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Headwork entails enlarging the intake and exhaust passages in a head to allow for more flow. Good headwork entails subtle reshaping, not just hogging the whole port out bigger. Generally, good headwork leaves the floors of the port alone since most of the flow activity in a port is near the roof of the port. The roof is the outside radius of the bend going to and from the combustion chamber and by inertia, most of the air wants to flow up there. Good headwork usually rounds the floor hump, which is the transition from the valve seat to the floor of the port. Stock, this is usually a sharp edge, which causes non-laminar (turbulent) flow separation.

The object of good porting is to increase flow as much as possible while keeping the port volume as low as possible to maintain as high of a flow velocity as possible. Big ports have low velocity at low rpm. This results in a loss of bottom end power due to the lack of energy available in the moving gas column behind the valve. The gas column has inertia, which helps fill the cylinder, especially at low RPM. Generally porting your head will cause some loss of bottom end power. Good head porters might be able to increase flow in the head up to 40 percent with no loss in bottom end but that is usually for American Iron heads, which are terrible to start with. Modern Japanese engines don't usually see as big gains as their design is much better to begin with. Gains of 10-20 percent are typical with a modern Japanese motor.

The other major area of headwork flow gain is in the valve job. A large percentage of gain can be in the valve job alone. The best valve jobs are called multi angle valve jobs with three or more distinct angles. The main angles are the throat cut, which is a 60-70 degree cut that blends the port wall to the seating cut. The seating cut is a 45-degree cut which is the sealing surface for the valve. This critical cut should be 0.040-0.060 wide for a multi valve engine like an SR20. Finally there is the top cut which is a 30-degree cut which blends the seating cut to the combustion chamber. The purpose of these cuts is to help the air flow smoothly around the valve, especially when the valve is starting to open or close.

Another valve job trick is to place a 30-degree back cut above the 45 degree seating cut on the valve itself. This helps the air get around the valve better especially at low lifts. A five-angle valve job uses two extra cuts to make the transition even smoother. The best valve jobs are radius valve jobs, which are a 3, or 5-angle valve job that is hand blended after cutting for a perfectly smooth transition. The quality of a valve job is very important because it can contribute up to 50% of the flow gains that headwork will get you.

The best valve jobs are done on a Serdi machine. The Serdi is very high precision, which insures that all the valve angles and depths come out equal. Most low price shops use stones. Stones can give a good valve job but the stones must be dressed frequently and dial indicators must be used to insure that the seating surface remains concentric. Stones require a highly skilled person who is conscientious of doing a good job. A butcher can make a big mess with stones.

Unshrouding the valves is an operation where the edge of the combustion chamber is cut back by about 25% of the valve diameter so that the wall of the combustion chamber does not block the air going past the valve into the cylinder.

Polishing the combustion chamber removes sharp edges that can glow red-hot and trigger detonation. It also makes it harder for carbon to stick. Polishing should be limited to the combustion chamber and exhaust port. The intake port should be no smoother than 220 grit as maintaining some boundary layer turbulence is good for good bottom end. This turbulence makes the port virtually a little smaller at low flow velocities.