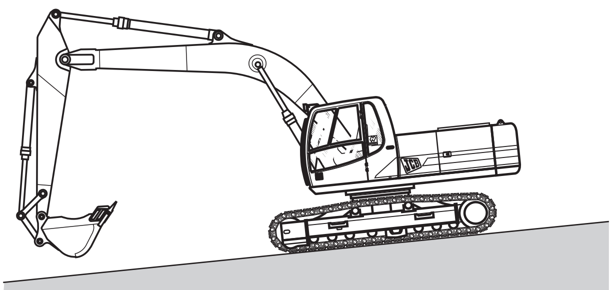
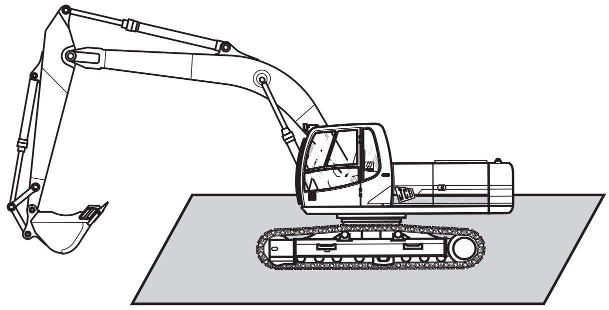


Fig 2.

– Higher wear rate of front rollers; reduced rate of sprocket and bushing wear.

Side-hill



– Increased wear of the rail sides, roller and idler flanges, bushing ends and track shoe ends.

On a Crown

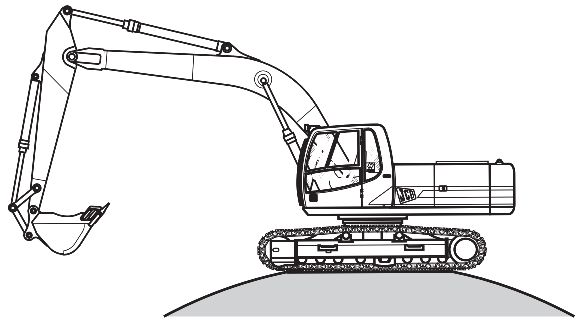


Fig 3.

– High wear of front rollers; reduced rate of sprocket and bushing wear.

In a Depression

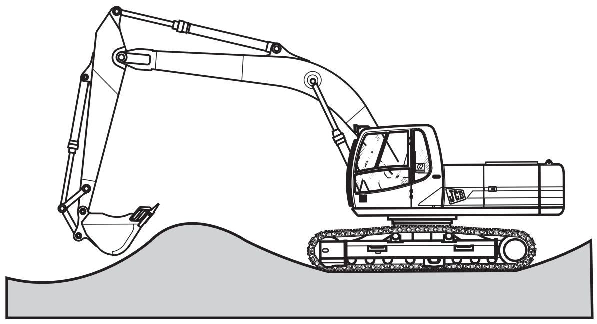


Fig 4.

– Higher wear on rear rollers and increasing forward drive wear of sprocket and bushing.

Application Effects

Dozing

– Shifts machine weight forward causing faster wear on the front rollers and idler than on the rear rollers.

Drilling

– Shifting the weight from one side to the other can increase the wear of the outer components.

Wear Rate Variables

Speed

– Wear rate is directly related to speed and distance travelled, not just hours worked.

Turning

– Wear rate increase with increased turning. Turning results in higher interference loads between moving components, especially on roller and idler flanges.

Counter-Rotation

– Consists in causing one track to travel forward while the other travels in reverse. The load applied to the side of undercarriage components increases the wear rate.

Spinning Track

– Spinning the tracks increases the wear rate on all components without accomplishing any useful work. Track shoes are particularly affected.

Counter-Rotation

– Consists in causing one track to travel forward while the other travels in reverse. The load applied to the side of undercarriage components increases the wear rate.

Favored Side Operation

– Uneven wear rate between the two sides of the undercarriage will result if work is always performed with a greater load on one side.

