CONSTRUCTION TRACKS

SERVICE CONDITIONS AND WARRANTY GUIDELINES

Including CTL, MX, MTL, and OTT
05/16

1. INTRODUCTION

The purpose of this guide is to provide warranty information regarding operation and proper use of Camso CTL, MEX, MTL and OTT tracks used on compact construction equipment. This guide focuses on the warrantable and non-warrantable failures as well as how best to prevent them. Information is also provided concerning track replacement versus continued usability and suggested recommendations to minimize further damage when a track is adversely affected.

Tracks are used in a wide variety of applications and operating conditions. Various types of rubber track damage may occur during its service life. In most cases where damage has occurred, repair is not necessary or feasible. Many times track wear or damage only results in poor aesthetics. Track functionality and performance, however, remain intact. In other cases, track damage is severe enough to justify replacement.

This manual will at first explain what a rubber track is, what the different types of rubber tracks for tracked machines that exist and how tracks are made. It will also show actual examples of different types of damage illustrated by pictures to describe the causes and recommend prevention to extend the service life of rubber tracks. It contains some essential tracked machine maintenance procedures.

It is essential that customers / operators are informed about the prevention of track damage and the consequences of misuse.

Track damage and failures are due to a variety of causes but will fall most likely within these two categories:

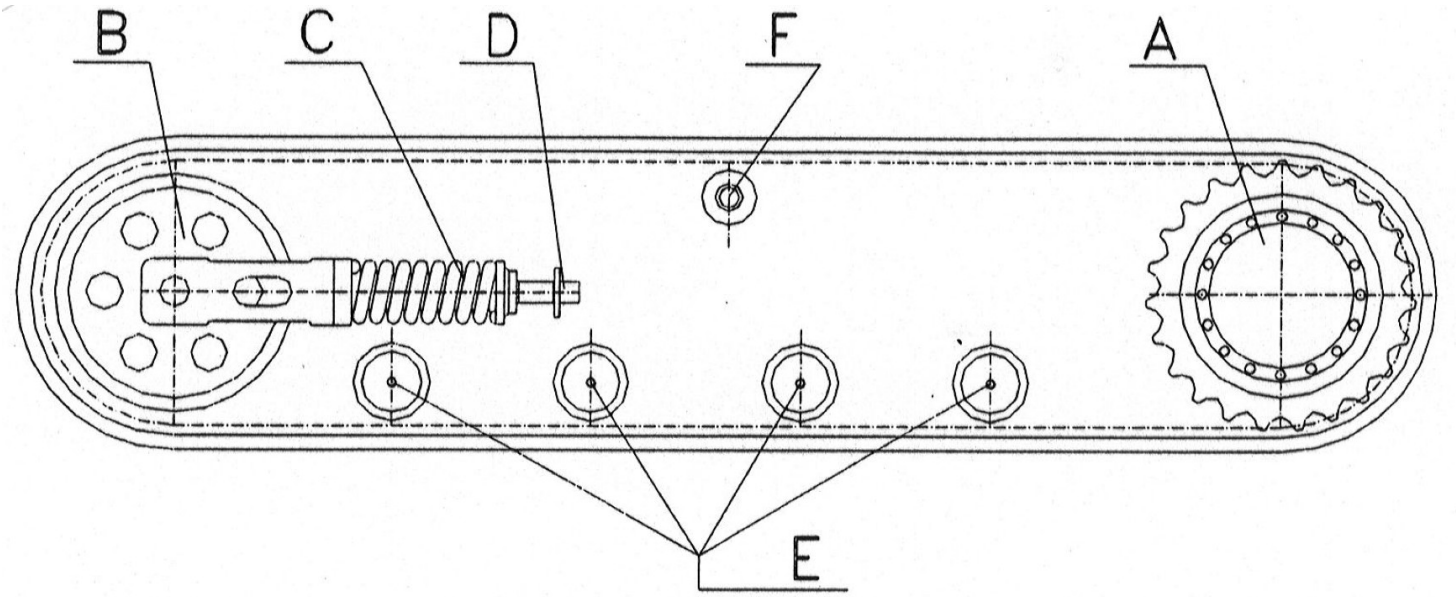
Warrantable:

- Disabling defects in materials and workmanship.

Non Warrantable:

- Operation in a manner or environment which exceeds the design specifications;
- Poor mechanical condition of the undercarriage components;
- Improper track tension;
- Mechanical damage;
- Cosmetic defects in materials and workmanship;
- Operational characteristics not related to defects.

2. BASIC COMPONENTS OF A TRACKED UNDERCARRIAGE



SPROCKET (A): It is the cogwheel usually situated at the back of the undercarriage which pulls the track. The number of teeth of the sprocket and its root diameter are important to choose the right track type.

IDLER (B): It is situated opposite the sprocket. The idler allows the track to be maintained at the right tension.

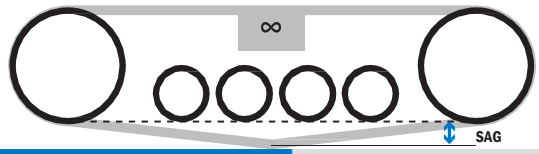
IDLER SPRING (C): It is designed to absorb the shocks and jolts of the machine. You only have to make sure that it is maintained in a good condition of work, meaning that it is operational.

