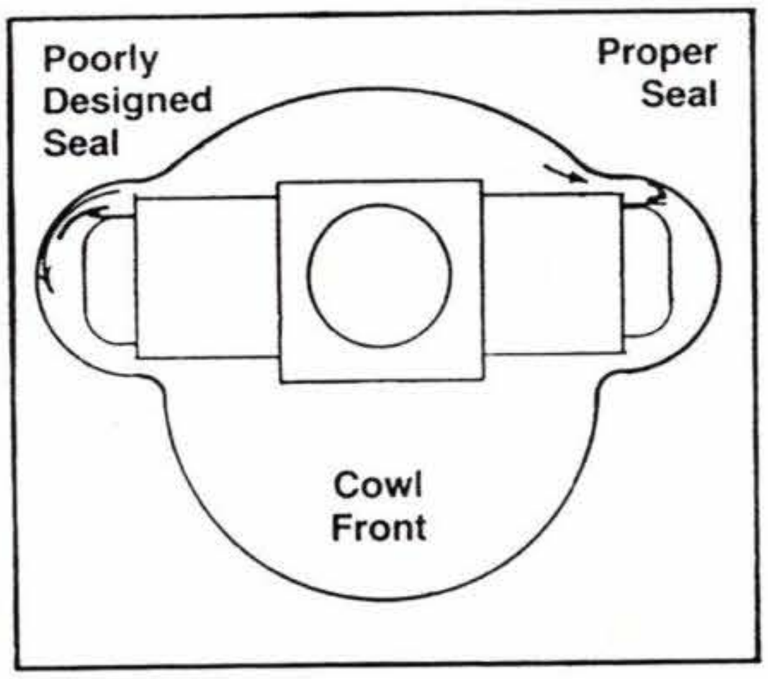
CRAFTSMAN'S CORNER

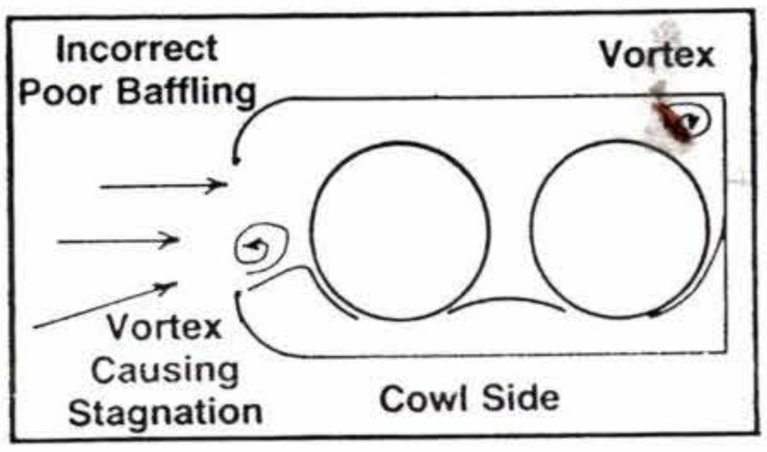
Ben Owen

ENGINE COOLING TIPS

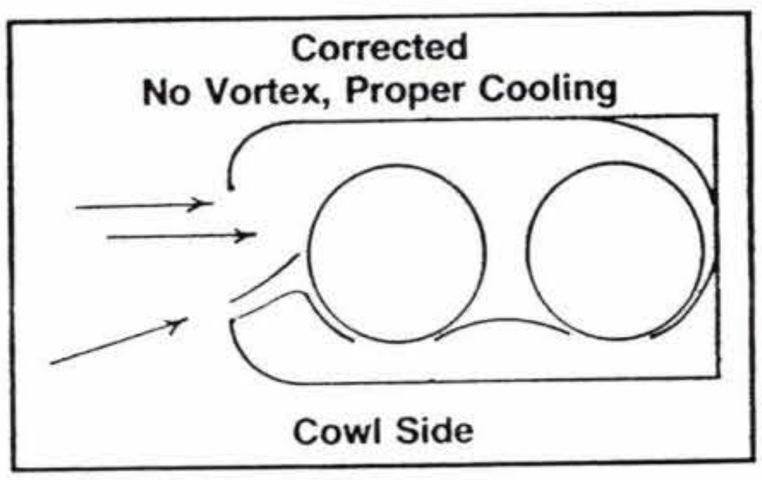
One of the common problems that is seen with cowling is poorly designed seals. The cowl front below shows a proper seal on the right side and a poorly designed one on the left. Silicon rubber will help in this area.



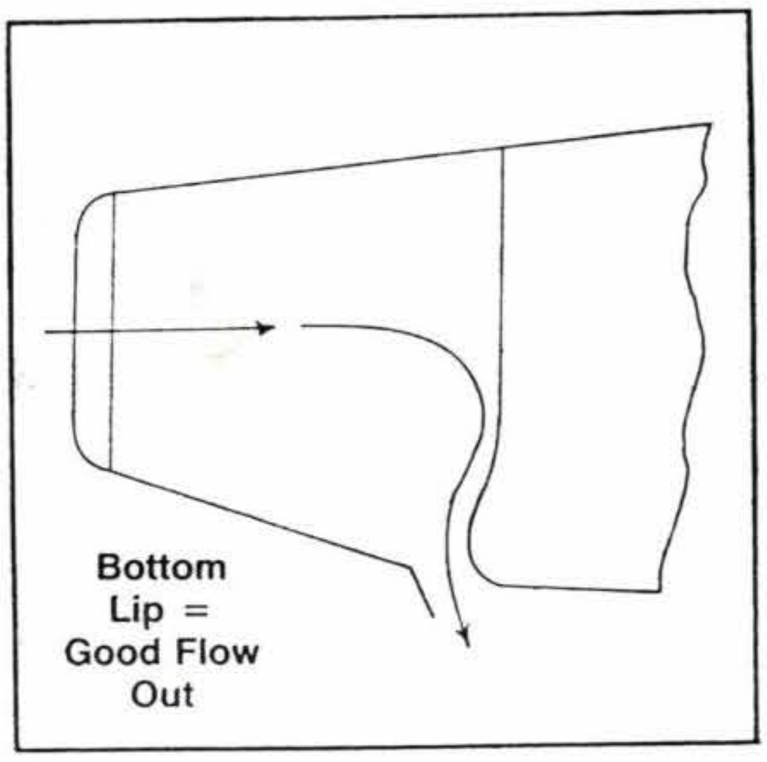
In the Sonerai newsletter, there is information on how small vortexes caused stagnation and hot spots on cylinders due to poor baffling.



