The Deere design

Approximately 20 percent of your crawler’s purchase price is for the undercarriage. More importantly, nearly 50 percent of your maintenance costs will go into maintaining it. We know that one weak link in a system can cause a problem.

That’s why all Deere undercarriages are integrally designed. All components are carefully matched in tolerance, strength, hardness, and wear limits for overall optimum wear life. Although wear cannot be eliminated, you can prolong the wear life of components — minimizing maintenance costs. Keep your undercarriage system running strong with certified Deere parts.

Your Deere dealer’s certified Customer Support Advisor (CSA) can help you manage undercarriage system costs from the day you buy your machine. Your CSA can also help you manage the undercarriage system on your non-Deere machines.

This strategy guide explains how to get the most out of your undercarriage. It is not a repair manual. It will give you a good look at what causes wear and provide you with information on how to better manage your system for maximum production. By understanding what causes wear and periodically checking wear patterns on key components, you will have the information you need to make the best maintenance decisions possible.

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Undercarriage system components

1. Track shoes are through-hardened for maximum life.
2. Front idlers are induction-hardened on the tread for long life.
3. Track links are forged from a special boron-steel alloy and deep-induction-hardened.
4. Carrier rollers are induction-hardened.
5. Sprockets are forged and induction-hardened for maximum strength and long wear life.
6. Track rollers are forged from a boron-steel alloy and then through- or induction-hardened for long life.
7. Track frames provide a solid working frame.
8. Pins and bushings are precision-machined, induction-hardened, and sealed from abrasives.

Split master links are forged from special boron steel. They allow for easier removal and installation of the track chain.
Track chain

– Sealed (non-lubricated) undercarriage track
Sealed track chain (non-lubricated) is constructed with counter-bored track links. Spring-steel conical-shaped washers seal in the track link counter bore and make contact with the bushing ends when the track links are pressed together. The steel conical washers act as seals to limit the entry of abrasive material between the pins and bushings. As internal pin and bushing wear occurs, the distance between track pins increases. This is called pitch extension. As pitch extension occurs, wear increases on the bushing outside diameter and the sprocket teeth. There is wear only on about 180 degrees of the track pin outside diameter and bushing inside diameter.

– Sealed and greased undercarriage track (excavators)
Most excavators have sealed and greased track chain. Sealed and greased track chains have counter-bored track links and a special “M”-shaped polyurethane seal. The seal keeps the grease inside the pin and bushing joint, and keeps abrasives out. Sealed and greased track chain uses a lubricant between the pin and bushing, which improves wear life by reducing internal friction between the pin and bushing. Sealed and greased chain also lowers travel resistance and reduces noise. During assembly, grease is pumped between the pin and bushing until filled. Sealed and greased chain lasts approximately 20- to 40-percent longer than sealed (non-lubricated) chain. Sealed and greased track-chain pins and bushings can be turned if the machine has been working in a non-impact application. Coat the pin and bushing joint with grease at this time.

– Sealed and lubricated undercarriage track
Sealed and lubricated track chains have counter-bored track links and polyurethane seals in the track link counter bore that make contact with the bushing ends when the track links are pressed together. The polyurethane seals maintain lubrication between the pins and bushings, and keep abrasives out. Lubrication provides a film of oil between the pin and bushing internal contact surfaces, reducing friction and virtually eliminating internal pin and bushing wear. Eliminating pitch extension slows sprocket tooth wear and bushing outside-diameter wear. Sealed and lubricated chain life is approximately 50-percent longer than that of sealed (non-lubricated) track chain. Sealed and lubricated track chain not only reduces bushing outside-diameter wear and sprocket tooth wear, it reduces noise and increases machine fuel efficiency. No matter what type of track chain, the track pins rotate approximately 180 degrees on the inside-diameter surface of the bushings as the track chain pivots into and out of the sprocket and idlers. On sealed track chain, wear will occur on about 180 degrees of the track pin outside diameter and bushing inside diameter. On sealed and lubricated track chain, this wear is virtually eliminated.

– Extended-life undercarriage with SC-2™-coated bushings
Based on a patented metallurgical breakthrough, SC-2-coated bushings deliver twice the wear life of standard bushings. Whether you turn bushings or run them to destruction, they eliminate a bushing turn. Doubling the wear life of the bushings also lets you maximize the wear life of the other parts in your track-chain assembly. SC-2-coated bushings are available for most John Deere dozers and select crawler loaders. They are interchangeable with standard undercarriage, require no special tools, and “will fit” other brands of non-Deere-tracked equipment.
Maximum Life Undercarriage: Beyond SC-2

— John Deere Maximum Life Undercarriage combines rugged SC-2-coated bushings, larger wear parts, and more durable seals for a long-life undercarriage that’s sure to keep your uptime high. Maximum Life Undercarriage is designed to deliver long and balanced wear so your crawler stays on the site and out of the shop.

