

PISTON CORE BOXES

By Geometer

MANUFACTURE Of pistons for certain types of small internal combustion engines, or single-acting steam engines, can be contrived in a variety of ways when for reasons of simplicity it is desired to form the interiors without the use of core boxes. It is possible to machine from the solid or cast from a simple pattern, or use cast iron to braze the bosses in.

The simplest type of piston machined from the solid is bored out to the minimum diameter near the gudgeon pin holes and, of course, larger below them where the skirt is normally parallel. In general, this construction is acceptable only for the smallest engines because of the limited area and support offered to the gudgeon pin.

The alternative is a piston with milled slot to accept the connecting rod and leave extra material for the gudgeon pin holes, though this is rather a heavy construction, and for that reason acceptable only for the smallest engines or those of low-speed type.

A further development is to machine out the interior above the gudgeon pin holes using a boring tool, though there is usually a limit to what can be done because of the bosses rubbing on the shank of the tool. Still, with effort and careful milling, this construction is reasonably comparable to that where the interior of the piston is cast.

Cast iron

Casting from a simple pattern, the gudgeon pin bosses must extend up to the crown, and to this extent the piston is heavier than one with circular bosses, though, in the case of light alloy, the bosses above the gudgeon pin holes can be machined with a boring tool, as for the piston with milled slot.

In the case of cast iron, however, difficulties of boring may be increased owing to material hardness or scale. Given that cast iron is acceptable, the built up construction is possible—the body of the piston bored, drilled crosswise, and the bosses brazed in.

Choice of any of the above con-

structions, then, for reasons of simplicity, necessarily involves drawbacks and difficulties; and when these are balanced against a regular construction of piston with circular cast bosses, it may well be decided that the latter is not only better but simpler, particularly when it is understood that a core box is quite straightforward to make.

The relationship of a finished piston to pattern, core and mould is shown at A and B. The pattern has a chucking piece Y for the piston and the core print Z—the latter of a length that the core does not tend to over-balance in the mould. Preparing for casting, the pattern leaves the outside shape in the mould, and the core, the exact shape of the interior of the piston, is placed inside.

Construction of a box for a core is as at C, where one half is shown in the lower diagram, and the complete box before the bosses are fitted appears in the upper diagram. Two sufficiently-large pieces of clean close-grained hardwood (beech) are em-

ployed. They should be square and true, and may be doweled at opposite corners by drilling straight through.

On one end the centre is marked, and a set-up can be made either in a four-jaw chuck or on an angle plate on the faceplate. Often the latter is preferable since using an aligning strip on the plate and clamping the box, it is always possible to remove it, examine the interior, and reset with reasonable truth.

Running the lathe as fast as possible, the box is drilled down the joint line, then the hole is bored true, opening out near the front end to the size and shape of the piston interior, and at the far end finishing to the size of the core print on the pattern, and to a length slightly shorter than this. Careful testing with calipers and depth gauge ensures accuracy.

The gudgeon pin bosses are turned circular and glued in holes drilled through the top and bottom of the box, while the open end in each half is filled with a glued and tacked-in half plug.

