Kubota

Bulletin No : G-23-007-01-KEEN
Date : Sep. 27, 2023
Ref.PB No :

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SUBJECT :
GUIDELINE : RUBBER TRACK DAMAGE

MODEL : FARM AND CONSTRUCTION MACHINERY WITH CRAWLER
SERIAL No. AFFECTED : ALL
COUNTRY AFFECTED : ALL
REASON FOR ISSUE :

When the rubber track damage was found, technician couldn't easily judge how to recover by using manuals. So, the guideline for rubber track damage is issued in this time.

☐ **WARRANTY INFORMATION**
- ☐ Mandatory Campaign : Allowable Man-hours ;
- ☐ Technical Bulletin : Allowable Man-hours ;
- ☐ Quality Related Information

☒ **SERVICE INFORMATION**

SERVICE BULLETIN

KBT Order No. : NA

1. General

This document is an educational material to ensure proper handling of rubber tracks and provides the action reference when rubber track damage is found. By using this guideline, you can understand the cause of the damage and use it to service your customers.

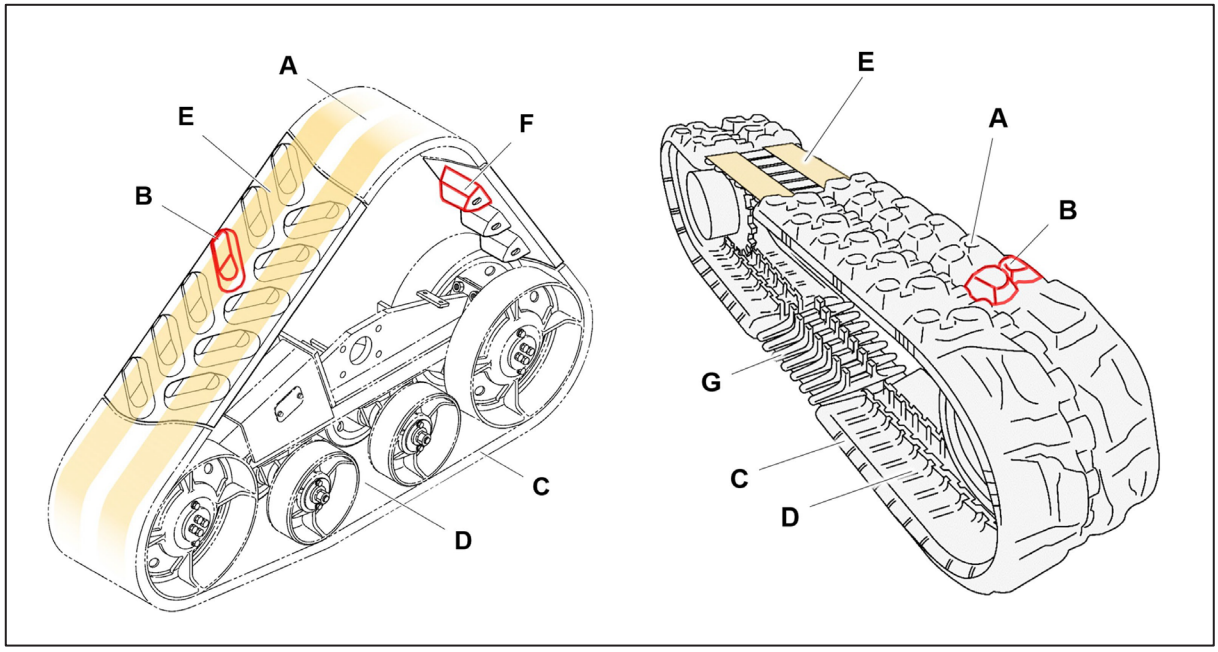
2. Guideline

1. How to use this guideline

(1) In item number "2.2 Area", find the alphabet of the damage location where you want to find the criteria.

(2) In item number “2.3 Inspection criteria”, find the item with the same alphabet in the "Applicable Area" column as the one in (1), and refer to the necessary information on its item.

