

## Issue No.: 03/2009 – Assembling and Disassembling Valves

Even the best valves have to be replaced sometime – no matter if this is due to wear and tear or engine damage, e.g. a valve impact, which, in turn, can be caused by a torn toothed V-belt or chain. Below are a few tips for a quick and reliable valve replacement.

### DISASSEMBLY

To prevent the cylinder head from being irreparably damaged, the valves must be sprung during disassembly, e.g. using a press or a valve spring tensioning device (Figure 1).



Figure 1: Springing of the valve

Tip: Before disposing of the disassembled valves compare them with the new valves in terms of stem diameter, total length, valve disk diameter, and seat angle.

### ASSEMBLY

Prior to the assembly of the new valves, the conditions of valve guides and valve seat rings shall be checked. If the parts show any heavy wear marks, they must be either reworked or replaced (you will find corresponding tips in the next issues of the Technical Messenger). The new valve is then inserted from the bottom through the valve guide.

Below is a short checklist of the items to be verified and, if applicable, reworked before the assembly is finished:

- The valve recess must be checked.
- The seating surface of the valve on the valve seat ring must be checked. Tip: Chalk the entire valve seating surface, insert the valve into the valve guide, and rotate it in both directions on the valve seat ring. If the chalk is distributed evenly the seating surface is OK.
- The tightness of the valve shall be checked. This can be done by generating a negative pressure (Figure 2). As alternative method, the cylinder head can be turned around with the valve disks at the top. Then gasoline or brake cleaning agent can be poured onto the valve disks. If the liquid used drains off very quickly the valves are leaky.



Figure 2: Leakage test

## PREVENT DAMAGE USING AN ASSEMBLY TOOL

The valve grooves are partly sharp-edged. To avoid damaging the valve stem sealing and resulting increased oil consumption, the valve grooves shall thus be covered by an assembly tool before the valve stem sealing is assembled. After that the valve spring is assembled with special attention to a correct seat of the valve spring (otherwise there is the danger of valve breakage). Then the valve collets connecting the valve with the spring seat are assembled.

## NEW VALVE COLLETS PREVENT VALVE DAMAGE

It is recommended to use new valve collets for each valve assembly. Old ones ran in with the old valve and thus will not fit exactly onto the new one, resulting in the danger of valve damage.

## ROTATION TEST FOR THREE-GROOVE VALVES

If a three-groove valve is assembled, the rotatability shall be checked. Unless the valve can be rotated there is the danger that it constantly knocks against the cylinder head. The rotatability is also important to keep the thermal load on the valves as low as possible and to avoid excessive deposits on the valve.

## ATTENTION IN THE CASE OF VALVE ACTUATION BY HYDRAULIC VALVE LIFTERS

If the valves are actuated by hydraulic valve lifters it is advisable to either empty the valve lifters prior to assembly or delay putting the engine into operation by approximately 12 hours after assembly. Otherwise there is the danger of valve impacts because the valves may be pushed down too far by the still completely filled hydraulic valve lifters.

If these tips are observed nothing will get into the way of a long product life of the MAHLE quality valves.