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Have you ever wondered how professional cylinder head porters and designers come up with their high-flowing ports and runner shapes? Naturally it takes considerable experience behind a die grinder and flowbench. But it also the right tools and techniques. One of those techniques is making a mold of the port. Port molds offer up a variety of analytical opportunities by enabling the porter to see the entire runner as a physical shape rather than as an empty cavity. The mold of course also allows visualization of parts of the runner that cannot be seen by looking into the port, such as the short-side radius or transition around the valve guide. The mold can be analyzed for shape, cut in various areas to measure port dimensions, and even compared to molds taken earlier or later in the process or versus other ports on the head. It's a seemingly sophisticated technique that in reality is very easy to do and only costs about \$25 in materials. If you port your own heads we highly recommend you take a mold. If you port heads for customers a mold can be a great way to periodically check your work on subsequent heads.



1 We've all used Silicone RTV as a gasket maker and have marveled at how it takes a firm shape. That's basically what we're using to make the mold. Silicone RTV (Room Temperature Vulcanizing) mold kits are available from hobby shops like [TAP Plastics](#). This kit is rated as "25 Shore A" mold rubber - meaning it yields a low shrinkage, dimensionally



2 The 1lb kit is good for making one intake and one exhaust port. The two parts are mixed right before you are ready to pour the mold. The mix consists of a 9:1 ratio by volume of base component (side A) and catalyst (side B). The catalyst is added directly to white base container.

In This Article:

Professional cylinder and designers spend behind the die grinder put a lot of time into port and runner shape by taking a mold of the head to see how to make your own.



These elaborately shaped exhaust ports are on a Ford Brodix head ported by Blackstone of [Watson Engineering](#). Shaping these ports takes lots of trial and error and verification. Preserving the shape requires a mold or a very expensive 3D CAD scan.



Here's a mold we took of a runner on a factory 460 head. Note the very tight radius transition from the valve. Also visible are the ridges and various other features that affect flow.

stable and elongation-resistant mold.



3 The two parts must be mixed thoroughly until the material is a light blue consistency throughout. White streaks mean the base is not mixed well, this will result in a mold with nooks and crannies.



4 You only have about 30 minutes of working time before the silicone starts to cure. A "green" catalyst is also available which allows one hour of working time.



This is a mold of the exhaust runner from a Edelbrock Performer cylinder head. You can use this mold to make improvements over the original shape.



5 The recommended pour procedure is to transfer the silicone mix into a paper cup and then poke a small hole in the bottom. Position the head so the port faces upward. Note that the valve should be placed in the head (without spring.) This will keep the silicone from running out.



6 The cup and hole method allows for the air bubbles introduced by the mixing process to dissipate. The cup also gives better control in ensuring the entire cavity is filled.



Making a mold of an intake runner allows you to use areas otherwise inaccessible to calipers.



7 Once the port is filled allow the silicone to cure for 6-8 hours. We prefer to let it sit overnight. Trying to remove the mold prematurely can lead to tearing.



8 After the mold has cured we remove the valve and prepare to extract the mold.



9 Using a screwdriver we carefully separate the mold from the port walls. Don't be too concerned about gouging the mold, be more cautious that the screwdriver doesn't nick up the valve seats or guides.



10 We like to spray silicone lubricant into the port to help release the mold. There are also release agents available made just for this purpose however we find the silicone spray works well.



11 You can also spray through the guide plate boss to get silicone lubricant thoroughly into the port.



12 If your valve guides protrude into the port you will most likely need to use a blade and place a cut on the valve head side of the mold. You only need to cut vertically along half of the mold as shown, this will allow the mold to move past the valve guide.



13 Use a screwdriver to carefully pry the silicone mold out of the port through the combustion chamber.



14 The removal process takes a little patience and muscle. You'll need to follow a sequence of prying, pulling, and pushing from the port side. Spray silicone periodically to lubricate the mold.



15 Once you get enough of the mold out you can grab hold and yank it out of the runner.



16 The end result is precise 3D view of the inside of your runner. As you can see it becomes very clear where the restrictions are, and what areas need work. On both these molds it is clear the pushrod passage pinches the port.

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