Valve Guide and Valve Seat Equipment

By Larry Carley

Cylinder head work has been and should continue to be a profit center for engine builders. Heads almost always require guide and seat work to restore compression and oil control. This includes drilling, reaming and replacing valve guides, removing worn, loose or damaged valve seats, cutting new seat counterbores, and machining valve seats. For performance work, it may also be necessary to trim guide bosses and spring seats, and realign or reposition guides and seats within the head. All of these jobs require up-to-date equipment that can handle today's multi-valve cylinder, and do it quickly, accurately and profitably.

Guide and seat machines have not changed a great deal in recent years. Many machines are quite similar in both appearance and operation. But there have been steady improvements and refinements in tooling and fixturing, and a closer look will reveal differences in the type of pilot system used ("live" pilot versus "fixed" pilot), the type of fixturing used (clamping and leveling systems, ease of setup, and the ability to handle large and small cylinder heads), the operating features of the machine head (how far it can tilt, the diameter and rigidity of the spindle shaft, the type of drive system, how far the power head can travel vertically as well as back and forth), differences in the size of the work table, how much storage is provided for tooling, and finally differences in the tooling (ease of setup, ability to resharpen quickly and easily, durability and cost).

Most valve seat and guide machines today come with an air float head that makes head repositioning quick and easy. A tilting head is handy for quickly aligning the spindle with the guide in the cylinder head. Pre-shaped carbide cutters that cut all three valve angles in one step eliminate the need for setting separate blades and maintain better consistency of the width, size and location of the cuts.

Some of the newer machines are available with computer numeric controls (CNC) for high volume production shops that want to automate certain steps in the machining process to save time and improve consistency. Other optional features may include things like a digital depth gauge, digital setting fixture for adjusting seat cutters to an exact size, or an electronic level to make head leveling quicker and easier.

In recent years, there has also been a trend toward "multi-purpose" machining centers. These "do-it-all" machines can typically handle boring and surfacing as well as guide and seat work, making them well-suited for smaller shops with limited floor space or those who don't want to buy a separate piece of equipment for each different machining operation in the shop. A multi-purpose machine is ideal for a low volume shop, and provides a great deal of flexibility as well as cost savings. Most of these machines can be quickly converted from one type of operation to another within a matter of minutes. Even so, in a high volume shop where every minute counts and work has to flow rapidly from one operation to the next, a dedicated valve seat and guide machine and a separate boring/surfacing machine may be a better choice.

If you're in the market for a new guide and seat machine, or a multi-purpose machining center that can also handle valve and seat work, there are a number of equipment suppliers who can help you choose a machine that will match your needs. When discussing your needs with an equipment supplier, consider the following questions:

What type of work are you doing now? How does that match up with the features and capabilities of the supplier's guide and seat machine?

If you're only doing passenger car/light truck engines and have no intention of getting into heavy-duty diesels, you obviously don't need a machine built to hold Cummins or Caterpillar heads. On the other hand, if you do virtually anything that comes in the door from small engines to big, you'll want a machine that's flexible enough to handle the broadest possible range of cylinder heads.

Are you doing mostly stock work, performance engine building or both?

If you're doing mostly stock engine work and need to cycle heads quickly to maintain your shop's productivity and profitability, speed is an essential feature to look for in new equipment. That means fixturing and tooling that is quick and easy to set up, possibly live pilot tooling to speed up the guide and seat work, and maybe even automated controls.

On the other hand, if you're doing mostly performance work, essential features to look for would be the highest possible precision and the ability to accurately control and locate guides and seats in the cylinder head. You also want a machine that can handle aftermarket performance heads as well as stock heads.

Why do you want a new guide and seat machine, or a multi-purpose machining center?

- Do you need to upgrade old, outdated, worn-out equipment?
- Are you trying to grow your business and need a new machine or an additional machine to do more head work?
- Do you need equipment that can handle bigger/smaller heads, or that can do multiple tasks?
- Do you need to automate certain processes as much as possible so you can make better use of your available manpower?

How you answer these questions should help you decide what kind of seat and guide machine best suits your needs.

Are there floor space limitations and/or special workflow requirements within your shop?

If you're cramped for floor space, a multi-purpose machining center might give you the elbow room you need by combining head work with surfacing and boring.

How much does the equipment cost? How much is it worth?

Though price may be the first question you ask, the cost of the equipment itself may be the last thing you should consider because what the equipment can do for you is just as important as its final price tag. A good machine that does everything you want it to do is far more important than buying a less capable machine that may cost a few thousand dollars less.

The price of a fully equipped guide and seat machine typically starts at around $24,000 and can go as high as $70,000 to $80,000 depending on how many bells and whistles you want. Multi-purpose machining centers may range from $16,000 up to $35,000 or more, depending on tooling and features.

Obviously, you should buy a machine that will make you money (unless machining valve guides and seats is your hobby) and give you a solid return on your investment. But don't just look at the cost of the equipment itself. Consider what it can do to improve quality, boost productivity and overall profitability in your shop.

Buying a machine that allows you to do a wider variety of heads can open up new markets and allow you to expand your business. Reducing comebacks by improving quality can slash warranty costs and enhance your reputation. Being able to machine heads in less time may eliminate a bottleneck and allow jobs to progress more smoothly through the shop.

Before you buy, compare the features of competitive equipment and ask the supplier to explain why their machine is better, faster or whatever than their competitors.

Finally, don't buy before you try. Nothing beats spending some time with a machine to see if it's right for you. If possible, you should also ask for the names of some other shop owners who have purchased similar equipment. Call them up and ask them how satisfied they are with their equipment, and whether or not they'd recommend it to you.

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