



Brand of NTN corporation

# DIAGNOSTIC EXPERT

## ANALYSIS & RECOMMENDATIONS



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TIMING AND ACCESSORY  
RANGES

## **GENERAL RECOMMENDATIONS**

- Do not store belts in direct sunlight
- Never fold, twist or bend a belt
- Never force the belt onto pulleys
- Always use the correct tools when fitting a belt
- Always follow the recommended tension and torque settings, always use the correct tools and always take notice of the rotation arrows on the pulleys.
- Always follow the manufacturers service schedules and fitment specifications
- Tighten all nuts and bolts, to the manufacturers recommended tightening torque
- Check the condition of all the parts in the belt path (rollers, pumps and pulleys)
- Check the condition of the plastic engine covers
- A timing or accessory belt should never be re-used

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Removal and fitment of  
a hydraulic tensioner



Removal and fitment of  
a timing kit and water  
pump KDP

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## MAJOR CAUSES OF TIMING BELT FAILURES

### TIMING

- 1** Tensioner pulley failure
- 2** Mounting bracket broken  
(or reduced operating clearance)
- 3** Abnormal noise
- 4** Incorrect roller positioning
- 5** Roller overheating
- 6** Damaged seal

### ACCESSORY

- 7** Oil leaks
- 8** Brocken bracket
- 9** Faliure of the aluminium support
- 10** Abnormal vibration of the roller arm
- 11** Misalignment and early failure of the actuator
- 12** Seizure of the tensioner rollers or pulleys
- 13** Corrosion of the belt track

## BOLT

- 14 Broken bolts

## BELTS

- 15 Uneven breaks
- 16 A clean break
- 17 Detached or separation of the belt teeth
- 18 Torn teeth on the belt
- 19 The back of the belt is split
- 20 Wear on the edge
- 21 Faulty tensioner

## 1 TENSIONER PULLEY FAILURE

### EVIDENCE

- Under tightened = Lower stop marked or broken
- Over tightened = Upper stop marked or broken

### CAUSE

- Incorrect tension

### ADVICE

- Always follow the manufacturers fitting instructions
- Check the adjustment direction of tension



Lower stop marked or broken



Upper stop marked or broken

## 2 MOUNTING BRACKET BROKEN

(or reduced operating clearance)

### EVIDENCE

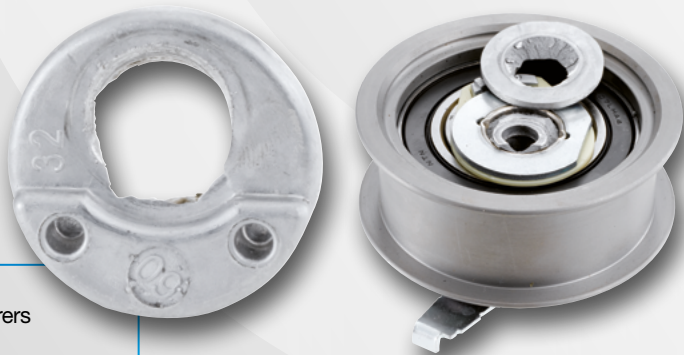
- Centre of the roller is broken

### CAUSES

- Incorrectly lubricated bolt
- Over tightening causing the support bracket to crack and break

### ADVICE

Always follow the manufacturers fitting instructions



### 3 ANORMAL NOISE

#### EVIDENCE

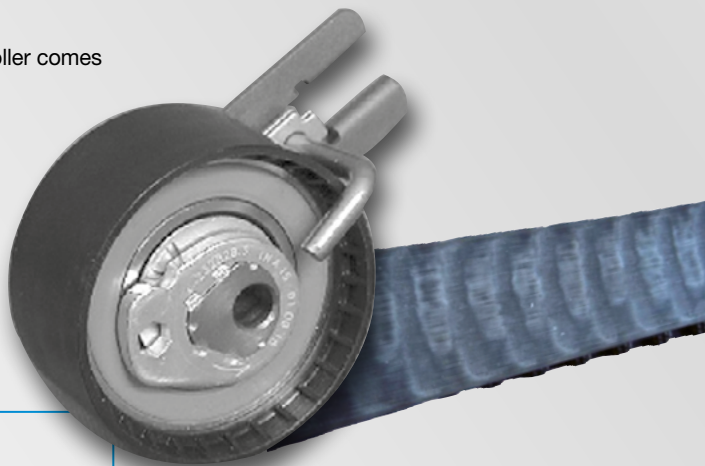
- The metal lug of the tensioning roller comes into contact with the stop
- Premature wear of the belt
- Grease leakage