Reverse Operation

– Causes higher wear rates on bushings and sprockets than forward operation. Since reverse travel is also equivalent to unproductive use of the machine, unnecessary reverse operations are not-recommended.

Track Tension

– Incorrect track tension will result in faster wear of undercarriage components.

– An over tightened track chain could reduce the wear life of bushing and sprocket by 2.5 – 3 times.

– This situation also reduces productivity and increases fuel consumption.

Track Shoes

– Shoes have to guarantee good traction and flotation. They have to allow the grouser to penetrate into the ground without letting the track shoes sink below the surface.

– Shoes wider than necessary are detrimental to all undercarriage components since they are generating uneven forces that are affecting the complete system.

Track Alignment

– Proper alignment of undercarriage components is a must to avoid accelerated and unbalanced wear.

– Each discrepancy in the roller frame, idler and sprocket will be detrimental to roller treads and flanges, link rails and sides of the sprocket/segments and the idler center flange.

Cleanliness and Parking

– Cleaning the undercarriage as soon as possible helps to avoid packing effect and removes abrasives and chemicals responsible for shortening wear life.

– Machine should always be parked on a flat surface in order to avoid static loads applied for a long time on one side only. This will avoid plastic deformation of sealing groups.

Checking and Adjusting Track Tension

It is important to regularly check and adjust track tension, poor tensioning can reduce track chain life by up to 50%. Always check the track tension when checking the track wear check.

1 Prepare the Machine.

Position the machine on level ground. Run it backwards and forwards several times. Stop after running it forwards.

Carry out steps 1 to 3 of Cleaning the Tracks (in the operators Handbook). Block up the undercarriage frame. Finish track rotation by running the track forwards. Stop the engine and remove the starter key.

⚠ WARNING

Raised Machine

NEVER position yourself or any part of your body under a raised machine which is not properly supported. If the machine moves unexpectedly you could become trapped and suffer serious injury or be killed.

INT-3-3-7_1

2 Check the Tension - JS130 - JS260

Measure gap **5-A** in line with the third roller (JS130/ JS160) or fourth roller (JS200/JS260) from the front and between the lower surface of the track frame and the upper surface of the shoe. The dimension should be 275-295 mm for hard ground conditions. For operation on soft sand or sticky mud it should be 320-340mm.

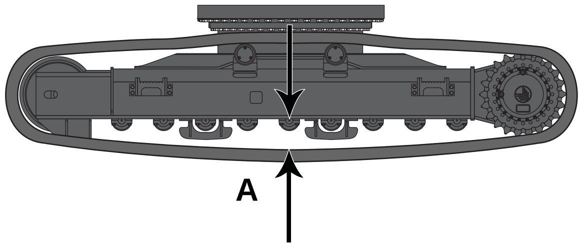


Fig 5.

Check the Tension - JS330 - JS460

Measure gap **5-A** in line with the third roller (JS330/ JS460) from the front and between the lower surface of the track frame and the upper surface of the shoe. The dimension should be 340-360 mm for hard ground conditions.

3 Adjust the Track Tension

Adjustment is made by either injecting or releasing grease from the check valve **6-B**. Inject grease to reduce the gap (increase the tension) or open to release grease and increase the gap.

If a gap **6-C** exists between the idler wheel shaft and the track frame, you may use pressure to apply the grease.If there is no gap **6-C** after the application of grease, then the necessary repairs must be carried out.

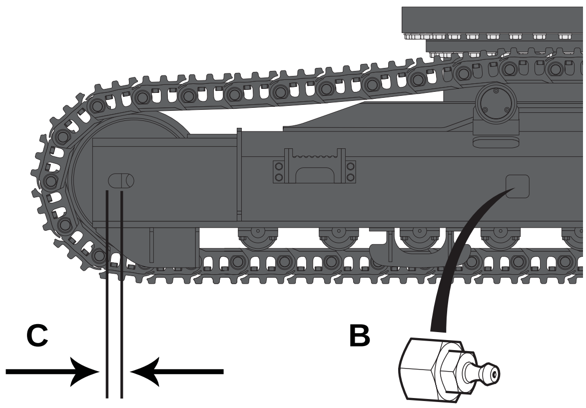


Fig 6.