2.2 Area



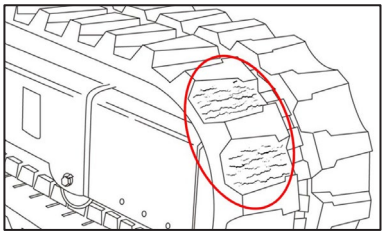
Agricultural machinery

A. Tread (not including tread lug)
B. Tread lug
C. Side edge of rubber track
D. Tread inner surface (not including guide lug)

Construction machinery

E Steel cord
F Guide lug
G Core metal

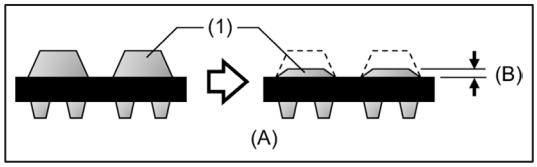
2.3 Inspection criteria

Applicable Area & Machine	Damage	Action / Cause of damage / Prevention
Area: A, B **Machine:** ☑ Agricultural machinery ☑ Construction machinery	**Ozone crack** 	**Action** Continue in service* *Even if ozone cracks reach steel cords, rubber track continues in service as long as no rust occurs on the cords. **Cause of damage** - Ozone cracks are a natural aging phenomenon of rubber - Ozone cracks are known to be accelerated by specific conditions like coastal environments with salt, regions with frequent snowfall, cold climates, and exposure to sunlight. - Due to the rubber in the same area being distorted over a long period. **Prevention** - If machine is under the prolonged parking, keep the following. 1) Avoid exposure to direct sunlight 2) Avoid low temperature condition 3) Operate the machine at least once a month to avoid distortion in the same part of track. Precautions for storing rubber tracks in a warehouse. 1) Avoid exposure to direct sunlight 2) Avoid low temperature condition 3) Avoid bad ventilation area 4) Loose the tension of track 5) Move the stored rubber track at 1-2 times per a week to avoid distortion in the same part.
Area: A, B **Machine:** ☑ Agricultural machinery ☑ Construction machinery	**Chunking** 	**Action** Replace rubber track if the damage is following condition. - Steel cords are exposed* *Moisture can penetrate exposed steel cords, causing them to rust and break. **Cause of damage** - External cuts caused by hard objects can reach other cuts on the track, and the rubber of tread surface can be removed out. Chunking is more likely to occur during sharp turns and spinning. - When driving over the sharp rocks, concrete fragments, tree stumps, and other debris. - Sharp turns and track spinning during dozer operations. **Prevention** - Avoid unnecessary quick or sharp turns, track spinning during dozer operations. - Avoid sharp, hard, or large foreign objects on the driving surface

Area:
A, B
Machine:
☑ Agricultural machinery
☑ Construction machinery

Excess or premature wear

Action
Replace rubber track if the damage is following condition.
- Steel cords are exposed
- Tread height is less than 5 mm



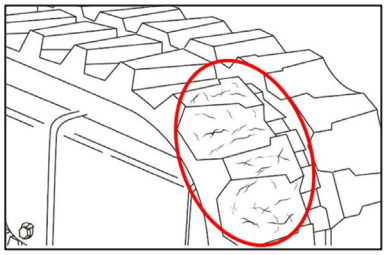
(1) Tread lug
(A) Side view of track
(B) 5 mm or less

Cause of damage
- The tread becomes worn over time due to regular use on muddy, dirty, and gravel surfaces.
- Excessive tread wear occurs on hard surfaces such as asphalt and concrete.
- Tread wear is accelerated by turning sharply and spinning the track during dozer operations.

Prevention
- Minimize turning and avoid quick or sharp turns on concrete or asphalt roads and on forest roads where there are many sharp stones.
- Avoid slipping as much as possible in heavy load operations such as towing and dozer operations.
- Avoid unnecessary quick or sharp turns, excessive loading, sudden acceleration and braking.

