



An INSPECTION

Sometimes, it takes more than a basic diagnostic approach to determine the solution to a cam belt problem. Gates investigate.

CASE STUDY

Manufacturer: Audi
Model: 100
Engine: 2.5 Tdi
Year: 1991-94

It looked like an open and shut case. The Audi 100 2.5 Tdi (circa 1991-94) had no known timing belt issues. The belt had failed prematurely, the engine was damaged and the usual suspects were quickly lined up:

- Foreign objects in the drive
- Inadequate torque on the tensioner
- Incorrect tension of the belt
- Misalignment in the drive

An examination by the garage technician revealed surface damage to the timing belt that could possibly have been caused when the belt failed. A small breach in the cam cover was also found. It was deduced that this damage had been caused from the inside. The logical conclusion was that both were caused by the aftermath of premature failure of the timing belt.

Although the motor factor was aware that manufacturing defects in timing belts are rare, the evidence gathered by the garage technician was sufficient in this case to suggest that the cause was clear. 'The belt had failed prematurely' so, in their view, this was a justifiable warranty claim. The belt manufacturer, Gates, was informed.

REVIEWING THE EVIDENCE

On arrival, the Gates inspector made a thorough examination of the belt and checked the damaged engine, looking for evidence that might



suggest the presence of any contributory causes of premature belt failure. It also helps to rule out the obvious suspects.

For example, not every technician realises that setting the correct tension of a timing belt plays a crucial role in the performance of the engine. If the tension is set too low, or even too high, it is unlikely that the belt will

perform efficiently. Premature wear, misalignment problems and/or early belt failure ahead of the scheduled duty-cycle are inevitable consequences. That's why Gates has introduced the STT-1 belt tension tester. It ensures that the precise tension can be set every time.

However, the presence of a perfectly functioning automatic

CTOR calls

tensioner in this particular drive, quickly ruled out tension as a contributing cause and there was no evidence of mismeshing. The list of credible suspects was re-examined.

The first suggestion that the garage technician might have been on the wrong track followed a closer look at the hole in the cam cover. It seemed more likely that something — a foreign object, perhaps — had been ejected and that this was in fact an exit wound. The second clue was found on the belt itself. The thorough examination had revealed a small envelope-like 'tear' on the surface.

What if the tear on the surface of the belt had been caused before the belt had broken? There was no doubt that this would have contributed significantly to the eventual destruction of the belt.

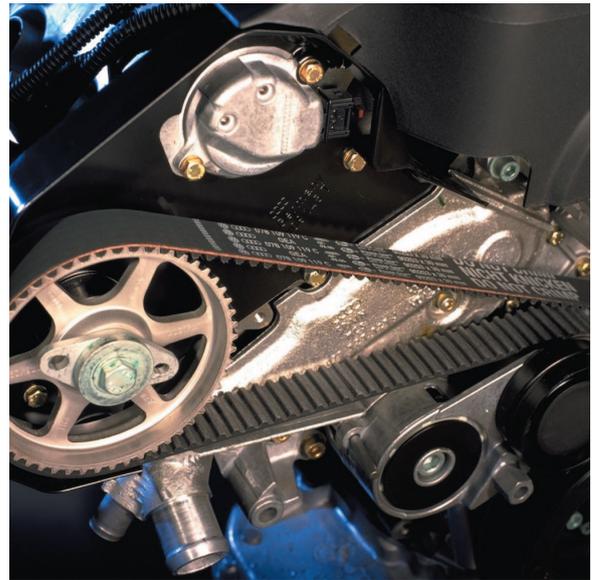
The location of the tear, centrally, rather than on either edge of the belt, seemed to rule out the engine block or the cam cover as a likely source of abrasion. It was more likely that a foreign object had become trapped between the pulley and the belt, causing damage to the tensile cords. On the other hand, the drive system compartment itself showed no real evidence to suggest how a 'foreign' object might have gained entry. There were no traces of dirt or oil, which might also have been present as a result of leakage in the drive system.

It seemed more likely that this was an inside job!

THE GUILTY SECRET

The finger of suspicion was beginning to point at the drive system itself. Once the tensioner was removed, the evidence was irrefutable. Part of the tensioner had

broken away. There was little doubt that this fragment had come adrift, become trapped between the pulley and the belt, causing the surface damage to the belt. This had led to the damage of the tensile cords, resulting in the premature failure of the belt. The evidence suggested that it had subsequently created a hole in the cam belt cover and made its escape.



SUMMING-UP

The initial conclusion by the garage was that the belt was at fault and so the warranty claim was submitted in good faith. The examination by the Gates inspector proved beyond all reasonable doubt, that the cause was a broken tensioner in the drive system itself.

Both the garage and motor factor concerned, accepted that there was no manufacturing fault with the belt. There were no fitment issues that had contributed to the cause of the premature belt failure that had led to the consequential damage to the engine.

NOBODY WAS AT FAULT

However, it might have been a different story had the initial conclusion been accepted by the belt manufacturer without quibble. The replacement belt could possibly have failed again and the repercussions would have been far more serious in terms of cost and reputation for the garage. Determining the true cause of the fault prevented these further repercussions.

THE VERDICT

The case shows how a good working relationship between garages, motor factors and the approach of a responsible parts manufacturer can help to resolve technical mysteries. It also highlights the essential role of timing belt kits when fitted as part of good workshop practices.

A garage technician has to be satisfied that, having replaced the belt, the metal parts are more than capable of surviving another complete duty-cycle. In other words, if belt kits were to be specified on every occasion, tensioners would always be replaced at the same time as the belt, making potential failures, as in this case, less likely to occur. Case closed.

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