WARNING

When opening the check valve always stand to one side and loosen a little at a time until grease starts to come out. If you over-loosen too much grease could spurt out or the valve cover fly out and cause serious injury.

8-3-4-5

WARNING

Under no circumstances must the check valve be dismantled or any attempt made to remove the grease nipple from the check valve.

8-3-4-9

Note: *Excessive tension can cause the track rail to wear the drive rollers and sprocket, insufficient tension can cause wear to the drive sprocket and track rail.*

4 Lower the Track

Remove the blocks from beneath the undercarriage and lower the track to the ground using the boom and dipper controls.

5 Repeat for the Opposite Track

Slew the boom round to the other side and repeat steps 1 to 4 above.

Links

Link Rail Wear

Measurement Techniques

The only measurable wear position on the link is rail (top) wear. It is measured with a broad base depth gauge from the rail surface to the track shoe plate. This dimension is the rail height. The correct location for track link measurement is outside of the links at the end of the track pin. Position the depth gauge as close to the end of the pin as possible, making sure links and shoe surface are clean. Ensure the gauge is flat against the link rails and perpendicular to the shoe surface. Measurement should be made to the closest 0.25 mm (0.01 in).

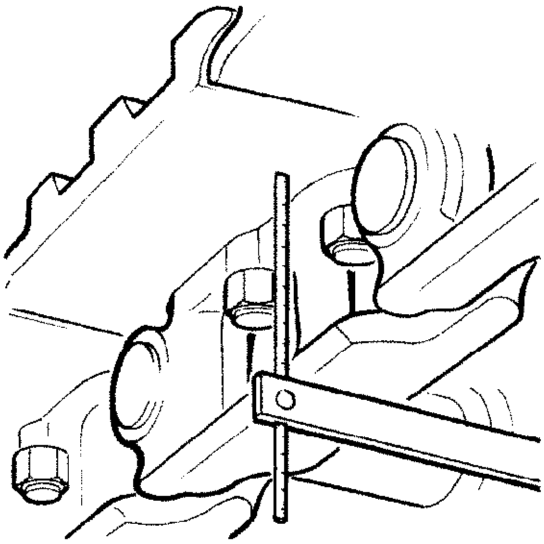


Fig 1.

Wear Limits - Service and Destruction

Link wear limits have been determined by setting the allowable wear equal to a fraction of the pin boss to roller flange or bush clearance. A 100% worn link and 100% worn roller tread matched together would cause the roller flange to begin to touch the link pin boss top. As wear proceeds past 100%, wear on the pin boss will reduce pin retention ability and link rebuildability. Wear on the top of roller flanges will reduce their guideability and rebuildability. If the link is worn to approximately 120%, structural damage will result in the form of cracking, breaking and pin and bush loosening.

Wear Charts

Wear charts for links have a built in factor allowing for faster wear rate as the hardness of the steel decreases below the case hardened depth. This is true for all components where the allowable wear is greater than the case hardened depth. In links the rate is about three times as fast after the case hardened depth is worn away.

Rebuildability

The size of components used on JCB machines (in common with other excavators) means that rebuilding is not usually economically feasible. Track links, however, can usually be successfully rebuilt with submerged and/or automatic welding to replace the worn away rail (top) surface provided the link meets the following criteria:

1. Rail wear at a point above the pin boss is not less than 80% or more than 100%.
2. Unevenness of rail height is not excessive.
3. Rail side wear due to roller flange or guiding guards or inside rail gouging by the sprocket hasn't reduced rail width significantly.
4. Pin boss is not worn due to roller flange or guiding guards causing reduced pin retention.
5. Counterbore depth and elongation wear (with Sealed Track) will not significantly affect resealing of the pins and bushes.
6. Face wear (area surrounding the link, bush and counterbores) has not reduced the thickness of the rail in that area by more than 20%.
7. Rail chipping or flaking hasn't caused more than 30% of the rail surface to be removed.