Area:
A, B
Machine:
☑ Agricultural machinery
☑ Construction machinery

Flex cracking



Action
Continue in service*

*Adjust the tension of rubber track if damage is significant.

Cause of damage
- Normal deterioration by repeated bending loads.
- Usage in regions with high ozone levels and long-term sun exposure.

Prevention
- Regularly monitoring and adjusting track tension.

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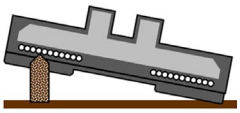
Area:
A, B, D
Machine:
☑ Agricultural machinery
☑ Construction machinery

Cut

Action
Replace rubber track if the damage is following condition.
- Steel cords are exposed*

*Moisture can penetrate exposed steel cords, causing them to rust and break.

Cause of damage
- Due to the nature of work, external cuts are to be expected.
- Critical external cuts are commonly caused by sharp rocks, concrete chunks, steel plates, rebar, nuts / bolts, sharp curbs, and tree stumps.



- Turning, especially when stepping over obstacles, is more likely to cause external cut.
- Sharp turns and track spinning during heavy load operations such as dozer operations.

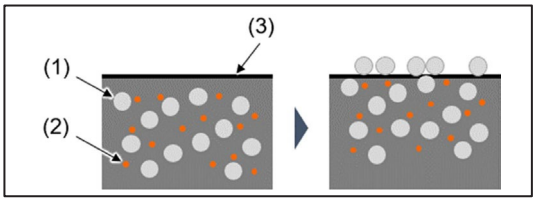
Prevention
- Avoid sharp, hard or large foreign objects on the road surface and avoid turning over obstacles as much as possible under the following driving conditions.
  1) Construction site
  2) Demolition site
  3) Forest road
  4) Mountain area
  5) Riding over curbs and steps
- Avoid the following operations.
  1) Quick or sharp turns
  2) High speed driving
  3) Excessive loading

Area:
A, B, D, F
Machine:
☑ Agricultural machinery
☑ Construction machinery

Blooming, Surface whitening

Action
Continue in service

Cause of damage
- Rubber track contains wax and antioxidant. These compounds seep out onto the rubber surface as time passed. Initially, they are transparent, but prolonged storage can cause them to turn white or brown due to oxidation and other factors.



(1) Wax
(2) Antioxidant
(3) Rubber surface

- The compounds seeped out onto the rubber surface serves as a protective film to prevent ozone cracking. This phenomenon is called blooming.
- Blooming protect the rubber from ozone, rain, or sunlight and is not abnormal.
- Blooming are accelerated by dynamic factors such as friction and bending, and by high temperatures of 40-50 degree.

Prevention
- If white or brownish blooms need to be removed, apply wax and wipe it off.

Precautions for storing rubber tracks in a warehouse.
1) Avoid exposure to direct sunlight
2) Avoid bad ventilation area

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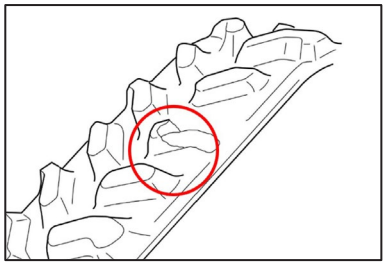
Area:
B
Machine:
☑ Agricultural machinery
☑ Construction machinery

Tear off



Action
Replace rubber track if the damage is following condition.
- Steel cords are exposed*

*Moisture can penetrate exposed steel cords, causing them to rust and break.

Cause of damage
- Interference between tread lug and foreign object.

Prevention
- Regularly wash the undercarriage to remove dirt and foreign object.
- Avoid sharp, hard, or large foreign objects on the driving surface.

