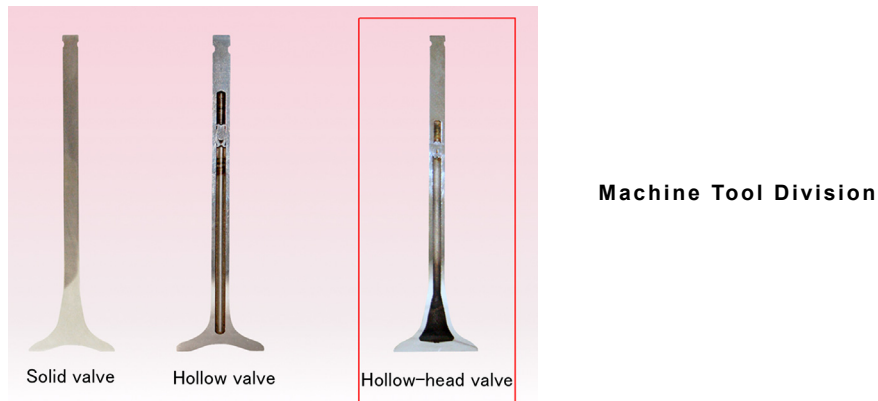


High-volume Technique for Forging Hollow-head Engine Valves



Mitsubishi Heavy Industries, Ltd. (MHI) is ready to supply lightweight, high-strength, hollow-head engine valves made with a hollow head and stem using an innovative forging technique.

The new technique involves a significant cost reduction, as well as a weight reduction of up to 20% compared with conventional solid valves. Here, we introduce the valve as one of the best ways to improve fuel consumption for the automobile industries to satisfy stringent carbon emission regulations worldwide.

1. Hollow-head Engine Valve

The important feature of our hollow-head engine valve is the hollows in the head and stem, which are commonly solid in engine valves. The advantages of the valve are as follows:

- (1) There is a drastic reduction in weight of up to 20% compared with standard valves;
- (2) The encapsulated sodium increases the heat conductivity and enhances the cooling efficiency to cope with the increased exhaust gas temperature associated with high-efficiency combustion; and
- (3) The reduced friction loss significantly improves fuel consumption, and a carbon dioxide reduction is also expected.

2. Feature of the Hollow-head Valve

When manufactured for use in high-performance racing car engines, hollow-head engine valves are made using a combination of drilling and welding. This involves many steps. Consequently, the high production costs prevented the general use of hollow-head valves.

MHI has developed a new processing method for making a hollow head that does not involve expensive machining and welding, enabling inexpensive high-volume production.

The new method allows continuous production utilizing the cold forging of column-shaped stock.

In addition, to maximize the merits of the hollow-head valve, the relationships of the hollow shape, strength, and stress were analyzed. Consequently, high-volume production of a shape unachievable with conventional processing methods has been realized. MHI has a wide variety of forging stock, ranging from heat-resistant steel to nickel alloy, and is ready to supply products that will improve the efficiency of engines, including automobile engines.