

(17 Dec 2007):







The first picture shows the finished cast iron liners, ready to be honed.

The other three pictures are of the crankshaft in various stages of machining. The crankshaft is the most complicated and time consuming part of the engine. It must be absolutely accurate in all dimensions and is very labor intensive. Every operation must be done manually. Although all of my machines have a digital readout, one wrong move during the finish grinding and the crank is "trash". And then there is the problem with all of the oil passages the must be drilled. The material selected for casting the crank is 4140 steel and is used because of its strength and wear characteristics. The down side, is that it is extremely difficult to drill small holes. If a drill breaks, it is very hard, if not impossible to remove. Not only are the oil holes hard to drill but, remember, they are also at an angle. This angle is critical because there is always the ever present chance of breaking through the side of either the rod journal or main journal. Before anything can be done, the cranks were sent to heat treating and were "solution annealed". This process removes any hard spots that may have happened during

casting. Then each end of the crank needs to be center drill. This is often difficult because the casting and heat treating process warps the metal. Once each end has successfully been center drilled, these holes are then used in almost every machining and grinding operation. This insures that every crankshaft is uniform and everything is "on center". To give you an idea of what I am talking about, the diameter of the main journals cannot vary more than .002. Remember the crank is over 5 inches long. This is thinner than a single human hair. Although, the entire engine demands the highest accuracies, the crankshaft, is by far, the most time consuming.