Area:
C
Machine:
☑ Agricultural machinery
☑ Construction machinery

Cut along the side edge of core metal

Action
Replace rubber track if the damage is following condition.
- Steel cords are exposed*

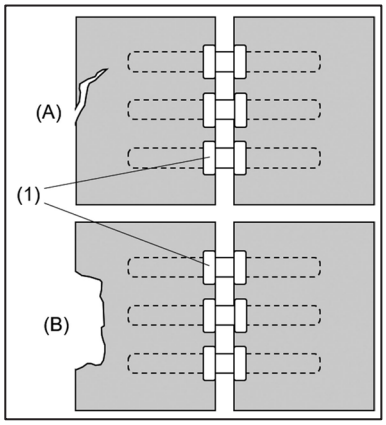
*Moisture can penetrate exposed steel cords, causing them to rust and break.

Cause of damage
- This damage is caused by driving over protruding objects or driving too close to a wall like rice field ridge in parallel. This is especially likely to occur in construction machinery due to concentrated load on the edge of core metal.

Prevention
- Avoid driving over protruding objects or sharp foreign objects on the driving surface.
- Avoid driving too close to a wall like rice field ridge in parallel.
- Avoid stumps and ruts during driving in forest road.
- If it is necessary to drive over steps, approach straight at a 90 degree angle toward steps so that both tracks on ground simultaneously.

Area:
C
Machine:
☑ Agricultural machinery
☑ Construction machinery

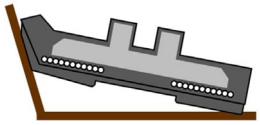
Cut, Tear



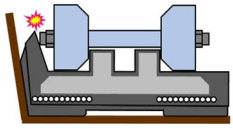
(1) Core metal
(A) Cut
(B) Tear

Action
Continue in service

Cause of damage
- This damage is caused by severe distortion of rubber track due to obstacles and walls.



- This damage is caused by interference between side of rubber track and undercarriage parts, when the roughness of the road surface causes the side edge of track to deform significantly.



Prevention
- Avoid sharp, hard or large foreign objects on the road surface.
- Avoid driving in contact with walls, ditches, or curbs.
- If rubber track is detracted, stop the machine immediately and put the rubber track back to normal.
- Adjust the tension of rubber track regularly to avoid interference between side of rubber track and undercarriage parts.

Area:
D
Machine:

☐ Agricultural machinery

☑ Construction machinery

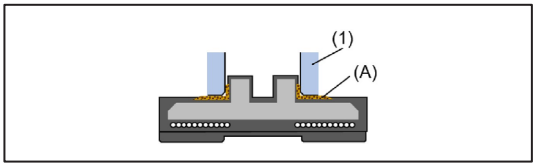
Torn around core metal

Action

Replace rubber track if the damage is following condition.
- 50 % or more of all core metals are completely exposed

Cause of damage

- Damage can occur when stones, gravel, or crushed concrete trapped between the inside of the truck and the casing and crushed into the rubber interior by idlers, etc.
  When the core metal is exposed, sand particles and moisture can enter and degrade the adhesion of the core metal.



(1) Idler
(A) Sand etc.

Prevention

- Avoid sharp turns to minimize catching debris in the undercarriage.
- Perform washing undercarriage after using the machine in areas with a lot of sand or gravel.

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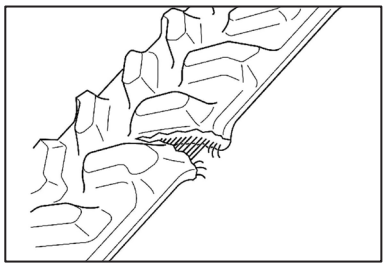
Area:
E

Machine:

☑ Agricultural machinery

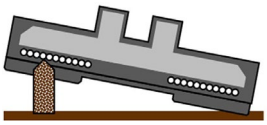
☑ Construction machinery

Tear off

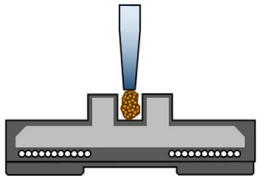


Action
Replace rubber track

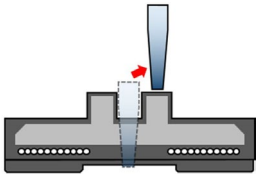
Cause of damage
- Due to over tension of steel cords:
  Following cases cause the over tension.
  1) When driving over sharp and protruding objects.