8 Links are not cracked through in the rail, pin and bush bores or shoe strap sections.

9 Bolt holes are not opened out or elongated to prevent adequate shoe retention.

10 Pin and bush bores are not damaged (broached) as to prevent adequate pin and bush retention.

With proper welding techniques and materials, the fully rebuilt (to 0% worn height) rail should provide about 80% of the original life to the service limit. This percentage may be reduced as impact level increases. By running the rebuilt rail to 120% or destruction it should provide about 100% of the original rail life to the service limit potential.

Link Wear Patterns

Rail (Top) Wear

Normal expected wear position.

Causes	Rolling and sliding contact with roller and idler treads.
Accelerators	Weight, speed, impact, abrasiveness, excessive shoe width, overtight track and snaking.
Effect	Wear limit reached when roller flanges begin to contact top of pin boss.
Remedies	Eliminate or reduce controllable accelerators listed above and rebuild (weld) to desired rail height.

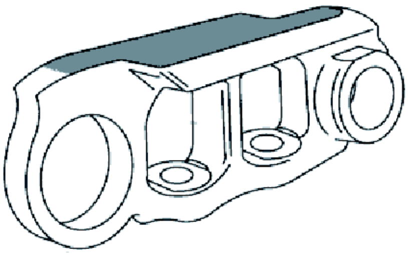


Fig 2.

Uneven Scalloping Wear on Rail Top

Causes (A & C)	Faster wear rate due to reduced contact with rollers at narrower link overlap area (also ⇨ ***Rail Side Wear (3-10)***).
Causes (B)	Sliding wear rate due to reduced contact area with idler at centre of link rail
Accelerators	Same as Rail (Top) Wear, particularly over tight track. (⇨ ***Rail (Top) Wear (3-9)*** .
Effect (A & C)	Wear limit over pin boss reached prematurely.
Note: *A, B & C; reduces rebuildability and causes vibration in extreme cases.*	
Remedies	Same as Rail (Top) Rail. (⇨ ***Rail (Top) Wear (3-9)***).

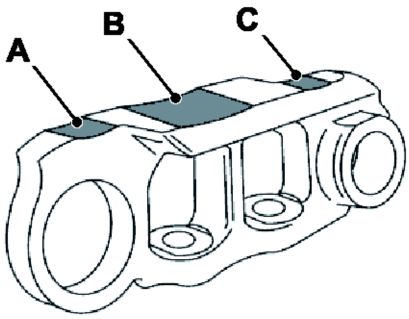


Fig 3.

Rail Side Wear

(Inside and/or outside)

Causes	Rolling and sliding contact with roller and idler flanges.
Accelerators	Same as ***"Rail Top Wear"*** plus uneven terrain, turning, side hill operation, excessive shoe width and snaking track.
Effect	Reduces rail wear life to service limit and rebuildability.
Remedies	Reduce or eliminate controllable accelerators, particularly snaking track, tight track and wide shoes.

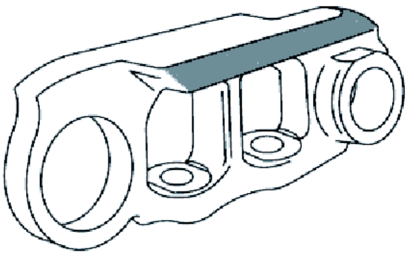


Fig 4.

Rail Inside Gouged

Causes	Sprocket tooth tip interfering due to snaking track and/or misalignment of track or sprocket (see ***Sprocket Wear***).
Accelerators	Side hill or uneven terrain, turning, excessive shoe width.
Effect	Reduced rebuildability of links and reusability of sprocket if severe.
Remedies	Correct controllable cause and accelerators.

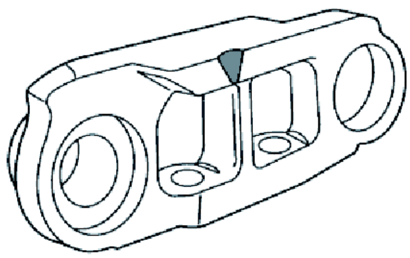


Fig 5.

