Dual Purpose Muffler

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The purpose of this project was to build muffler that serves two purposes; attenuating exhaust noise and increasing performance. Computational fluid dynamics software was used to create models and simulations of the flow of exhaust gases through proposed muffler designs to create an optimized design. The dual purpose muffler (DP) uses seven 1.15-inch diameter perforated tubes wrapped in fiberglass to increase sound attenuation instead of one larger perforated tube. It increases vehicle performance by maintaining a straight through design with the seven perforated tubes and expansion chambers on each end of the muffler. Tests were done with three mufflers; straight pipe (SP), turbo muffler (TM), and the DP muffler for sound, 0 to 60 miles per hour, and exhaust back pressure. The sound testing was done with the test vehicle at Idle, 2000 rpm, 4000 rpm, and 5000 rpm. The sound was measured with a decibel meter, computer program, and microphone. The 0 to 60 test was measured with a stopwatch. The back pressure test was done with a pressure gauge in the exhaust pipe. The results from the sound test in decibels are as follows: idle; SP=84, TM=76, and DP=75. 2000rpm: SP=90, TM= 77, and DP= 80. 4000rpm: SP= 103, TM= 96, and DP= 87. 5000rpm: SP= 106, TM= 104, and DP= 92. The average 0 to 60 test times in seconds are as follows: SP= 10.4, TM=11.5, and DP= 9.5. The horsepower produced was found from the 0 to 60 tests using basic physics equations. The DP produced 8.51% more horsepower than SP and 17.62% more than the turbo muffler. Fuel efficiency tests were done and DP used 2% less fuel than TB; SP wasn’t tested because it is not street legal. The back pressure results in psi are as follows: SP = 0, TM= 1.5, and DP= 2. The results show that DP met all engineering goals set.

Awards Won:

Second Award of $2,000