

ANALYSIS

unusual and a subsequent inspection of the 'ball race' under laboratory conditions suggested that it was unlikely that it had ever turned under the power of the belt in the drive.

A careful inspection of the back plate revealed two crescent-like marks. These provided the clue that solved the mystery in both cases.

INSPECTOR'S DIAGNOSIS

The marks (Fig 1) were almost identical to others that remained so far unexplained on the backplate of the tensioner that had seized on the first vehicle. It now seemed likely that both tensioners had experienced interference of a similar nature, caused by something that was taking place in both drive systems.

Contamination from a foreign body was immediately ruled out.

Both installers had elected to fit a belt kit. Each appeared to be fully aware of the necessary procedures with

respect to the need to consult manufacturer data, prior to installation, in order to affect a successful timing belt replacement. Additionally, the second site was a Gates Official Workshop and as such, was familiar with good practices relating to belt handling and precise tension setting. A timing belt tension-setting device had been used in each case. The Gates inspector was, therefore, satisfied that negligence was not a probable contributor to premature belt failure on either occasion.

It was only when a spare cylinder head was obtained and the installation procedure was re-enacted, that the cause of the marks — and consequently, the seizure of the tensioner — was identified.

RE-ENACTING INSTALLATION

The timing belt tensioner fits over a stud on the cylinder head and is securely seated by means of a locating peg (Fig 2). In this position and

correctly seated, there can be no contact with the backplate of the tensioner. However, if the locating peg is not properly engaged (Fig 3) when the locking nut is secured, the backplate is able to make contact with the locating peg. By rotating the tensioner manually, the crescent-like scoring on the back plate was reproduced. It was the same as that identified in each drive on both engines on either side of the Pennines.

Both mechanics understood the importance of positioning the tensioner on the locating peg. However, neither was aware how easily it could be dislodged during the installation procedure. Both suffered through the same inadvertent mistake.

LESSONS TO LEARN

It is essential that all of the components in the drive are located precisely and set up correctly. Once the installation tension of the belt has been accurately set and a visual check has been made for alignment, turning the engine over by hand is a worthwhile exercise in order to ensure that the drive pulley and all tensioners are operating and moving efficiently. Torque settings must also be checked according to the manufacturer's recommendations.

CONCLUSION

Nobody was negligent in either case. The re-enactment showed how easily the locating peg can be disengaged before securing the locking nut. As the securing nut is tightened, the backplate can buckle or bend. Contact between the locating peg and the backplate causes the crescent-like markings and seizes the tensioner. For both mechanics, it was just a case of 'one of those things'.

MORE INFORMATION

Gates has produced a Troubleshooting Guide for multi-ribbed belts, including tips for belt examination. For more information on this, as well as Gates timing belts and tensioning equipment

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Fig 3. Tensioner is fitted incorrectly and is not securely located.