TRACK TENSION DEVICE (D): It is situated in line with the spring and the idler. This component of the undercar- riage is essential because it allows for adjustment of the tension. Having a good tension can avoid lots of problems. See section for general tension guidelines

THE TRACK ROLLERS (E): It is situated all along the undercarriage support the weight of the machine and distribute it evenly on the track.

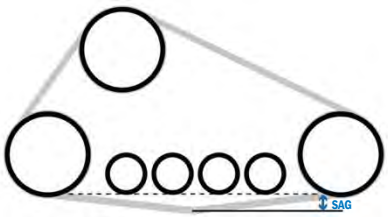
THE UPPER ROLLER (F): It prevents the track from sagging.

3. GENERAL TENSION GUIDELINES



General Tension Guidelines :	These values should only be used as general guidelines. Always refer to Operator's Manual for correct tensioning and setting procedures.
15 mm SAG (small machines <2,5T) 25 mm SAG (medium machines between 2,5T & 5,5T) 35 mm SAG (large machines between 5,5T & 14T)	

General Tension Guideline – MEX



General Tension Guidelines :	These values should only be used as general guidelines. Always refer to Operator's Manual for correct tensioning and setting procedures.
25 mm SAG (small machines) 50 mm SAG (large machines)	

General Tension Guideline – CTL

4. TRACK CONSTRUCTION

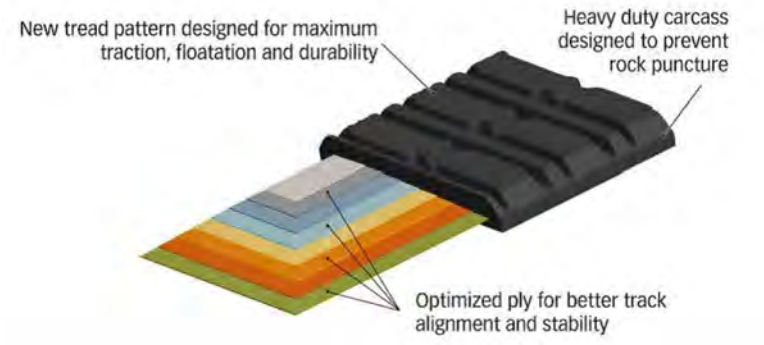
4.1 CTL & MEX tracks (Metal Embed Rubber Track)

A – High tensile steel cables
B – Embedded metal bars
C – Drive sprocket holes/Drive bars
D – Traction lugs

Camso CTL/MEX tracks are constructed using a combination of natural and synthetic rubber in combination with steel reinforcing cable bands and metal bar inserts for a long lasting low abrasion track. The steel cable bands give the track tensile strength, while at the same time maintaining lateral flexibility as well as excellent internal track alignment to better distribute loads across the entire track width. The tread is molded into specific shapes, with each shape giving a distinct performance advantage depending on the application.

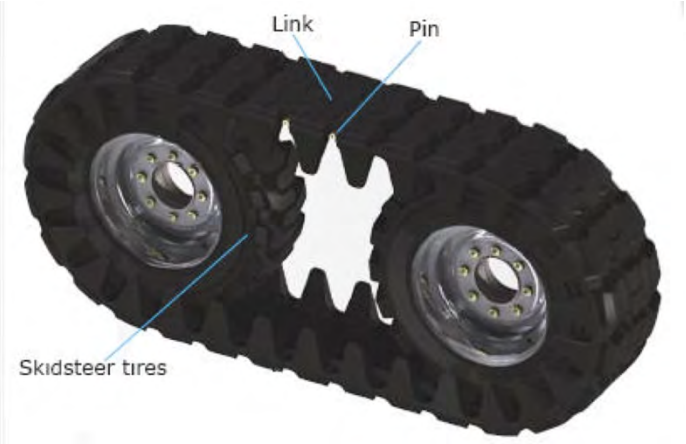
In order to effectively use this service and administration guide, certain terms must be defined as they are frequently referenced throughout the document. For additional definitions of track system terms used throughout this document, refer to Appendix A - GLOSSARY of Standardized Track System Terminology.

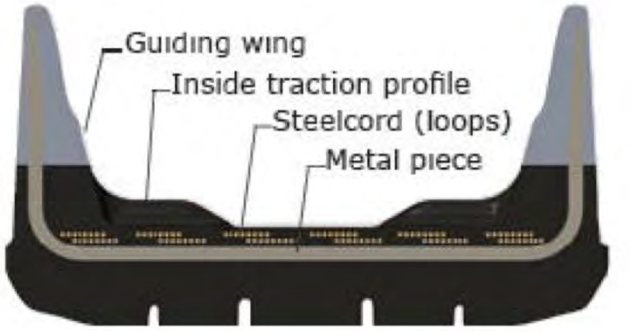
4.2 MTL Track (Multi-terrain Loader)



Camso MTL tracks are specifically designed for ASV/CAT multi terrain loaders. Heavy duty carcass construction and drive lug rubber compounds are specifically formulated for high resistance in high torque applications.

