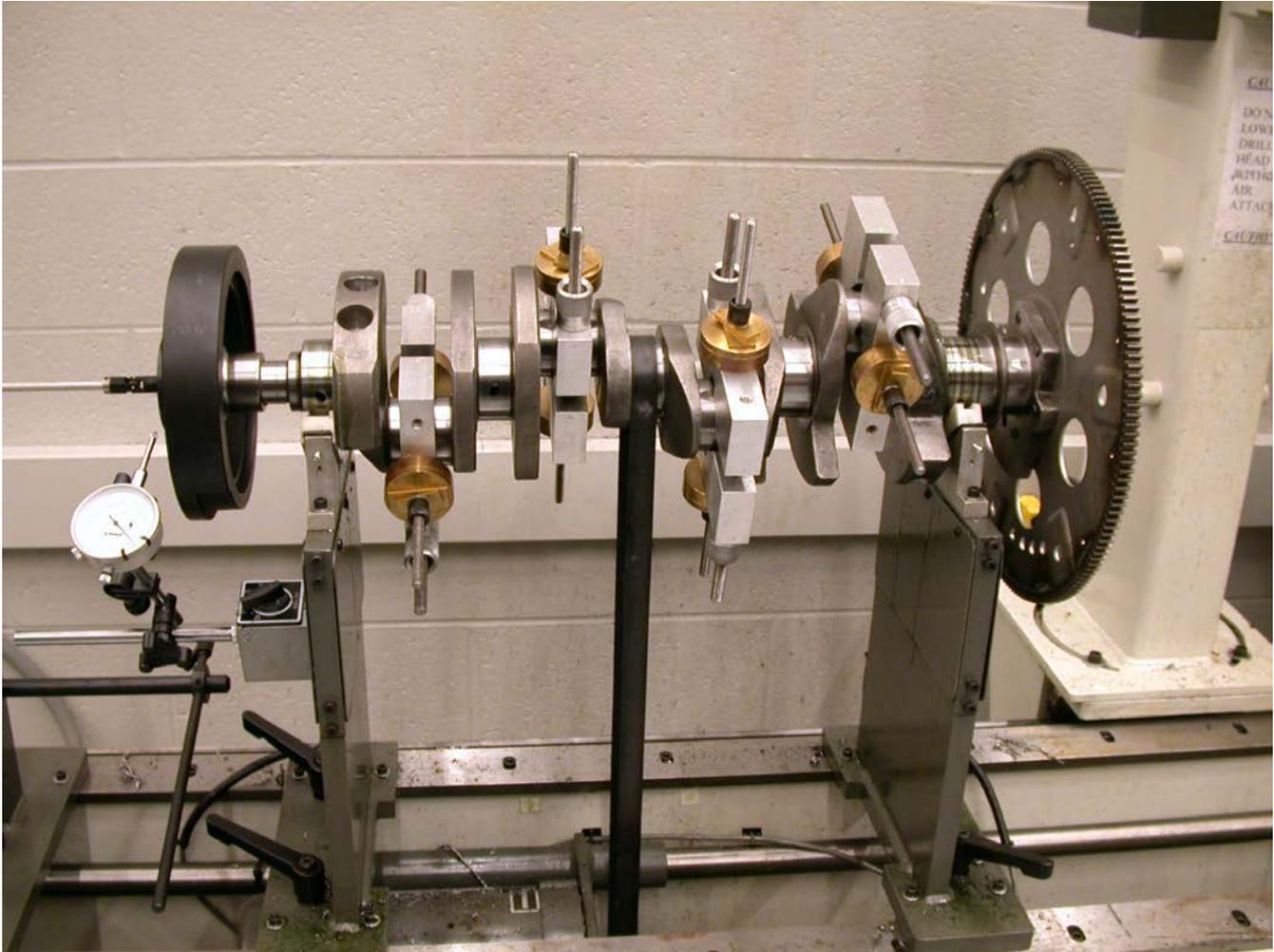


**Wheels:** A reader wants to know what the term “balancing and blueprinting” means when reading about a high performance or replacement engine for his vehicle.

**Halderman:** Balancing means that all rotating components in the engine are weighed and material is removed from the heavier units such as the pistons so they all match. The crankshaft is also balanced. This makes the engine operation smoother and allows faster engine speed without vibration. Blueprinting simply means that all engine parts are measured and match the factory specifications (engine blueprint specifications). Parts such as pistons and connecting rods can vary slightly. The process of rebuilding an engine and matching all of the rotating components is a time consuming job. This is why engine balancing is usually performed on high performance engines that are more likely to be operated at high engine speeds.



**Wheels:** If this balancing and blueprinting operation is so time consuming, how are the vehicle manufacturers able to produce engines that are balanced on an assembly line?

**Halderman:** Today’s engines are produced in a factory where all components are measured using air gauges. This method is very fast and very accurate. The cylinders are also measured and are graded for size. The largest pistons are then assembled into the largest cylinder bore to provide the best possible fit. It was common practice to have 3 or more grades for all components. The newest trend is to eliminate these grades and attempt to produce all parts to the exact same dimension and weight so the process of matching different grades of components will not be necessary.

Because of the precision selection and assembly of factory components, I tend to recommend the use of a good used engine instead of overhauling an existing engine. Before readers send in hundreds of

hate letters, there are several exceptions to this recommendation. If the vehicle is being restored, it is important that the serial numbers of the engine match the vehicle and this means the engine should be overhauled rather than replaced. If additional power is the objective, then rebuilding the existing engine with high performance parts may be a good solution. But again, there are factory built “crate engines” that can be purchased which are built to the same production standards as new engines and for a reasonable cost considering the alternatives of purchasing individual parts and cleaning and assembling the original engine.

**Wheels:** Where can readers learn more about engine building?

**Halderman:** There are several high performance magazines that usually include performance engine builders in each issue that will introduce you to the area of engine building plus many automotive engine textbooks. Check with local bookstores or websites such as [www.amazon.com](http://www.amazon.com) or [bn.com](http://bn.com). (Hint: Search for books by Halderman.) Sinclair Community College also offers a series of high performance engine rebuilding courses including engine block and rotating assemblies, cylinder head reconditioning, and engine assembly and dyno testing plus a high performance engine induction course that covers supercharging, turbocharging, and other aspects of high performance engine tuning.