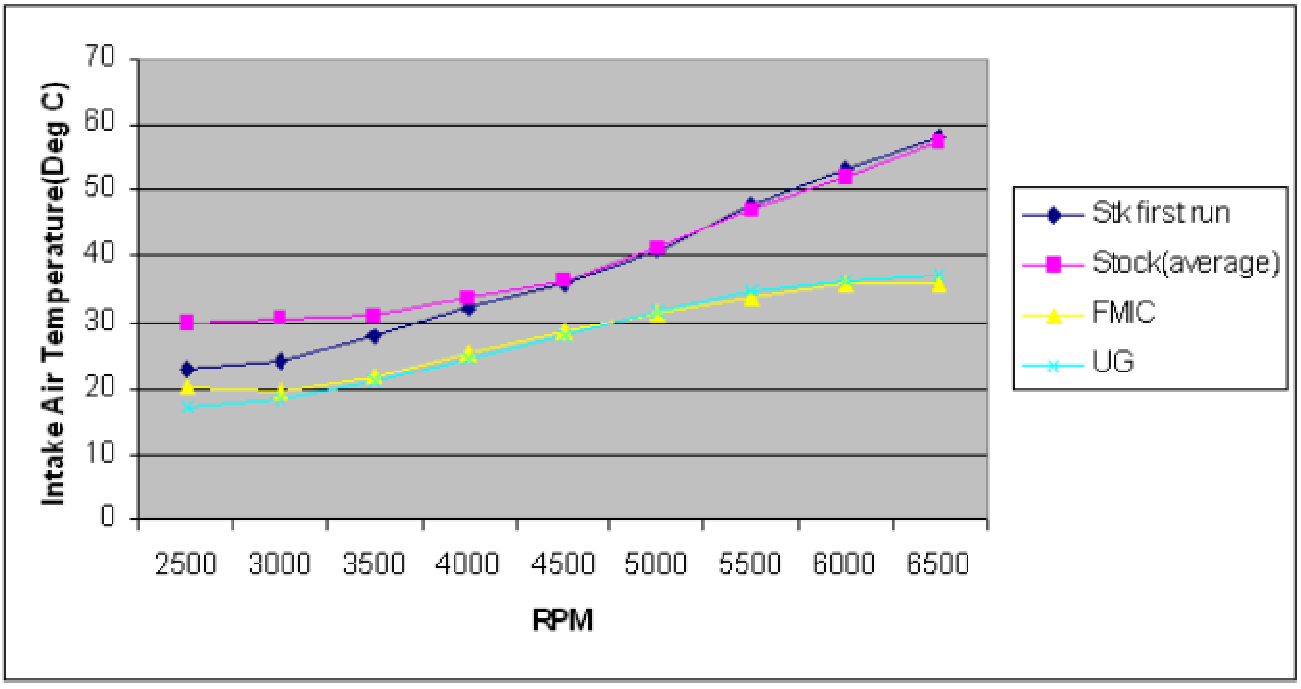
TyrolSport Intercooler Testing Part II – The Open Road

To validate our intercooler testing results on the dyno, we decided that we would go out and test all of the intercoolers in real world driving conditions. Some people believe that an intercoolers' performance on a dyno is artificial; there are no readily available dyno fans that can simulate the 50-90 mph cooling wind that one might see while cruising down the highway. Others believe that the position of a front mounted intercooler unit gives it inherently better ability to cool the charge contained within the core.