4.3 Over-The-Tire Tracks (OTT)





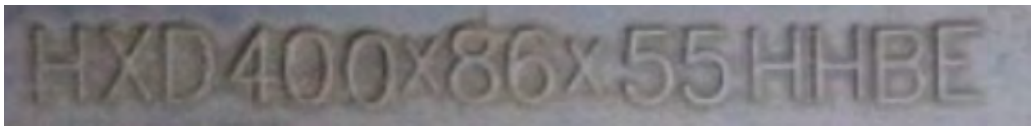
Camso HXD brand over-the-tire tracks utilize superior rubber compounding, high-tensile steel cord, and forged metal embeds. The OTT is a durable addition to a wheeled skid steer to obtain maximum traction and floatation.

5. PRODUCT IDENTIFICATION

Camso 500 (SD) / 700 (HXD) Series

Camso CTL & MEX track part numbers as well as serial numbers are located on the inner edge of the track ID carcass.

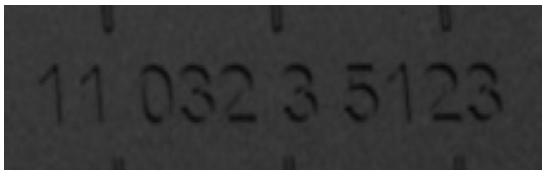
What the Part Number looks like



What the Serial Number looks like for tracks manufactured in KOREA

12103B2 = year 2012, 10th month, 3rd week of October, B:day of the week (Tuesday), 2 : Production shift

What the Serial Number looks like for tracks manufactured in Sri Lanka



(11) year, (032) day, (3) plant, (5) product group track, (123) sequential number

What the Serial Number looks like for MTL tracks manufactured in Plattsburg

MTL Track Serial Number
The letter (K in this case) defines the month a track was produced (K= November).
The year the track was produced will be the number following the letter,
2007 in the example the rest of the numbers is the sequential number.

6. CTL / MEX – TREAD PATTERN AND CARCASS

Tread pattern will wear differently depending on many factors. There are two main mechanisms for tread pattern wear: abrasive action during the transfer of power to the ground, (the scrubbing action as the tread bar leaves and enters ground contact), and when turning on hard surfaces.

The rate of tread bar wear is heavily influenced by the following factors:

- **Aggressive turning;**
- **Amount of road travel;**
- **Soil and ground conditions;**
- **Side hill operation;**
- **Total machine weight;**
- **Machine balance.**

Traction lugs will wear at different rates across the width of the track. In general, overall traction lug wear can be reduced by minimizing the amount of road travel and sharp pivot turning on hard road surfaces.

Transport / Roading Wear

Tread wear rate increases significantly during roading operations. It is important to minimize the distance and duration of high speed roading whenever possible. If long distances must be covered, consider transporting rather than roading. If roading must be done, tread bar wear rates can be reduced by staying off pavement, reducing transport weight and speed, and adjusting machine balance for even **weight distribution** front to back. The greatest rate of tread wear occurs on a hot day with a poorly balanced, heavy machine. If possible, transport during cooler parts of the day and at reduced travel speeds and with minimum ballasted weight, as this will lower temperatures of the treads, guide lugs, and rolling components.

6.1 Premature Tread Pattern Wear, (Low Hour)

Delamination of layer

Slippage

APPEARANCE: Traction lug wear and abrasion is inevitable. However, if usable traction lug height deteriorates rapidly compared to previous experience in similar ground conditions with delamination of the layers, warranty coverage may be applicable. Usually, this type of wear will progress rapidly and occur **within the first 100 hours of operation**.

WARRANTABLE: If we see can identify a compound problem (delamination of the layers, problem of curing...), depending upon hours of operation, ground conditions, previous brand experience, etc. **Submit claim for consideration**.

NON WARRANTABLE: In case of excessive roading or transport time, Slippage during the operation, operation on aggressive floor (oils, high heat, chemical products).
The tracks are warrantied against manufacturing defects, not against the problems of use. In case of demanding application, HXD tracks are more suitable

PREVENTION: Avoid oil and chemical exposure, running on sharp terrain, and operating in high heat conditions. For paving, understand that this type of application is very demanding for the tracks and that they will have a shorter life.
Also, when operating a CTL machine, make sure to avoid turning the machine on the spot by running both tracks in opposite directions and avoid the slippage when loading the bucket. It is recommended to operate only one track in order to turn the vehicle. This greatly reduces the wear of the tracks.

6.2 Tread pattern & Carcass cuts / damage

6.2.1 Cut relative to the use

APPEARANCE: Cut at the outer diameter of the track

NON WARRANTABLE: Cuts and cracks on the tread side are the most common issues encountered on rubber tracks. When the track drives over stones or sharp objects, the stress is located on a very small surface and will create the cuts. If the machine turns or spin on this object, cut will most likely happen. This type of defect is considered cosmetic in nature and will generally not affect the overall track life.

PREVENTION: Careful operation is needed when using rubber tracks near sharp objects. Spinning of the track over a sharp object may also show several consecutive traction lugs with similar damage. Damage may also occur by carelessly offloading from trailers. Watch for sharp objects and avoid them.

6.2.2 Cut relative to joint weakness

APPEARANCE: Straight crack which can occur at the inner or outer diameter of the track with clearly defined, non-jagged edges.

WARRANTABLE: If we can identify that the crack is in a joint area. In this case, it can be a contamination during the manufacturing process.

