



Engine Building Process

The engine building process is one of the most critical stages when building a high-performance motorcycle. At Spears Racing, every engine receives a complete and thorough inspection of all working components.

Bottom End

We begin with the bottom end (crankcases). The transmission is checked and clearanced inside the cases, and new transmission carrier bearings are installed when needed.

The crankshaft is magnafluxed to detect any cracks and is then clearanced in the cases for proper side play. The connecting rods are also clearanced at this time. For customers wanting the best possible durability and performance, we highly recommend upgrading to **Carrillo connecting rods**. New main crankshaft bearings are installed, and once everything passes final inspection, the cases are closed up.

Cylinder Head Work

The top end is completely disassembled, and the cylinder heads are thoroughly inspected. Spears offers two levels of valve work depending on your goals:

- **Standard Valve Job**

Valves and seats are machined to exact factory specifications for reliable sealing and performance.

- **Competitive Valve Job** (Recommended for racing)

Valve faces and stems are precision machined. Intake valves receive a special double cut, while exhaust seats get a three-angle cut. Intake seats are given a blended four-angle or full-radius cut, depending on the application. All valves are then hand-lapped and checked for perfect sealing. All seat work is performed on our state-of-the-art SERDI valve machine.

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Porting Options

We offer two levels of port work:

- **Mild Port Cleanup**

Casting flashings and port irregularities are removed. The critical valve-seat-to-port area is blended, and the carburetor adapter-to-manifold junction is matched. The port shape and size are left unchanged — essentially making the port flow the way the original designer intended.

- **Full Race Porting & Chamber Work**

The ports and combustion chambers are reshaped and contoured for maximum airflow while maintaining proper flow velocity. This delivers meaningful power increases across the entire RPM range. The valve-seat-to-port transition and carburetor-adapter-to-manifold junction are also fully blended.

Final Top End Assembly

The cylinders are installed and the proper deck height is set to achieve the best balance of power and reliability. The cylinder heads are then bolted to the cylinders and CC'd (combustion chamber volume measured) to determine the final compression ratio before final assembly.

Camshaft Timing

Camshaft timing is extremely important. We work directly with you to select the optimal opening and closing points based on your riding style, track conditions, and performance goals.

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