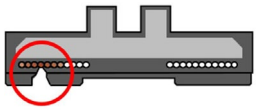
  2) When the large objects such as: rocks, timber and other debris of foreign materials enter the undercarriage.



  3) [Constructor only] When the rubber track is partially or completely detracted and the idler, rollers or sprocket rides up on the core metal protrusion.



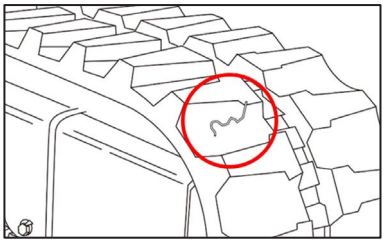
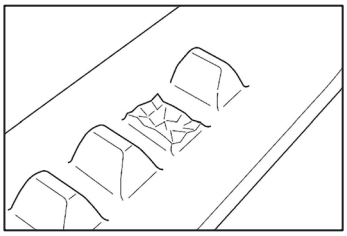
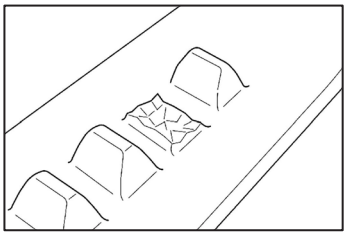
- Due to corrosion of steel cords:
  1) When the rubber track gets damages, such as deep cuts, that reaches the steel cords, and steel cords are corroded by moisture.



Prevention
- Regularly monitoring and adjusting track tension.
- Avoid sharp, hard, or large foreign objects on the driving surface. If it is unavoidable to drive in such a place, operate only in a straight line as much as possible.
- Avoid unnecessary quick or sharp turns.*

  *By minimizing sharp turns less foreign objects will enter the undercarriage.

- Regularly wash the undercarriage to remove dirt and foreign objects.

Area: E **Machine:** ☑ Agricultural machinery ☑ Construction machinery	**Coming out of steel cord** 	**Action** Use pliers to extract and cut the steel cord's end. The cord will recoil within the rubber, sealing the tiny hole with its elastic properties. **Cause of damage** Since the end of cord is positioned close to the outer edge of rubber track, end of cord can be pressed out by foreign force.
Area: F **Machine:** ☑ Agricultural machinery ☐ Construction machinery	**Side crack** 	**Action** Replace rubber track if the damage is following condition. - Steel cords are exposed - Guide lug is torn off  **Cause of damage** - Repeated interference between the guide lugs and track rollers when driving on inclines. - Lug deformation due to the side of lug pushed with a strong force by the idler. **Prevention** - Regularly monitoring and adjusting track tension.
Area: F **Machine:** ☑ Agricultural machinery ☐ Construction machinery	**Base crack** 	**Action** Replace rubber track if the damage is following condition. - Steel cords are exposed - Guide lug is torn off  **Cause of damage** - Repeated inward bending of the rubber track when driving on rough roads. **Prevention** - Regularly monitoring and adjusting track tension.

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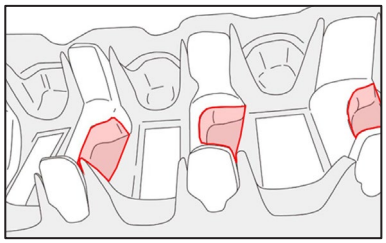
Area:
G
Machine:

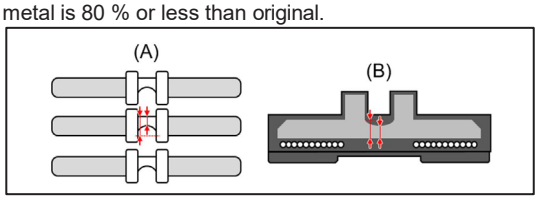
- ☐ Agricultural machinery
- ☑ Construction machinery

Premature wear



Action

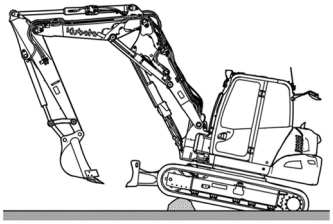
Replace rubber track if the damage is following condition.
- Core metals are broken off
- Width of core metal is 67 % or less, or thickness of core metal is 80 % or less than original.