6.3 Flex Cracking / Ozone cracks

APPEARANCE: Cracks are usually shallow, and only at the base of the tread bar. Some of these may be due to minor manufacturing defects, environment, or minor mechanical damage. **The defects will generally not affect overall track life**. This type of defect is considered cosmetic in nature and not warrantable.

NON WARRANTABLE: Flex cracking generally occurs over time, and is due to rubber fatigue. This fatigue is caused by repeated bending loads as the track goes around the wheels and from traction lug stress due to tractive effort. Flex cracking can also be accelerated in high ozone areas, or in conditions where tracks are stored outside and continuously exposed to the sun.

PREVENTION: In order to minimize the occurrence of ozone cracks:

- Avoid exposing stored tracks to direct sun light;
- Avoid exposing stored tracks to direct rain and snow fall;
- Store tracks in well ventilated warehouses;
- Use the tracks at least once a month.

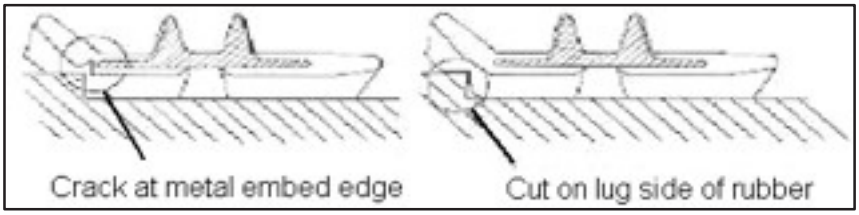
In some cases, the cosmetic issue may signal the early stages of another problem. If unusual cosmetic defects are seen, document the defect with photos and current hours, and then monitor the area of concern to see if a more serious condition develops.

6.4 Longitudinal Edge Cutting

Edge crack (contact damage)

APPEARANCE: Longitudinal crack along the edge of the track.

NON WARRANTABLE: Localized point loading on outer carcass edge by contact with curb lines, hard surfaces, or allowing the track to run in windrows or along berms causing severe bending. When the outer track edge is driven over projections, intensive stress is applied to the drive lug surface especially at the edge of the embedded metal bars causing longitudinal cracks and cuts along the edge of the track carcass and internal embedded metal bars.



PREVENTION: This type of damage usually does not disable a track, and it should continue to run. Overall track life may or may not be significantly reduced. When operating the machine, avoid edge contact with hard surfaces or allow the track to run in windrows or along berms causing severe outer edge bending.

6.5 Carcass delamination

OD Carcass Delamination

APPEARANCE: Separation and delamination will generally be in a large area and usually limited to one layer (between two specific layers of rubber). Because of this, the separation will be smooth. It will most likely be concentrated in one area of the track. Many times the separation occurs with clearly defined, non-jagged edges.

WARRANTABLE: Contamination or incomplete manufacturing cure.

Minor Separation

NON WARRANTABLE: In some cases, a minor or partial separation of a small area can occur. Although probably related to a defect in materials and workmanship, a small area is considered a non-disabling or cosmetic defect and should only be submitted for warranty “documentation”. It is possible that the minor separation could progress to a warrantable condition, **but the machine should continue to run until that time**.

6.6 Loose Wire Strands

Wire strands - (cosmetic)

APPEARANCE: Small wire which are coming out of the tread or the carcass

NON WARRANTABLE: Free floating or loose wire strands introduced into the mold during the manufacturing process. On some early production CTL/MEX tracks, fine wire strands may occasionally appear protruding from the tread or carcass after several hours of operation. **The defects will generally not affect overall track life**. These strands are strictly cosmetic in nature and should not be considered as an early indication of impending internal track failure

PREVENTION: Cut the wires or continue to operate with the wires which are coming out. Within the first 100 hours of operation or less, these strands will diminish as they work themselves out of the outer layer of rubber or are worn away during operation.

6.7 Material Ingestion under roller path

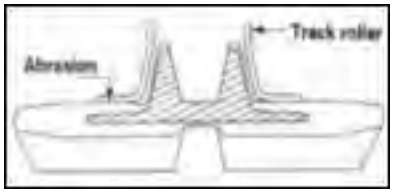
ID carcass wear (normal ground conditions)

ID carcass wear (severe or rocky conditions)

APPEARANCE: The track inside surface will show pitting and cutting initially. In normal soil conditions, the inside rubber will wear but not chunk. As the rubber wears away, the ride will become rougher.

NON WARRANTABLE: This type of wear is normal and will be seen mainly along the roller wheel path. When operating in rocky or gravel type ground conditions, cuts in the rubber will cause the rubber to come out in chunks and eventually expose the embedded metal bars.

PREVENTION: This level of abrasion is highly dependent on ground conditions. Small stones covered with mud can stick to the track rolling stock and increase the abrasion rate. Keep the track and undercarriage clear and free of any material build up. When operating in gravel or rocky type conditions drive the machine slowly and minimize sharp turns to prevent as much debris and gravel from entering the track undercarriage and along the roller wheel path. It is recommended to replace the track when more than half of the metal bars are completely exposed.



6.8 Steel cord breakage

APPEARANCE: A main cable failure can have several different appearances, depending on the severity of the damage. In most cases, the damage will go through the entire carcass.