#### CAUSE

- Belt under-tensioned or over-tensioned

#### ADVICE

- Change the roller and belt
- Check the belt tension





## 4 INCORRECT POSITIONING OF THE ROLLER

### EVIDENCE

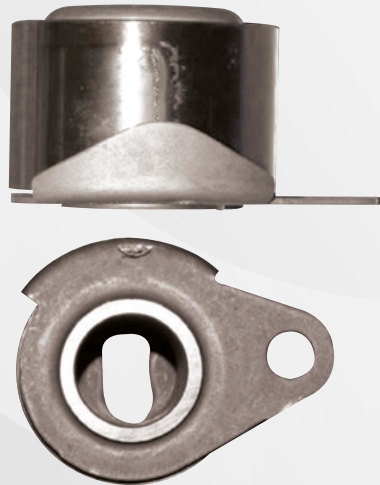
- Wrong indexing of the tensioner
- Circular marks around the retaining bolt hole
- Purple coloration
- Roller jamming causing belt friction

### CAUSES

- Incorrect tensioner, index not correctly positioned on the engine housing
- Over tightening of the mounting plate bolt

### ADVICE

- Change the belt
- Always follow the manufacturers fitting instructions



## 5 OVERHEATED ROLLER

### EVIDENCE

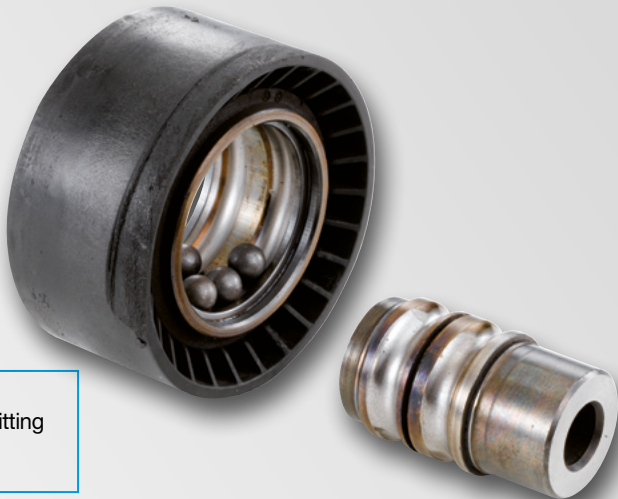
- The roller is broken and miscoloured

### CAUSES

- Excessive tension
- Obstruction of the belt system causing the belt to slip and generate heat

### ADVICE

- Always follow the manufacturers fitting instructions



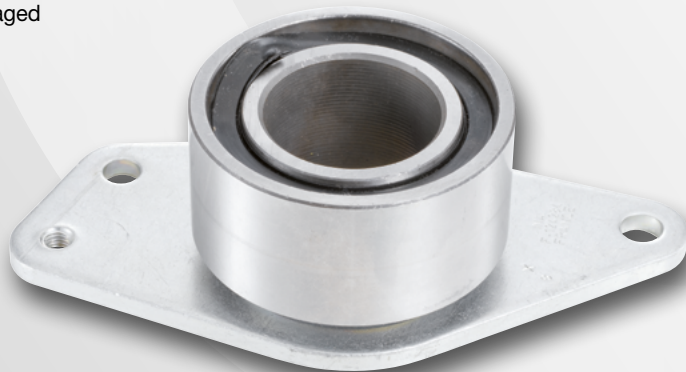
## 6 DAMAGED SEAL

### EVIDENCE

- Seal on the roller is damaged

### CAUSE

- Mishandling /shocks when fitting the part



### ADVICE

- Fit all parts supplied with the roller
- Replace the damaged roller with a new roller