(A) 67 % or less
(B) 80 % or less

Cause of damage
- Normal deterioration driven by sprockets and idlers.
- Premature wear is accelerated under the following conditions
  1) Excessive load such as towing and dozer operation
  2) Sandy conditions
  3) Over-tension of rubber track
  4) Usage of excessive worn sprocket

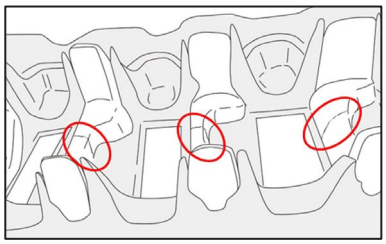
Prevention
- Avoid the following operations.
  1) Excessive load such as towing and dozer operation.
  2) Sandy conditions
  3) Over-tension of rubber track
  4) Usage of excessive worn sprocket
- Avoid rocky terrain to prevent pin point loading.



Area:
G
Machine:

- ☐ Agricultural machinery
- ☑ Construction machinery

Crack



Action

Replace rubber track.

Cause of damage
- Worn of core metal.
- Excessive force on core metal

Prevention
- Avoid the usage in the core metal wear condition.
- Avoid the usage in sandy condition.
- Avoid unnecessary sharp turns, aggressive driving and pin impact on core metals.
- Avoid rocky terrain to prevent pin point loading.

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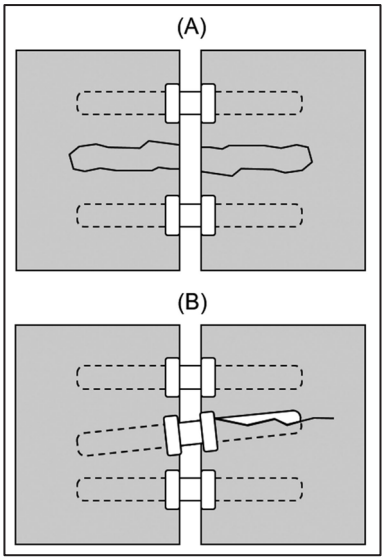
Area:
G
Machine:

☐ Agricultural machinery

☑ Construction machinery

Missing or detachment

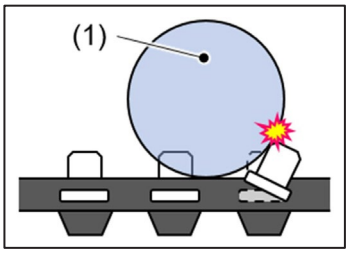


(A) Missing
(B) Detachment

Action
Replace rubber track.

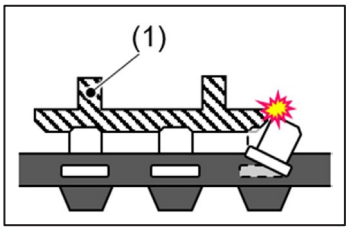
Cause of damage
Core metal is bonded to the rubber track with adhesion. Force or chemical damage is suspected as a cause of core metal detachment or missing.

- Caused by force:
  1) When running over obstacles, the track may undergo reverse bending. The vertical downward force of a track roller or contact with the undercarriage frame may occur enough removal force. Higher speeds are worse because of higher downward inertia forces.
  2) When the idler continues riding on protruding part of core metals, core metals might peel off finally.