The tear can be straight across, or at an angle. In some extreme cases, such as severe packing of debris due to being stuck or buried in material under full load, the track may tear across the entire width at once.

The shape of the failure in the rubber is wrenched, which is the sign of a failure not linked to a manufacturing problem which would show a slick crack.

The broken extremity of the steel cord have been elongated.

6.8.1 Overtension due to: Untracking – Overloading - Hard impact

NON WARRANTABLE: Localized over tensioning of the track main cables, due to:

- Untracking, resulting in localized guide path loading;
- Overloading due to rocks or debris passing between idlers and tracks;
- Loss of tensioner recoil due to extreme ID build-up of soil, mud or debris;
- Track not correctly tensioned;
- Hard impact with curbs or other job site hazards.

PREVENTION: Track cables are designed to operate under track tension as well as power transfer, and able to take localized loads without damage. However, in extreme conditions, it is possible to overload and break a section of the main cable. If the machine becomes stuck or buried in soil, do not attempt to drive the machine out of the situation. Clean out the undercarriage first to avoid an over tension condition.
Monitor the correct tension of the tracks, see section 3 General tension Guideline.

6.8.2 Overtension due to worn sprocket

New Sprocket

Worn Sprocket

NON WARRANTABLE: A worn sprocket will create a bad meshing between the sprocket and the track and will create abnormal tension to the track.

PREVENTION: Sprocket wear is normal in operation and as it is a wearable part, it needs to be replaced as needed, or as stated in the track loaders operators' manual. Depending on the make and model, sprockets need to be replaced every 1500 hours. However, if a worn sprocket is used it can cause considerable damage to a track.

If there is too much 'slop' or 'play' between the connection of the drive sprocket to the track the machine will 'shunt' causing enormous strain on the track resulting in a damage to the track's joint.

6.8.3 Overtension due to improper loading of the machine

We see more and more customers who load and unload the machine in the trailer like below.
Be aware that this method creates a big risk to break the tracks.

The tracks will not suddenly break when loading or unloading, but you can break a part of the steel cable inside and the track will break completely later.

At this moment, all the weight of the machine is localized on this line.

7. CTL / MEX – METAL BARS

7.1 Metal bar separation

Drive bars transfer the machine load and driving torque into the track, and provide the means to keep the track on the machine. Drive bars will typically not wear appreciably during the life of the track.

7.1.1 Separation due to lack of adhesion


Early stage (Metal bars beginning to move in carcass)


Later stage (complete separation)

APPEARANCE: Loss of drive bars due to contamination will usually exhibit a smooth drive bar separation from the inner carcass ID. Little or no remaining rubber material will be left adhered to the metal surface.

WARRANTABLE: Lack of rubber compound adhesion to the metal drive bars inserts during the manufacturing process due to contamination.

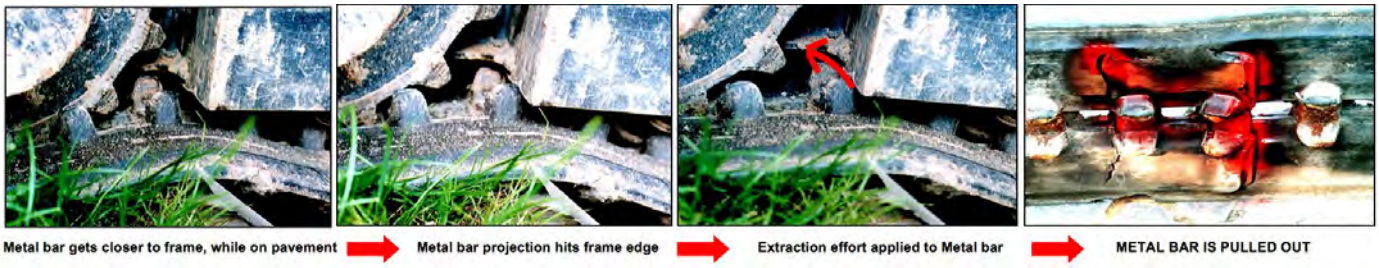
7.1.2 Separation due to force induced

The shape of the rubber is ripped

We still have rubber bonded on the metal bar

APPEARANCE: Evidence of this failure mode will be different than the previously described warrantable drive bar loss related to adhesion. (See section 7.1.1 Separation due to lack of adhesion). If the problem is due to untracking, no smooth separation of the drive bars will be seen as the bars will be pushed through or tore from the inner track carcass. Rubber will be seen still adhered to the separated drive bars and take on a jagged, torn separation appearance.

NON WARRANTABLE: Loss of track tension in some cases can allow the sprocket to ride on top of the metal drive bar sprocket guide causing extreme localized force being applied to only one side of the drive bar. This condition can cause separation of the drive bar as the sprocket forces the bar through the track carcass. Improper track tension, worn sprockets, or poor mechanical condition of other undercarriage components can also contribute to untracking. When machine moves onto curbs, obstacles, especially when tension is too low, the metal bars are likely to hit the frame of the undercarriage or the rollers.



Cracks can also appear along the top of the embedded metal bars due to heavy force applied to the metal bar (excessive loading transport). If this failure mode appears, the embedded metal bars will finish to be pulled out of the carcass with rubber bonded around it.