Pin Boss Top Worn

Causes	Sliding and roller contact with roller flange tops (see ***Roller Flange Wear***).
Accelerators	Non uniform front and rear roller wear when link is not 100%.
Effect	Loss of pin retention and reduced rail rebuildability.
Remedies	Swap rollers to balance wear effect and rebuild rail, rollers as required.

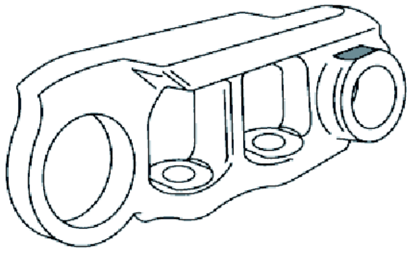


Fig 6.

Elongation of Counterbore

Causes	Rotating contact with the bush end in pitch extended track (see ***Track Bush Counterbore Wear***).
Accelerators	Non - a direct function of pitch extension.
Effect	Reduces re-sealability of counterbore. Link is less rebuildable.
Remedies	Turn pins and bushes in track at service limit.

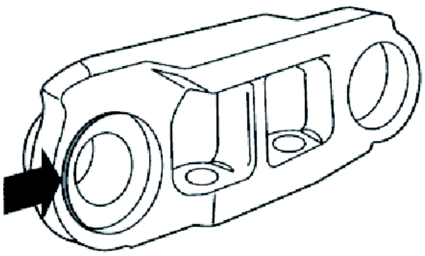


Fig 7.

Depth Wear in Counterbore

Causes	Rotative contact between track or bush end with bottom of counterbore.
Accelerators	Abrasiveness, side hill loads and turning, side thrust impact and excessive shoe width.
Effect	Same as Counterbore elongation wear (⇨ ***Elongation of Counterbore (3-11)***).
Remedies	Reduce or eliminate controllable accelerators and install new seals at pin and bush turn time.

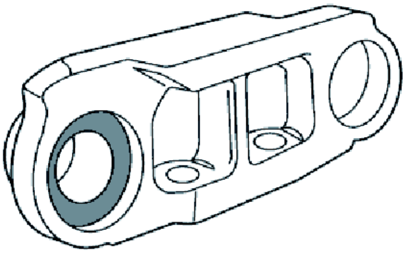


Fig 8.

Face Wear

Causes	Rotative contact between overlapping link faces following track link counterbore depth wear and bush end wear which allows end play.
Accelerators	Abrasiveness, side hill loads and turning, side thrust impact and excessive shoe width.
Effect	Reduces wear life of original and/or rebuilt link and reduces rebuildability. (Also ⇒ ***Rail (Top) Wear (3-9)***).
Remedies	Reduce or eliminate accelerators.

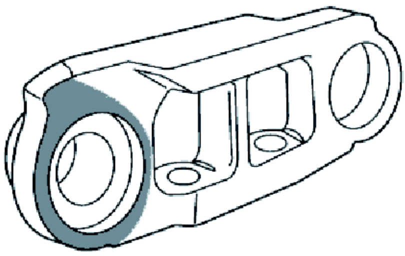


Fig 9.

Pin Boss End - Guiding Guard Wear

Causes	Sliding contact between pin boss ends and guiding and roller guards.
Accelerators	Sliding wear rate due to reduced contact area with idler at centre of link rail.
Effect	Reduces pin retention and therefore limits rebuidability.
Remedies	Reduce or eliminate all controllable accelerators related to loads conveyed from shoe link. Keep bolts properly torqued and use narrowest shoe possible.

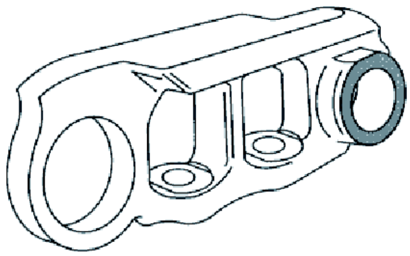


Fig 10.