## 7 OIL LEAKS

### EVIDENCE

- Leaks from the actuator

### CAUSES

- Mishandling /shocks when fitting the part
- Using an incorrect actuator

### ADVICE

- Always follow the manufacturers fitting instructions



## 8 DAMAGED MOUNTING BRACKET

### EVIDENCE

- Distortion or absence of the mounting arm

### CAUSE

- Incorrect tightening or loosening of the joint

### ADVICE

- Tighten the bolts to the recommended torque settings
- Lubricate the unthreaded shank of the bolt but not the threads



## 9 FAILURE OF THE ALUMINIUM SUPPORT

### EVIDENCE

- The roller support has failed
- Accessory belt is thrown from the system

### CAUSES

- A faulty overrunning alternator pulley
- A fixed, non-disengageable pulley installed in place of the overrunning alternator pulley

### ADVICE

- Replace the belt and overrunning alternator pulley
- Check all the components in the accessory system
- Use the correct tools for the application



## 10 UNUSUAL VIBRATION FROM THE ROLLER ARM

### EVIDENCE

- Broken spring
- Premature wear of the roller

### CAUSES

- Length of the belt is incorrect
- Obstruction caused by external parts

### ADVICE

- Check the over running alternator and idler pulleys



## 11 MISALIGNMENT AND FAILURE OF THE ACTUATOR

### EVIDENCE

- Damaged actuator

### CAUSES

- Washer not fitted when actuator is repalced, causing misalignment of the actuator and early failure
- Under or over tightening of the joint

### ADVICE

- Remember to always fit the washer





## 12 SEIZURE AND OR UNUSUAL NOISE

### EVIDENCE

- Extensive corrosion

### CAUSES

- Failure to replace the plastic cap, allowing water and dirt to enter the bearing
- The grease is degraded by contamination and can no longer correctly lubricate the internal elements of the bearing



### ADVICE

- Always fit the cap provided with the roller
- Check the correct position of deflectors

## 13 CORROSION OF THE TRACK

### EVIDENCE

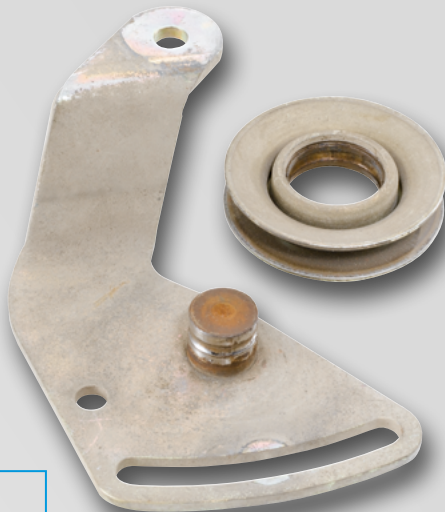
- Significant deposits of rust and debris

### CAUSE

- The grease is degraded by contamination and can no longer correctly lubricate the internal elements of the bearing

### ADVICE

- Avoid using pressure washers on the engine
- Check the correct installation of the belt deflectors and engine covers



## 14 BROKEN BOLT OR STUD

### EVIDENCE

- The bolt has snapped

### CAUSES

- Low tightening torque applied to the bolt /stud
- Metal fatigue is caused by the back and forth movement of the roller, this causes shear force within the bolt/stud causing it to snap

### ADVICE

- Tighten all nuts and bolts to the exact recommended torque
- Lubricate the unthreaded shank of the bolt but not the threads



## 15 UNEVEN BREAKS

### EVIDENCE

- The belt is torn diagonally
- Damage to the back with small holes and causing a risk of fraying

#### TIMING

##### CAUSES

- Belt over-tensioned
- Component blocked by an external element
- Solid or liquid pollutione