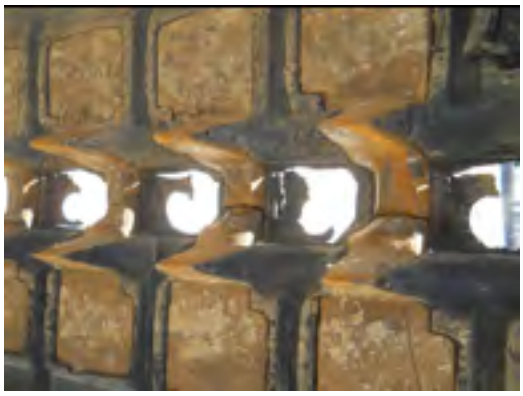
ID carcass cracks (above embedded metal bars)

PREVENTION: It is important to verify and maintain proper track tension as directed by the machine manufacturer and is one of the simplest ways to ensure full life out of your track.
Over or under tensioning of a track will cause terminal damage leading to costly downtime and track replacement. Loose tracks run the risk of detracking and breaking / extracting metal piece while too tight of a tension magnifies the load and increases wear on the entire undercarriage system.
It's also important to check if the meshing between the sprocket and the track is optimal

Monitor the correct tension of the tracks, see section 3 General tension Guideline.

7.2 Metal bar Wear


Big wear of the central due to non-adapted sprocket




Big wear of the central due to operation on sandy field

APPEARANCE: Premature wear of the central section of the metal bar

NON WARRANTABLE: Premature wear to the drive bars can be caused from:

- Excess of tension which have accelerated the wear of the sprocket and the metal pieces.
- Too old and already abraded sprockets which results with a pitch which does no longer matches to rubber track pitch
- Sprocket non-adapted to the track
- Operating on sandy fields is also a major cause of wear. The metal pieces will start to wear out and finally section becomes thin and metal pieces break.
- Rubber tracks which operate with an extraordinary heavy load on them.

PREVENTION: Sprocket wear is normal in operation and as it is a wearable part, it needs to be replaced as needed, or as stated in the track loaders operators' manual. Depending on the make and model, sprockets need to be replaced every 1500 hours or when the tracks are replaced. A worn sprocket can cause considerable damage to a track.

Check periodically the tension of the tracks and avoid operating in overloaded conditions.
In case of operation in a sandy field, clean out the undercarriage at the end of the day.

7.3 Metal bar Breakage

Untracking due to gravel in roller path

Drive bars cracks (impact)

Impact with a curb

Breakage due to abraded sprocket

APPEARANCE: Breakage of one or several metal bar(s). Usually at the central section

NON WARRANTABLE: Mechanical damage to the drive bars can be caused from untracking or ratcheting due to:

- Incorrect track tension. As the drive bars begin to ratchet, they will pop in and out of the drive sprocket and can cause substantial damage to the tips of the drive sprocket and metal bar inserts.
- Too old and already abraded sprockets, which pitch does no longer matches rubber track pitch.
- Hard impact of the track against concrete stairs, curbs or other job site hazards.
- Overloading / severe impact event which well exceeds the design intent or capabilities of it.

PREVENTION: It is important to verify and maintain proper track tension as directed by the machine manufacturer and is one of the simplest ways to ensure full life out of your track. Over or under tensioning of a track will cause terminal damage leading to costly downtime and track replacement. Loose tracks run the risk of detracking and breaking metal piece while too tight of a tension magnifies the load and increases wear on the entire undercarriage system.
Keep the track and undercarriage clear and free of any material build up. **Never attempt to clear excess of material by driving the machine.**

8. MTL TRACK

Typical Wear Patterns / Characteristics

Carcass wear can vary greatly depending on the environment and application. As the track accumulates hours of operation, it will show many surface blemishes on the outside and inside carcass surfaces, including; cuts, scrapes, scratches, nicks, surface cracks, slits, etc. The carcass will deform to allow most debris to pass by without damage. In cases where sharp objects are contacted, various degrees of minor carcass damage will result and is considered normal.

The drive lugs should remain intact but may show some signs of wear from friction, minor ingestion or loading. Loss or major damage of drive lugs should be reported immediately.

8.1 Carcass layer separation

Tread delamination

APPEARANCE: Separation of the tread from the carcass due to contamination. A partially piece of the tread is removed from the carcass (smooth separation appearance).

WARRANTABLE: Poor adhesion due to contamination or improper cure.

8.2 Drive lug separation


Drive Lug Loss (smooth separation)

APPEARANCE: Loss of drive lugs due to contamination will exhibit a smooth / clean separation appearance from the internal diameter of the carcass.

WARRANTABLE: Poor adhesion due to contamination or improper cure.

8.3 Drive lug Damage


Drive Lug Loss Or Damage (jagged appearance or separation)

APPEARANCE: Loss or damage to drive lugs due to force or ratcheting will have a jagged edge, no smooth separation.

NON WARRANTABLE: The jagged edge of the drive lug separation indicates that it was torn by force. A defect in material or workmanship will have a smooth separation.

The damage here suggests:

- Over-tensioning => the meshing between the track and the sprocket is not correct and the sprocket doesn't engage properly.
- Loss of track tension => Debris passing between the carcass and drive sprocket can also damage the drive lugs.
- Slippage of the sprocket inside the track during the operation when the bucket gets stuck on the floor.

