Crankshaft Balancing

Motorcycle Crankshaft Balancing is one of the most critical (and often overlooked) steps when building or refreshing a high-performance engine.

Your description perfectly captures why it matters. Out-of-balance crankshafts create destructive vibrations that destroy bearings, rob horsepower, and shake the entire motorcycle. These forces grow with the **square** of engine speed — double the RPM and the vibration forces increase **four times.**

Why Rebalancing Is Required When Changing Pistons or Rods

When you install new pistons, rods, pins, rings, or bearings, the total mass on each throw changes. The crankshaft was originally balanced at the factory with specific counterweights to match the original rotating and reciprocating masses.

To rebalance it correctly, technicians fit **bobweights** (also called bob-weights) onto the crank throws. These simulate:

- 100% of the rotating mass (big-end of the rod, rod bearings, etc.)
- A percentage of the reciprocating mass (piston assembly + small end of the rod) — usually around 50%, though the exact percentage depends on the engine design and desired balance characteristics.

Only after the crank is dynamically balanced with the correct bobweights attached can it be considered properly balanced for the new components.

Quick Summary of Best Practices

- Always rebalance the crankshaft when changing pistons, rods, or significantly altering any masses.
- Use accurate bobweights calculated from the actual weighed components (piston + rings + pin + locks + small-end rod + rotating big-end assembly).
- Dynamic balancing (not just static) is essential for multi-cylinder and high-RPM engines.
- After balancing, the crank should spin with minimal vibration — typically measured in gram-inches or ounce-inches of imbalance.