Overrunning alternator pulley

The alternator overrunning pulley is used to meet the most stringent demands of running noise and overall forces within the belt drive.

Cases for the use of the alternator overrunning pulley include:

- diesel or petrol engines with severe periodic crankshaft vibrations
- very low engine running speeds,
- V-engines with valve cut-out (cylinder or block cut-out),
- sudden contacts in automatic transmissions,
- sudden contacts caused by climate compressors,
- extremely high performance alternators (high mass moment of inertia).

Outwardly the alternator overrunning pulley resembles the fixed drive wheel. In fact it consists of the following components (see figure):

- Drive wheel with profile for poly V-belt,
- Overrunning clutch / mounting unit with outer and inner rings plus clamping ramps,
- Roller bearing for overrunning function and freewheeling support,
- Inner ring, threaded, for fitting alternator shaft,
- Serrations for assembly tool,
- Seals,
- Protective cap.

In the event of interfering crankshaft vibrations the alternator overrunning clutch decouples the alternator for a short period. High force peaks in the belt drive are thereby avoided and vibrations are greatly reduced.

In other words the rotation of the crankshaft actuated by the piston action is periodically subjected to vibrations. These vibrations sometimes work with the rotation of the crankshaft (accelerative) and at other times they work against the rotation (decelerative).

As the crankshaft decelerates momentarily so it works against the rotation of the alternator. Since alternators generally have a large mass moment of inertia however this gives rise to a situation in which the alternator wants to drive the crankshaft. At this point there are produced unacceptably high belt forces which cause belt vibrations and associated running noise. To prevent this the overrunning clutch decouples the alternator at this moment. The whole process takes just milliseconds.

Should the INA alternator overrunning pulley fail, e.g. due to overload, it continues to function as a conventional fixed drive wheel. Well-known competing products have no such failsafe function in the event of failure. The belt can come loose and the front end accessory drive will be lost. In this event the failure of the power steering pump is critical.

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