Alternator De-coupler Pulleys

A question we often get asked is…What is the purpose of a clutch pulley on an alternator?
The clutch pulley allows the alternator's heavy rotor to overrun, absorbing shock, as engine revs and/or Alternator load changes. The result is smoother idle, no belt chirp, and increased life of alternator, power steering pump, water pump, serpentine belt and automatic belt tensioner. It is important to remember that an Alternator Overrun or Clutch Pulley is a service part and will wear out and loose efficiency over time. This need has really come about with serpentine belts and far more ancillary components running on this single belt and also the increased size and output of modern alternators and therefore their rotor size and mass.

We have found that in some situations the overrun pulley has been replaced by the OE manufacturer by a solid Pulley and then returned to a Clutch Pulley in subsequent models. Some vehicles can have the clutch pulleys replaced with solid pulleys quite successfully whereas others will suffer from a greatly increased amount of noise and component wear, In our experience this would come down to how smooth the particular vehicles motor runs and what harmonics are present in its drive line components.

We have had some information from Denso identifying clutch pulley failure as a potential factor in constant drive compressor shaft failure due to the shock sent through the belt to the compressor when an alternator pulley has failed.

There are 2 Basic types of Overrun Pulley

1. Clutch type, which can be likened to a starter motor clutch with rollers that free wheel in one direction and lock up in the other.
2. OAD or Overrunning Alternator De-coupler that is like the above but with an added spring to further reduce belt "shock".
   A good Visual demonstration is on the link https://www.youtube.com/watch?v=4EXYP1CmL9Q

CP410GQ Mitsubishi Clutch Pulley

Suits Mitsubishi
Suits Lancer Outlander
6PV CCW 17 x 59 x 37mm

CP614GQ Bosch Clutch Pulley

Suits Holden Vectra
5PV CCW 17 x 60 x 43mm

CPT006 Clutch Pulley Removal Tool

Suits Bosch, Valeo
Use with Rattle Gun

CPT007 Clutch Pulley Removal Tool

Suits Denso
Use with Rattle Gun

Alternator Clutch Pulley 2

This one builds on to Tech Tip 22 on Alternator Clutch Pulleys/DE couplers.

The importance of Alternator clutch pulleys becomes apparent when we look at some other consequences of their failure.

An article in a recent “TAT” magazine was having a look at an A/C issue that was a reoccurring problem in Golf Diesel 2.0 Litre “TDI”. The compressor which is a direct drive type had failed twice with no obvious issue with the Compressor or other parts of the A./C system as the compressor oil was clean. The front hub of the compressor had failed with loss of connection between the pulley and shaft. The compressor turned normally when turned by hand so it was not seized. This would normally be assumed to be a compressor failure due to high head pressures which could be caused by a number of issues, poor airflow over the condenser, a blocked or faulty TX etc. Because this was the second failure with no obvious A/C issue the repairer looked further and found that the Alternator Clutch pulley was seized. A rumbling sound that was worse at idle and low revs was also noted and attributed to the seized pulley.

The seized alternator pulley had in turn led to the belt whip, vibration and “shock load” that is normally absorbed and dampened by the clutch pulley being transferred by the belt into other components in the belt drive line with the consequence of Compressor clutch failure.

We have also heard of a similar issue with a locked up dual mass flywheel potentially causing the Compressor clutch to fail in a Mercedes Vito Diesel.

Genuine Valeo A09-9411GQ
Direct Drive Compressor with external
Displacement control to Suit VW Diesel
TDI 2.0 Litre Golf