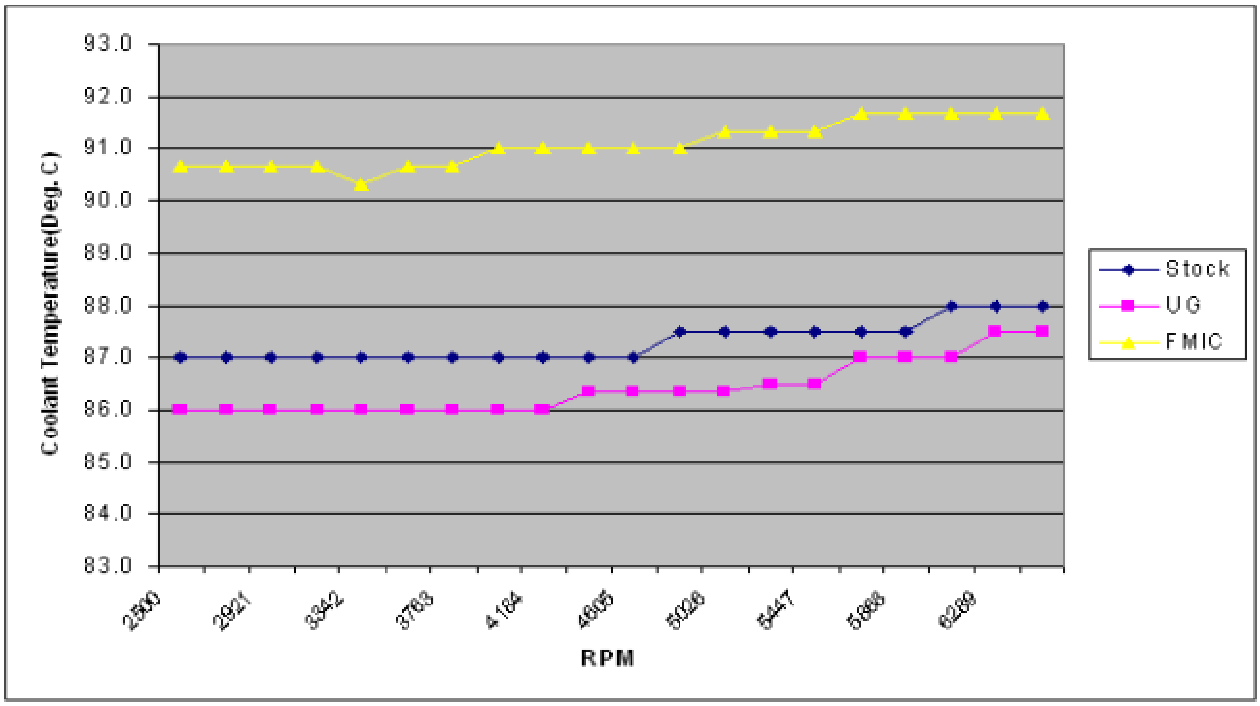
In order to validate or dispute the popular hypotheses, we ran each of the three intercoolers on the highway from 2500-6700rpm in third gear, at full throttle. This would represent real world acceleration from approximately 35mph to approximately 95mph. Each of the intercoolers was run on the same roads and same day. The runs were conducted in opposite directions to negate wind direction. We ran each unit four times, and eliminated the first run for consistency. Coolant and oil temperature were monitored so that it would be the same for each unit at the beginning of the testing. All data acquisition was done with VAGCOM software. The results were interesting.

The first chart shows Inlet Air Temperature for the three units while accelerating at full throttle from 2500-6700rpm:



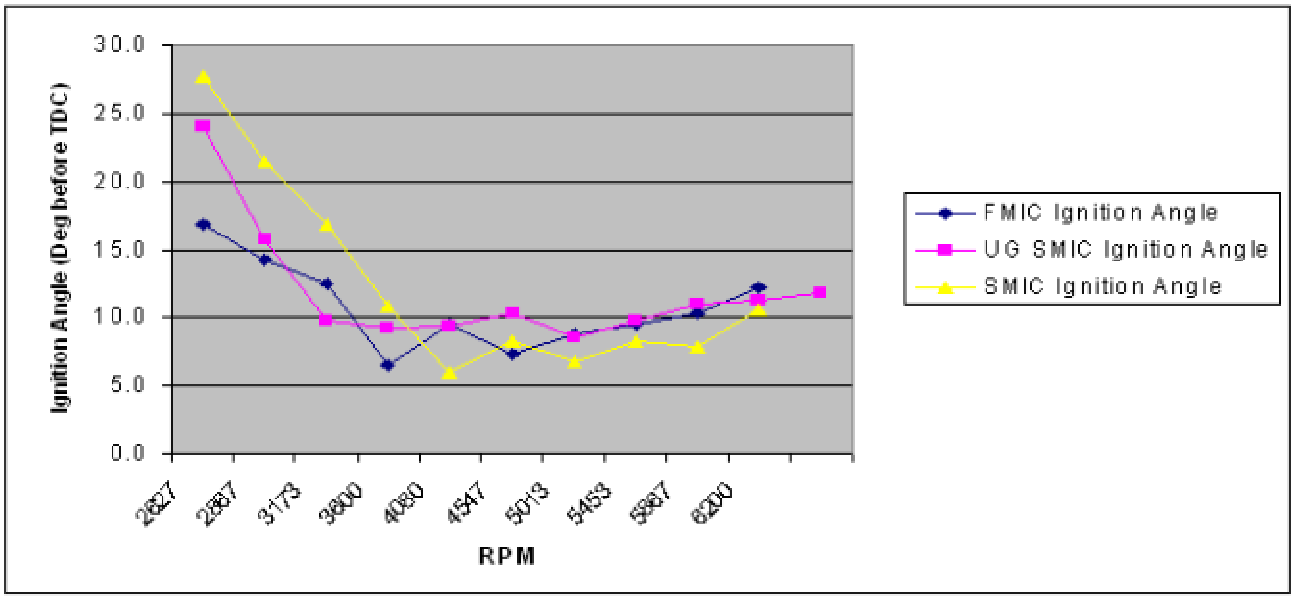
Here we clearly see that the stock intercooler is clearly outclassed by the TyrolSport UG SMIC and the FMIC unit. The charge temps for both the UG SMIC and FMIC are in a dead heat. Get it? Oh well….Maybe we should continue on with the data…..

Our second chart shows coolant temperatures for the three units while accelerating at full throttle from 2500-6700rpm.