PREVENTION: Check periodically the tension of the tracks and the undercarriage condition.
Avoid to move forward when the bucket get stuck on the floor

9. OTT

Recommended tires / Characteristics Typical / Wear Patterns

1. OTT tracks should be adapted only on air inflated tires (never on foam-filled tires)

2. OTT tracks should be fitted on tires with the below tread in order to provide high traction between tire and internal traction rib of the OTT

Good tread for OTT

Internal Traction Rib

In the below list of CAMSO tires for skid steer, you can see which are recommended for OTT tracks:

OTT tracks should wear evenly across the surface of the track although wear can vary greatly depending on the environment and application.

As the track accumulates hours of operation, it will show many surface blemishes on the outside and inside surfaces, including; cuts, scrapes, scratches, nicks, surface cracks, slits, etc. In cases where sharp objects are contacted, various degrees of minor carcass damage will result and is considered normal.

Proper care and inspection should be made to look for unusual wear patterns both on the outside and inside the track, as well as the tires themselves. Any unusual wear should be reported immediately.

9.1 Wear inside the guide wings

APPEARANCE: Wear or scuffing on the inside of the guide wings.

NON WARRANTABLE: The major causes of inside guide wing wear improper tire size or under-inflated tires. Wear can also be seen due to sidewall impact or axial movement.

PREVENTION: Verify correct tire size, contact Camso for recommended tire size for machine and OTT use. Check tire pressure often and adjust as necessary. Ensure that the OTT length is within recommended spec. Avoid hitting and running up the side of curbs.

9.2 Inner diameter wear

APPEARANCE: The inner diameter of the OTT will have wear or scuffing, possibly down to the metal embeds.

NON WARRANTABLE: Pre-mature wear on the inner track surface is caused by tire slippage within the OTT.

PREVENTION: It is important to first make adjustments in the track tension, ensuring that it is within the factory recommended specifications. Over-inflated tires can also cause tires to turn inside the track and wear the inner surface, make sure tires are at recommended PSI.

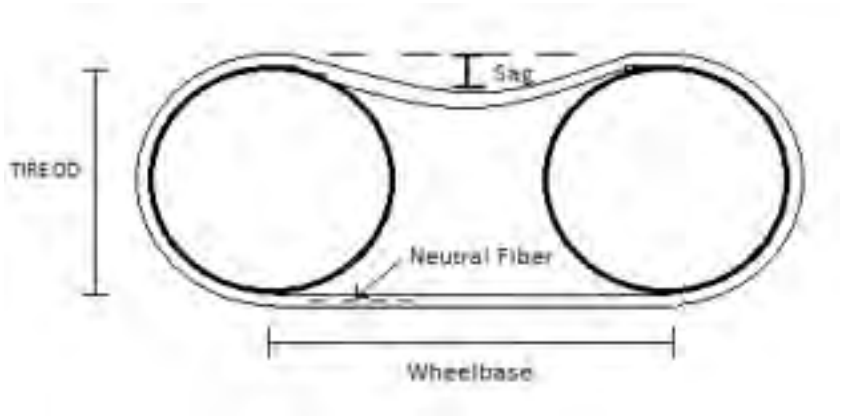
9.3 Cracking between the guide wings

APPEARANCE: Cracks in the rubber between the guides as seen in the photo above.

NON WARRANTABLE: Cracking seen between the guide wings is caused by over tensioning the OTT.

PREVENTION: Ensure track is tensioned to factory specifications and tire PSI according to specification. Although the damage is irreversible, if corrected in a reasonable amount of time this should not significantly reduce the life of the OTT.

Correct tensioning of OTT : sag=approximately 2 inch (50mm)



9.4 Bent of guide wings

APPEARANCE: The metal guide wings appear to have been bent outward.

NON WARRANTABLE: Metal guide wings can be bent outward by both foreign objects becoming ingested between the tire sidewall and the guiding pieces or by under-inflated tires.

PREVENTION: Ensure proper tire PSI according to specifications, this will help to keep foreign objects from becoming ingested between the tire and OTT.

9.5 Tread pattern impact / damage

APPEARANCE: Jagged rips or tears in the outer diameter of the OTT.

NON WARRANTABLE : Impact damage can be caused by driving over a number of hazards including sharp objects, curbs and/or rebar concrete reinforcements.

PREVENTION: Avoid sharp objects and blunt force impact situations.

9.6 Tread pattern Chunking

APPEARANCE: Chunks, nicks or other non-smooth wear on the outside diameter of the OTT.

NON WARRANTABLE: Chunking of the outer surface of an OTT can be the result of many different causes. OTT used in paver applications will result in chunking as will other applications where the OTT may be exposed to oil or corrosive chemicals or high-heat conditions. Sharp terrain may also result in chunking.

PREVENTION: Avoid chemical exposure, high heat and sharp running terrain.

9.7 Tapered wear

APPEARANCE: Treads will exhibit a tapered wear, usually thicker on the outside and tapering in towards the inside of track.

NON WARRANTABLE: Tapered wear is the result of axle bending or flexing under severe or heavy loads.

PREVENTION: To ensure proper wear and avoid tapering, it is imperative to rotate the tracks every 100 hours.

