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**Subject: Superior Crankcases**

Superior has recently introduced its new improved replacement crankcases for Textron Lycoming 320 and 360 series engines. This crankcase has undergone rigorous certification testing and has been enthusiastically received by the overhaul community, as well as being recognized as a major design improvement of our XP-360 engine. This crankcase substantially improves oiling of the entire engine and has superior structural properties and strength.

The crankcase casting is made from AA C355 aluminum alloy heat treated to the T71 condition per AMS 4214. This is an aerospace grade structural alloy with tightly controlled chemical and compositional properties. The T71 condition is a stabilized material condition resulting from the tightly controlled AMS 4214 heat treatment. This results in a very strong crankcase that will not distort or warp under loading or thermal changes and oscillations. By itself, this would be a significant improvement over any available crankcase.

The Superior crankcase also has a reinforced casting in between the cylinder decks where the majority of deck-to-deck or stud-to-stud cracking would occur in an OEM crankcase. This reinforced crankcase cylinder deck eliminates deck-to-deck cracking and creates a much stiffer overall case.

Beyond the structural improvements, the crankcase also has a vastly improved oiling design. The main feature of this new design is the balanced oil system. Other cases lubricate all of the camshaft and bearing journals through the right case-half oil gallery. This results in the left side having a stagnant slug of cool oil to feed the lifters - and nothing else, while the right is struggling to keep up with the demand. The balanced oil system lubricates the crankshaft and camshaft from either side of the crankcase. This reduces oil pressure fluctuations and equalizes oil flow through the entire engine, including the lifters. The balanced oil pressures insure consistent lifter pressure, reducing the potential for camshaft and lifter spalling.

Another side benefit of the balanced oil system is that both sides of the engine get warmed oil sooner. This also means that under higher power conditions both case halves radiate a more balanced heat load – cooling the oil through the mass of the case. This also eliminates differences in case half temperatures and resulting misalignments due to the thermal expansion differences.

As an indication of how significant this balanced cooling effect is, during certification testing we had to insulate and put 2 pre-heaters on the oil sump to maintain the maximum oil temperatures required for certification – running supercharged at over 200 HP! - with the oil cooler in bypass! At other lower power operating regimes, the oil temperature was as steady as a rock.

Finally, Superior has also incorporated pressurized oil lubrication on the crankcase thrust face. This reduces friction on the loaded surface of the case where the crank pulls the case forward. The entire aircraft is being pulled through the air by the load on this face. If all this wasn't enough, every crankcase also comes machined to accept piston cooling oil nozzles for higher performance applications. These crankcases are available in different configurations, contact Superior for more information.