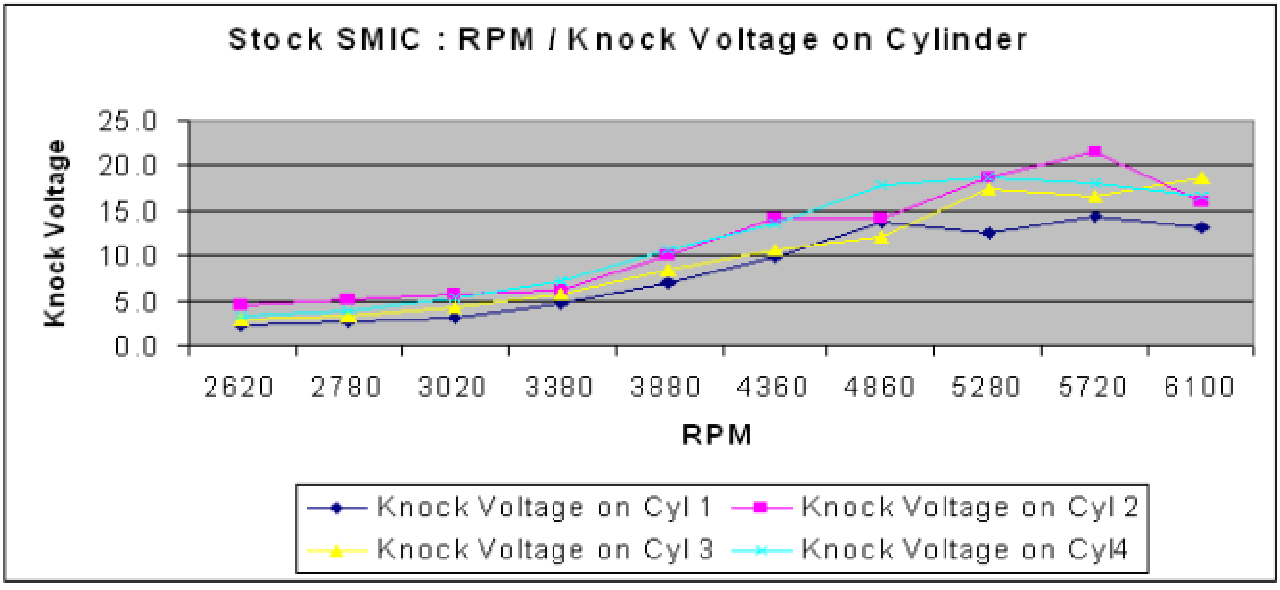


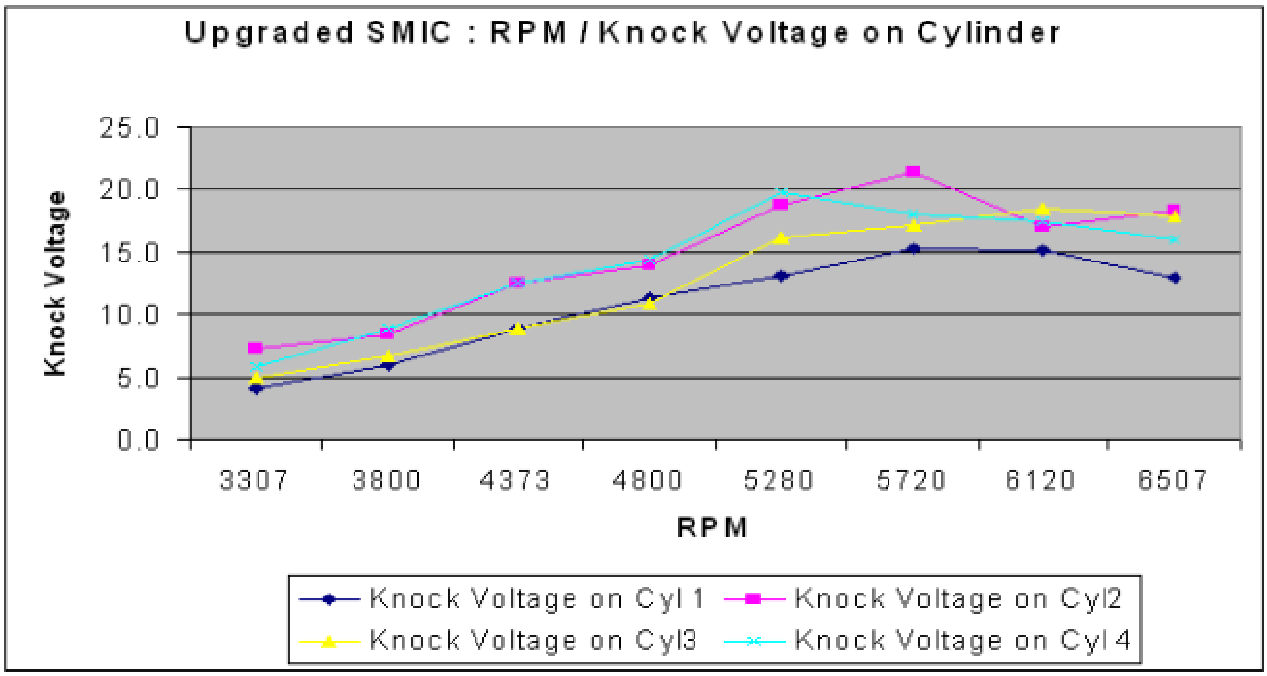
The first thing one notices is that the FMIC runs higher coolant temperatures overall. We tried to equalize the starting coolant temperatures while cruising down the road, but the FMIC coolant temps refused to go below 90deg, while the SMICs cruised at 86-87deg. Please be aware that all the units ran within the specified operating temperatures, and that 91deg C is an acceptable coolant temperature. However, this decreased cooling capability could become an issue when driving hard for extended periods of time.

