

Issue no. 03/2019: Torn-off valve due to canted valve spring

After repair work on the valve train, a valve may occasionally break off during operation under unfavorable conditions. This is generally caused by an assembly error: a valve spring installed at an angle.

If the valve spring is assembled canted unnoticed, uneven forces act on it, because even when the valve is closed, the spring is more compressed on one side. When the valve now opens, the spring is pressed onto the block and the stroke of the camshaft creates a massive bending moment in the upper area of the valve shaft.

Starting from the lowest groove on the valve shaft, this can cause the valve to be torn off. It then falls into the combustion chamber, becomes trapped between the piston and cylinder head, and is severely deformed.

THESE ARE TYPICAL CHARACTERISTICS OF THIS DAMAGE SCENARIO:

- The damage occurs immediately after the repair.
- The fracture starts at the top of the third groove and runs across the valve shaft (see Figure 2).
- Valve keys are partially deformed at the partitions.
- There are uneven pressure marks on the contact surfaces of the valve spring in the cylinder head (see Figure 3).
- The fracture surface exhibits the typical structure of a forced rupture (see Figure 4).

→ IMPORTANT!

When mounting the valve springs, ensure the seat in the cylinder head is correct! If new valves are installed, the valve keys should always be replaced too!

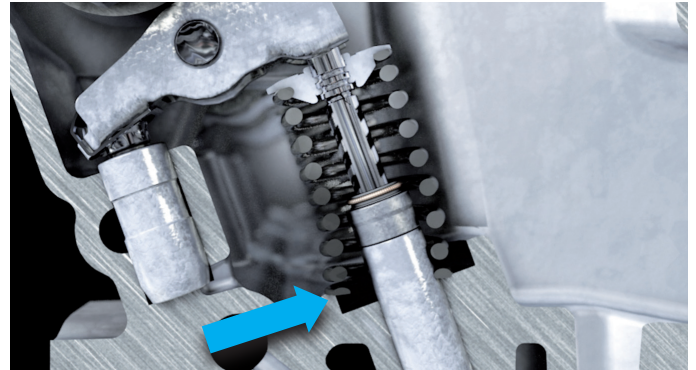


Figure 1: Valve spring installed at an angle

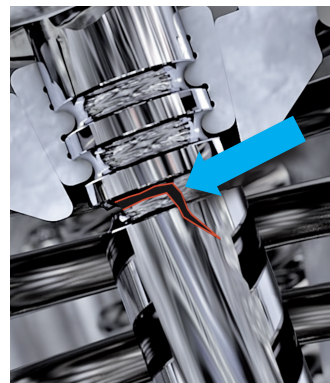


Figure 2: Valve fracture at the lowest groove



Figure 3: Pressure marks in the cylinder head



Figure 4: Broken valve

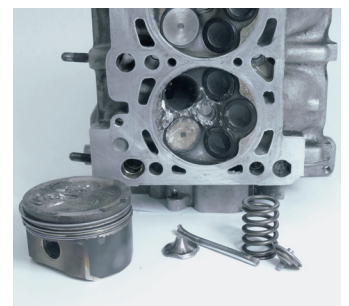


Figure 5: Typical damage scenario after a valve has torn off