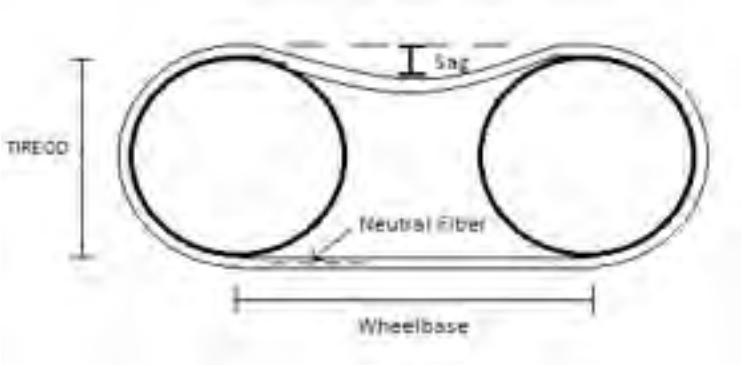
9.8 Torn or ripped link fingers

APPEARANCE: Jagged tear of the link or junction finger or track near these points.

NON WARRANTABLE: Over-tensioning of the OTT can result in a jagged tear of the link or junction fingers. Material ingestion between tires and OTT can be the results of an overtension.

PREVENTION: Ensure proper tensioning of OTT and tire PSI according to factory specification. In case of material ingestion between the tires and the OTT, stop the machine to remove excess material.

Correct tensioning of OTT : sag=approximately 2 inch (50mm)



9.9 Damage to sidewall of tire

Damage to sidewall of tire using OTT

APPEARANCE: Light to severe wear of the inside or outside sidewall of tires of a wheeled machine using an OTT.

NON WARRANTABLE: Under-inflated tires will bulge within the OTT and wear along the sidewall. An incorrect ply rating will result in tires not being able to support the load and will also causing bulging that will wear on sidewall. If the tires are sized incorrectly, according to factory specifications for use with OTT, heavy sidewall damage will occur. Misalignment between front and rear tires, nave plate position, or a bent wheel or nave plate will also result in severe wear of the tire sidewall.

PREVENTION: As with many other issues, it is extremely important to ensure proper PSI rating as is true with ply rating versus machine load. Recommended tire size should be followed to prevent sidewall wear and OTT damage. On the machine, check to ensure proper alignment and wheel offset.

10. APPENDIX A: GLOSSARY OF STANDARDIZED TRACK SYSTEM TERMINOLOGY

Alignment: Uniform parallelism of track components that minimizes the interaction between the track guide or drive lugs and wheels.

Carcass: The central part of the track.

Chunking: Loss of small pieces of rubber by tearing from the wear surface of the track.

Delamination: Separation of track carcass layers between construction sheets. Can also refer to separation of tread bar layers.

Detracking: Track comes off of the drivewheel. Normally known as “untracking”.

Metal bar(s): A series of metal inserts embedded into the inside surface of the track carcass for the purpose of both keeping the track retained on the undercarriage, and also to provide a surface to transmit power to the track.

Drive Sprocket: A large powered wheel with teeth that engages the embedded metal drive bars and transmits power from the machine to the tracks.

Guide Wings: On an OTT, referring to wings or sidewall contact points that stabilize and move the track.

ID, Inside Diameter: The inner surface of the track carcass where the drive bars are positioned and the portion of the track that contacts the idlers and rollers.

Inside Reinforcement: Term used for a heavy duty carcass design in which additional layers of rubber and reinforcing plies are added between the cables and the inside surface of the track.

Idler Wheel: A large non-powered wheel (usually at the front of the undercarriage) that provides a reaction point for the track tensioning system.

Junction Link Fingers: On an OTT, refers to the point where the ends of the track meet. There may or may not be an extension link.

Leading Edge: When referring to Traction lugs, the edge of the tread bar that first engages the soil when the machine is being operated in the forward direction. This edge is to the rear on Traction lugs that are in contact with the soil. When referring to drive bars, it is the edge of the drive bar that first engages the drive sprocket when operated in the forward direction.

Roller: Small non-powered wheel used to distribute machine load over the track.

OD, Outside Diameter: The external surface of the carcass on which the Traction lugs are attached, and that contacts the ground.

Recoil: The movement allowed by the tensioning system in order to allow “give” for material which may pass between the track carcass and the wheels.

Reinforcement Plies: Specialized bias ply layers embedded with reinforcing wires perpendicular to the main cable, in order to increase lateral stiffness and provide internal carcass protection.

Scuffing: A rough/ smeared surface on tops of traction lugs which occurs when turning on hard surfaces.

Tensioning Force: The total reaction force applied to tension the track.

Track Tension: The force seen in a given section of track, which is statically ½ of the tensioning force. Track tension can change depending on amount of tractive force and also on the amount of system recoil.

Tractive Effort: The amount of power that is transferred to the ground from the track.

Traction Lug(s): A series of shaped rubber pieces attached to the track outside surface, and which transfer the tractive force to the ground.

Undercarriage: Term normally used for the track system excluding the track itself. When referenced in the context of rubber track, the undercarriage may also refer to a system in which the track gauge is not easily adjustable.

Wheel Path: The portion of the inside track surface that is in contact with the wheels.

Wheelbase: The distance that the track is on the ground as measured front to back. This is typically measured from the centerline of the idler axle to the centerline of the drive sprocket.