Maximum Life Undercarriage has been designed to withstand up to 4,500 hours in wet and highly abrasive soil, with up to 57-percent per-hour cost savings over standard sealed and lubed track.

— Larger and better seals
New seals in Maximum Life Undercarriage are reinforced to retain structural integrity.

— More steel for longer and more balanced wear
As you can see in the photo below, Maximum Life Undercarriage has larger components for longer and more balanced wear. The blue areas below illustrate the added wear material.

Estimated cost per hour*

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD SEALED AND LUBED TRACK</th>
<th>SC-2 EXTENDED LIFE TRACK CHAIN</th>
<th>MAXIMUM LIFE</th>
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<tr>
<td>Features</td>
<td>Life – 2,000 hours</td>
<td>Life – 3,000 hours</td>
<td>Life – 4,500 hours</td>
</tr>
<tr>
<td>Turn at 900 hours</td>
<td>Turn at 1,400 hours</td>
<td>Turn at 2,200 hours</td>
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<tr>
<td>Technology</td>
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<td>SC-2 bushings</td>
<td>SC-2 bushings, new seals, and Maximum Life components</td>
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<tr>
<td>Cost reduction from standard sealed and lubed track</td>
<td>NA</td>
<td>29%</td>
<td>57%</td>
</tr>
</tbody>
</table>

*In wet, abrasive soil conditions, similar to those in central Florida.

After punishing tests in abrasive sand, zero wear. Track-chain assemblies were field-tested in abrasive sand. These photos show the standard bushing wore 32 percent while the bushing with SC-2 coating had no visible wear.
Wear factors

– What causes wear?
An undercarriage works as a system. When a machine is in motion, there will be normal, unavoidable wear. With good undercarriage maintenance and operating techniques, the rate of wear can be reduced.

– Undercarriage maintenance
Maintenance practices that can reduce wear are:
1. Track tension or track sag
2. Track shoe width

A tight track magnifies the load, which results in more wear on the track bushings to sprocket teeth contact areas and the track-link-to-idler roller contact areas. Increased wear also occurs at the track-link-to-idler contact point and track-link-to-roller contact points. More load means more wear on the entire undercarriage system. Also, a tight track requires expending more horsepower and more fuel to do the job.

– Track tension and track sag affect wear
The most controllable factor in undercarriage wear is correct track-chain adjustment. Correct track sag for all conventional crawlers is two inches (± 1/4 inch). Tight tracks can increase wear up to 50 percent. For example, 1/2-inch track-chain sag on a crawler in the 80-horsepower range results in approximately 5,600 pounds of chain tension when measured at the track adjuster. The suggested two-inch track-chain sag on the same machine results in approximately 800 pounds of chain tension when measured at the track adjuster.

Follow these steps to adjust track-chain tension:

#1 Move the machine forward, slowly.
#2 Let the machine roll to a stop.
#3 Center the track pin over the carrier roller (A).
#4 Put a straightedge over the track (B).
#5 Measure the sag at the lowest point (C).

Always adjust track sag in the actual underfoot working condition. Check track sag often.
Track shoes

Track shoe width makes a difference
Select the narrowest track shoes possible, and make sure they give you the flotation you need. Wide track shoes used on a hard surface will put an increased load on the track-chain pin and bushing joints, and can affect pin and bushing retention in the track links. Lubricated track chain seal integrity can also be affected. A wider than necessary shoe width also increases stress and load on idlers, rollers, and sprockets. The wider the track shoe and the harder the under-track work surface, the faster track shoes, pins, bushings, rollers, and idlers will wear.

Open-center (center-punched) track shoes allow some soil, debris, and material to work out from between mating undercarriage components through the shoe. Open-center shoes are best for landfill operations or in snowy conditions.

Closed-center shoes should be used in almost all other applications.

The primary cause for track shoe loosening and split-master link separation is improperly torqued hardware. See your operator’s manual for proper torque procedures and specifications.

Wide shoes can reduce chain life by 50 percent and accelerate wear on all components, especially in rough terrain.
Operating tips

– Machine operation affects undercarriage component wear
  By using intelligent operating procedures, you can extend the life of the undercarriage.

– Limit nonproductive, high-speed travel
  High-speed operation accelerates wear on all undercarriage components. Track wear is directly proportional to speed. Speed equals stress. The distance a track machine travels determines wear. Plan your jobsite work carefully to make travel productive.