#### ACCESSORY

##### CAUSE

- Penetration of gravel and dirt due to plastic engine protection not being fitted



### ADVICE

- Replace the belt
- Check the belt system
- Follow the recommended fitting instructions
- Check engine pulley wear

## 16 A CLEAN BREAK

### EVIDENCE

- Clean tears in the belt

### TIMING

#### CAUSES

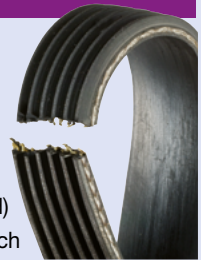
- Defective materials
- Use of incorrect tools such as screwdrivers
- Folding of the belt during assembly process
- Solid or liquid pollution



### ACCESSORY

#### CAUSES

- Foreign object trapped between belt and pulley(s)
- Excessive tension
- Damage to the inner weft of the belt (glass fibre cord)
- Use of unsuitable tools such as screwdrivers



### ADVICE

- Replace the belt
- Check the rest of the belt system
- Follow the manufacturer's fitting recommendations

## 17 DETACHED OR SEPARATION OF THE BELT TEETH

### EVIDENCE

- Tearing of the teeth from the belt

#### TIMING

##### CAUSES

- A partial or complete blockage of the engine timing system
- Teeth are torn off the belt weft:  
under-tensioned belt or liquid contamination



#### ACCESSORY

##### CAUSES

- Accelerated ageing by heat, or abnormal stress
- Possible debris build up in the belt grooves



### ADVICE

- Replace the belt
- Check and repair the belt system as necessary
- Check the presence and correct positioning of the belts guards

## 18 TORN AND DAMAGED TEETH

### EVIDENCE

- Material is torn from the belt and accumulates in the belt ribs or teeth

#### TIMING

##### CAUSES

- Excessive tension
- Worn pulleys
- Operating temperature too high



#### ACCESSORY

##### CAUSES

- Bonding of particles resulting in abnormal noise
- Misalignment of pulleys
- Pulley wear



### ADVICE

- Follow the recommended fitment guides
- Check engine cooling
- Check for wear on the pulleys, change the

belt, and check the tension applied by the tensioner is correct

- A belt must always be dry and free of any trace of oil or coolant (oil and coolant damage the belt)

## 19 SPLITTING OF THE BELT

### EVIDENCE

- Presence of small visible cracks

#### TIMING

##### CAUSES

- Temperature too low or too high
- Aging of the belt
- Contact with a foreign object or misalignment



#### ACCESSORY

##### CAUSES

- Increased preload
- An under tensioned, allowing the belt to slip on the rollers leading to overheating



### ADVICE

- Replace the belt
- It is essential that the manufacturer's recommended belt tension is applied to the new belt
- The use of an electronic belt tension meter is

sometimes required

- Check the system components for any signs of overheating
- Check the condition of the plastic engine covers
- Check the engine's cooling system



## 20 SIDEWALL WEAR

### EVIDENCE

- Premature wear on one side, the inner cord may be frayed. Causing high levels of noise

### TIMING

#### CAUSES

- Misalignment of pulleys and / or tensioners
- Contact with a foreign object



### ACCESSORY

#### CAUSES

- Fitment using unsuitable tools such as screwdrivers
- Belt movement when fitting the pulley(s)



### ADVICE

- Replace the belt and realign the pulleys
- Check the condition of all components in the accessory and distribution system
- Follow the manufacturers fitting instructions

## 21 TENSIONER FAILURE OR EXTERNAL ELEMENT BLOCKAGES

### EVIDENCE

- The back of the belt has very pronounced wear

#### TIMING

##### CAUSES

- Excessive tension
- Blocked by an external element (water pump)



#### ACCESSORY

##### CAUSES

- Slipping of the belt on a rollers due to incorrect belt tension
- Defective overrunning alternator pulley



### ADVICE

- Replace the belt, and check nothing is blocking the belt system
- Check the tension applied by the tensioner
- Always follow the manufacturers fitment instructions and recommendations



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