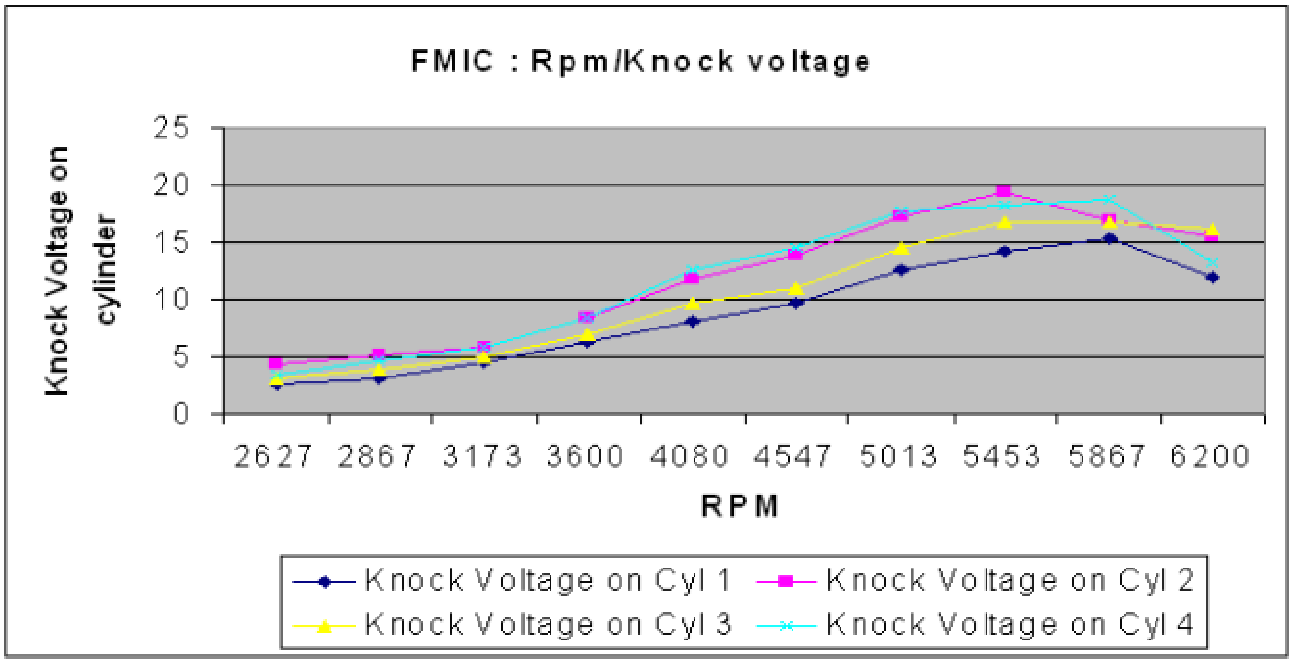
The next chart shows Ignition Timing Advance of all three units(Higher being better). Again we see that the stock SMIC is at a disadvantage, with the FMIC and UG SMIC being superior:



The final chart shows individual cylinder knock Voltage for each of the three units(Stock, UG SMIC, FMIC), Lower being better.







The knock voltage tests did not reveal anything worthwhile for comparison, but validated that the #2 cylinder is the one most prone to having large amounts of knock, with #1 being the least prone. We're not exactly sure why this is, but our hypothesis is that the factory intake manifold is resonance tuned in such a way as to cause this phenomena.

So what does this all mean? Basically, all three of the intercoolers performed the same in real world conditions as they did on the dyno. The cooling affect of the additional airflow did not meaningfully improve the performance of the intercoolers relative to each other.

The UG SMIC outperformed the stock SMIC by a wide margin in all of the testing. In addition, it performed equal to, or better than the FMIC in most of the testing. Most importantly, it outperformed the FMIC in power, and in boost response.

When shopping for an intercooler, it would be in your best interest to gather similar data from the manufacturers of the particular units in which you are interested. We have seen a few intercoolers on the market that actually perform equal to, or worse than stock, even though they “look” like they would work better. Buyer Beware!

If you have further questions or additional data requests from TyrolSport, please feel free to email us, and we will provide you with as many answers as possible. Thanks!