– Limit reverse operation
  Reverse operation accelerates wear on the reverse-drive side of the track bushings and sprocket teeth. The only time bushings rotate against sprocket teeth under load is during reverse operation.

  During reverse operation, approximately 75 percent of pins and bushings are under contact, load, and motion from the bottom of the front idler to the first pin and bushing joint engaged by the sprocket tooth. Forward operation puts about 25 percent of the pin and bushing joints under contact, load, and motion.

Reverse operation greatly increases load between the pins, bushings, and sprocket teeth, and between the track links, idler tread surface, and carrier roller, greatly accelerating the wear rate between these components.
– **Use rock guards selectively**
Full-length rock guards are not required in normal working conditions. If you are working on soil or surfaces that pack, full-length rock guards will trap the material between the track rollers and links, reducing their useful life. Use rock guards when you are working in rocky material — larger rock and material will not lodge as easily between the sprocket teeth and track bushings or between the track links and idler tread. Rock guards also aid in guiding the tracks in extreme hillside applications.

– **Reduce slippage and spinning**
Track slippage and spinning accelerate track shoe grouser wear and limit productive work. Heavy contact between the sprocket teeth and track bushings, between the track links and rollers, and between idler tread surfaces accelerates wear.

– **Plan your turns**
Constantly turning to one side will reduce the life of a track. The sprocket teeth, bushings, track links, idler, roller flanges, and tread surface on the side under constant load will wear faster. Plan your job to even-out turns if possible.

– **Working on a crown** puts all of the load and machine weight on the inner ends of the track shoes. The load is transferred to the inside track links, inside roller, idler tread surfaces, bushing ends, and sprocket contact areas. Continual work on a crown will accelerate wear on the inside track contact surfaces. Compare that wear to the wear on the outside track components.

– **Working in a depression** puts all of the load and machine weight on the outer ends of the track shoes. The load is transferred to the outside track links, outside roller, idler tread surfaces, bushing outside ends, and sprocket contact areas. Continual work in a depression will accelerate wear on the outer track contact surfaces. Compare that wear to that on the inside track components.
Operating tips continued

A. Buildup of material causes excess wear.
B. Uphill operation causes wear on the rear components.
C. Downhill operation shifts weight to the front of the machine.
D. Sidehill operation shifts the load to the downhill side of the undercarriage.

– **Clean undercarriages frequently.** Prevent packing of soil and debris in undercarriage components by cleaning out the track as frequently as possible. Packing prevents the proper engagement between mating components such as sprocket teeth and track-chain bushings. This can cause increased loads on undercarriage components and higher wear rates.

– **Operate with the terrain.** Plan your jobs and the movement of your machine to fit the terrain, and you will reduce undercarriage wear.

– **Working uphill** shifts the weight of the machine to the rear. This adds more load to the rear rollers and increases sprocket teeth and bushing forward drive-side wear. There will be a light load on the undercarriage when reversing down the hill.

– **Working downhill** shifts the weight to the front of the machine, with the additional load placed on the front roller, idler tread surface, and track links. When you reverse up the hill, the bushing rotates against the reverse-drive side of the sprocket tooth. Also, there is heavy load and motion between the bushing and sprocket teeth, which accelerates wear. A heavy load is placed on all pins and bushing joints from the bottom of the front idler to the first bushing contacted by the sprocket teeth. Extra load also is placed between the sprocket teeth and track links and the idler tread surface, reducing the life of bushings, sprockets, track links, rollers, and idlers.

– **Working on a slope or sidehill** shifts weight to the downhill side of the machine and causes additional wear on the roller flanges, sides of the track links, and grouser ends. Balance wear between each side of the undercarriage by changing the direction of work on the slope.
Alignment and wear points

Alignment checks
Track-frame and front-idler misalignment will accelerate wear on all components. You can check for alignment by observing the wear patterns on the bottom rollers, carrier rollers, and front idlers. You also can stand at the front and rear of the machine and do a visual inspection. Reference your machine manuals for specific adjustment procedures.

A. Check alignment.
B. Check bottom rollers.
C. Inspect the carrier roller.
D. Check front idlers.
E. Check pins and bushings.

John Deere provides complete undercarriage service — regardless of your machine make or model. See your local dealer to schedule your undercarriage inspection today.
Your CSA has the answers

Your certified CSA will help you set up a periodic inspection program, including record-keeping and maintenance suggestions that will help you minimize downtime, maximize your budget, and extend undercarriage life. A planned preventive-maintenance program will help you get the most from your investment. It’s never too early to start controlling undercarriage costs. You can rely on your John Deere dealer for the best parts and support in the business for all your tracked machines.