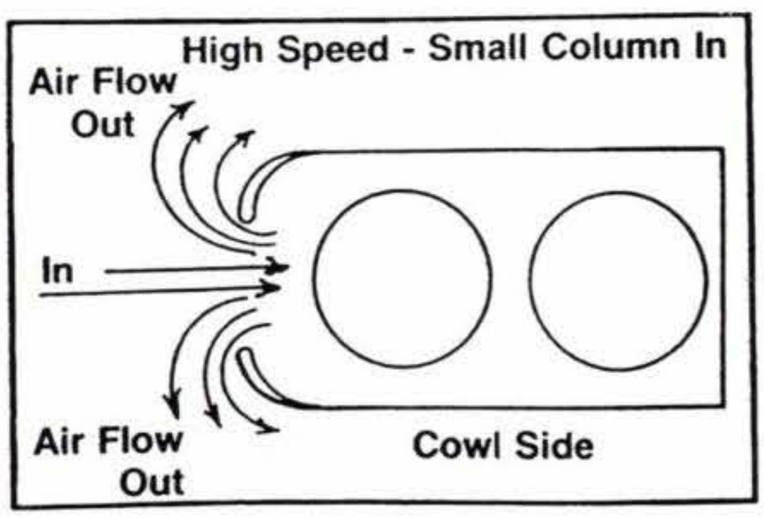
The drawing below shows the corrected baffling, ensuring the proper flow in the corner and leading into the cylinders which eliminate stagnation. This was most pronounced on the left side of the engine due to the proximity of the cowling and front cylinder to the propeller. Two changes had to be used together . . . if one is left off, the other won't work. The left rear cylinder dropped from 415 degrees F to 370 degrees F in normal cruise and from 440 degrees F on climb-out to 400 degrees F.



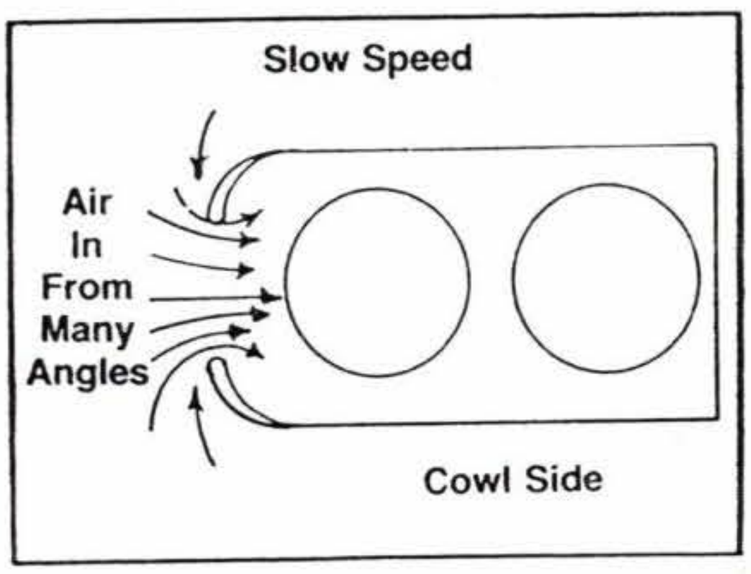
EAA Director Harry Zeisloft designed a bottom lip for good flow outlet that had considerable performance effect on both cooling and cruise speed to eliminate the sharp lip at the bottom of the cowl.



At high speed the air has to turn a corner getting into the cowl and if too much air gets in, it must go out again around the cowl. If that edge is sharp, the drag rise will be high.



Slow speed air comes in from all around the cowl and it needs the curved inlet lip there as much as any.



I suggest that you take in the minimum amount of air consistent with requirements for climb and slow speed/high power flight cooling. Cowl flaps are an excellent idea to assist here. Eliminate sharp corners and try to make the inside air flow as smooth as the outside. There should be a good inlet opening up gently to the pressure chamber. Keep the flow attached and going in the right direction. The collector should be somewhat like a horn in area and should squeeze slowly down to an outlet slightly larger than the inlet. Of course, you'll have added thrust from added heat. It helps if heated cooling air is expelled backwards. Also, if you aim your exhaust system backwards instead of down, you can get a very real boost in airspeed. You might combine the exhaust flow and the outlet air to get some degree of augmentation. Any engine mounts, wire, cables, etc. in the way out where the high speed air is accelerating will cause high drag exactly like they would on the outside. Try to visualize the flow internally as well as you visualize the external flow in designing the cowl for reducing drag.

Thanks to A. J. Smith, Harry Zeisloft, the Dragonflyer Newsletter and the Sonerai Newsletter.