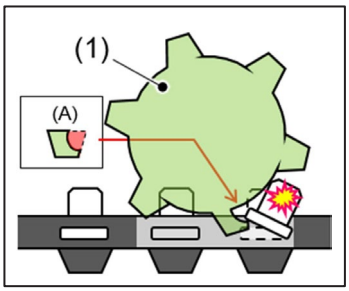
(1) Idler

3) Track is detracted, protruding part of core metal contacts crawler guide, and then core metal is detached.

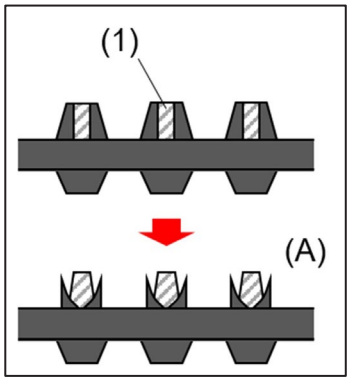
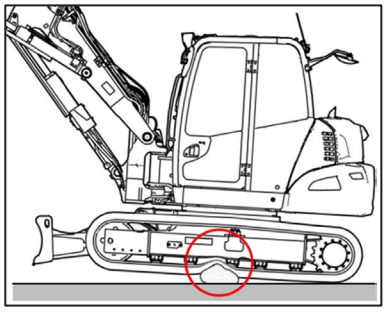


(1) Crawler guide

4) Worn sprocket pulls out the core metal.



(1) Sprocket
(A) Worn

		- Caused by chemical damage: 1) Strong chemicals, such as acid, strong alkali or salt, are well known chemicals which attack core metal adhesion. These are, in other words, places where steel tends to rust. To check the progress of rusty condition of core metal, inspect the rubber covering the protruding part of the core metal. If the rubber occurs delamination as shown in figure and there is a wobble in the core metal, It means that the time to replace rubber has come soon.  (1) Core metal (A) Delamination
		Prevention - Regularly monitoring and adjusting track tension. - Avoid turning while driving over obstacles. - After machine is used in place where steel tends to rust, perform washing machine to remove dirt and foreign object. - Replace sprocket and other undercarriage components if worn. These worn parts can pull through the core metal.
Area: G **Machine:** ☐ Agricultural machinery ☑ Construction machinery	**Broken or bent** 	**Action** Replace rubber track.
		Cause of damage Due to driving over non-compressible sharp objects.
		Prevention - Avoid driving near sharp objects.

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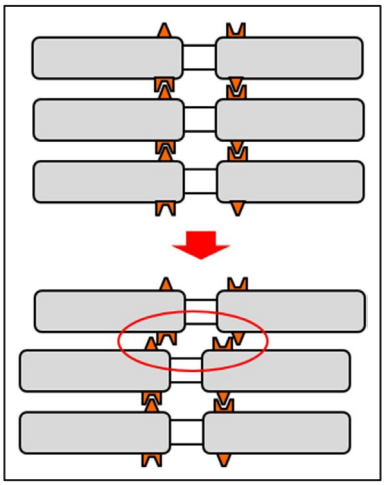
Area:
G
Machine:

- ☐ Agricultural machinery
- ☑ Construction machinery

Dislocation of core metal (side slip)

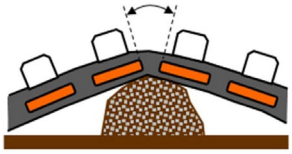


Action

Continue in service by resetting the dislocation.*

*Side slip may be recovered by following procedure.

1) Carefully move over an obstacle to cause the track to reverse bend.



2) The distances between core metals widens and core metal align to original position.

3) If dislocation is still not fixed by 2), turn it in the opposite direction to the dislocated core metal to twist the track back into its inter-locking location.

Cause of damage

- When the machine rides over an obstacle and turns, the rubber track may deform laterally, releasing the interlock of adjacent core metals.

Prevention

- Avoid turning while driving over obstacles.
- Regularly monitoring and adjusting track tension.