



NSX & S2000 Performance Specialists

1115 W Fairmont Dr
Tempe, AZ 85282

480-894-6277 / ph
480-452-0964 / fx

<http://www.ScienceofSpeed.com>
info@ScienceofSpeed.com

ScienceofSpeed's Conclusive Track Testing of Speed Engineering Directional Brake Rotors

Reason for testing:

Speed Engineering offers a directionally vaned brake rotor that is a direct replacement for the factory Honda rotor. The front factory Honda ventilated rotor has straight vanes. This straight vane design is less expensive to produce (as the left and right are interchangeable) making it ideal for OEM equipment. The Speed Engineering rotors have directional, side-specific, vanes which actively pump air from the center of the rotor outwards and a reverse mount design that takes advantage of the greater airflow on the wheel side of the rotor. Directional vaned rotors are well established to provide more efficient brake rotor cooling. The question was "how much?" for the S2000 application.



In order to properly test the rotors, we needed a consistent testing environment and a way to accurately measure the brake rotor temperature in real time to eliminate variables (such as the time required to enter the pits and have temperatures read).

About testing:

ScienceofSpeed performed testing at Inde Motorsports Ranch in Wilcox, AZ. IMR is a 21 turn road course with a good sampling of hard-fast and slow-long braking corners. The testing was performed over two days with a ambient high of 95 degrees. 56 laps (over 154 track miles!) were completed in order to have the largest sampling of data possible.

The vehicle used was ScienceofSpeed's 2005 Honda S2000. The car is a relatively factory track prepared S2000 weighing 2860 lbs with driver. The car has factory calipers and Carbotech XP10 brake pads front and XP8 brake pads rear. Fluid used was Motul RBF600. The only change made between tests was the rotors installed.



In order to capture accurate real-time data – a laboratory grade infrared sensor & controller was purchased to provide real time data. The Omega OS100E infrared sensor & controller is a highly accurate sensor used in industrial process automation, laboratory, and other testing environments requiring a range of 0-1000 degree F, high accuracy (+/- 2%), and fast response time (100 millisecond).



The sensor was mounted to the lower control arm and positioned such that the sampling 36mm spot was focused on the center of the swept area of the disc. The sensor's emissivity was adjusted and verified using a calibrated thermometer in ambient temperature. The sensor's body was equipped with a water cooled jacket to protect the sensor against radiant heat from the brakes. The sensor's output was datalogged along with vehicle speed and time.



Vehicle speed and time was logged in order to eliminate the variable of the car being driven faster or slower to influence rotor temperatures. Laps completed with the factory and Speed Engineering rotors with the most consistent lap time and average vehicle speed were used. Each session's data was downloaded and analyzed.



Results:

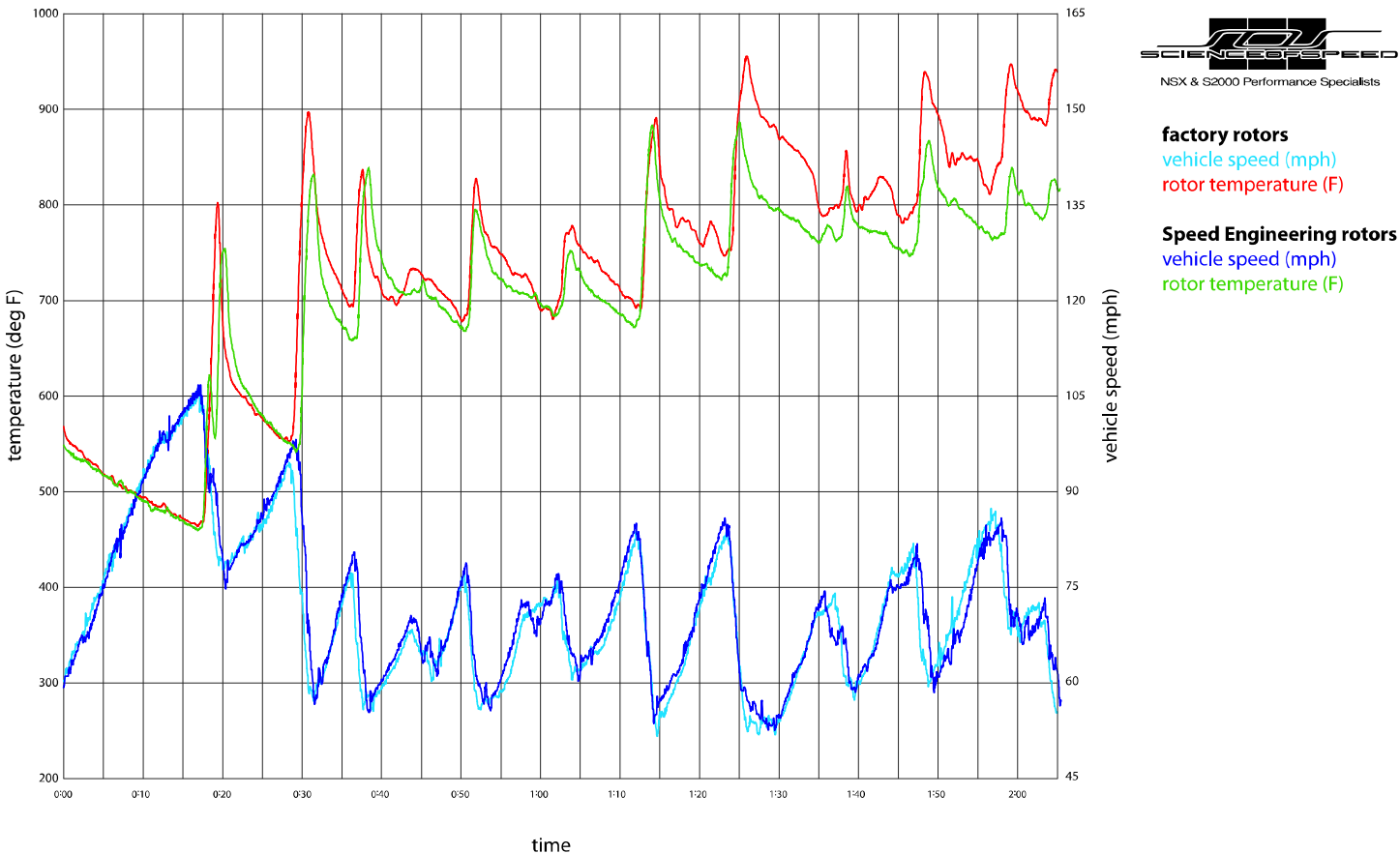
We analyzed rotor temperature between two laps that had only a .48 mph (.7%) average difference. We have the following results to share:

- The Speed Engineering rotors were 96.5 degrees (12.4%) cooler from lap start to lap end.
- The Speed Engineering rotors were 58.4 degrees (7.4%) cooler on average through the lap.



	start temp (F)	end temp (F)	temp gain (F)	rotor temp (avg)	speed (avg)	lap time
factory Honda rotors	568.9	943.1	374.2	791.0	68.37	2:049
Speed Engineering rotors	548.7	826.4	277.7	732.6	68.85	2:037
difference			96.5 less	58.4 less	0.48	:012

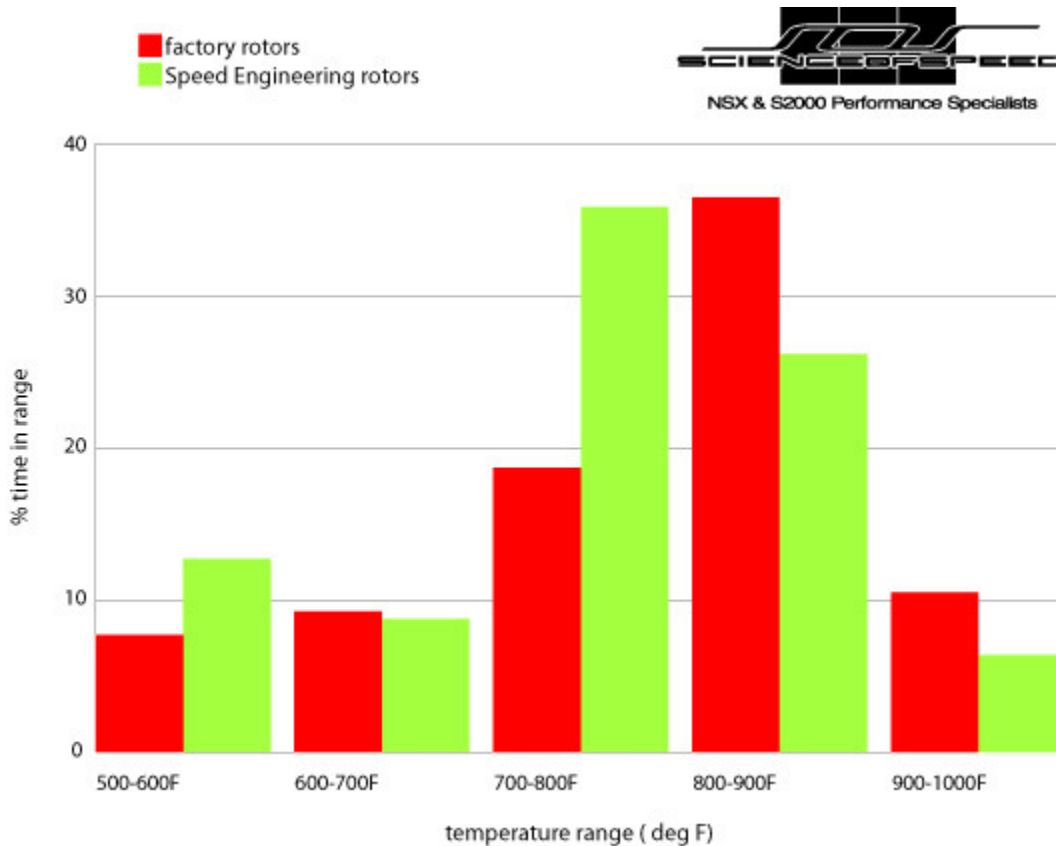
The following graph shows the entire lap with rotor temperature and vehicle speed plotted. The blue plots are vehicle speed demonstrating the consistency of the lap. The red plot shows the factory rotor temperature, the green plot shows the Speed Engineering rotor temperature. The plot demonstrates the Speed Engineering rotor to run consistently cooler and also to recover temperature at a faster rate at higher operating temperatures.



factory rotors
 vehicle speed (mph)
 rotor temperature (F)

Speed Engineering rotors
 vehicle speed (mph)
 rotor temperature (F)

The following histogram bar graph shows the duration of time spent at certain temperature ranges over these laps. The red bars are the factory rotor showing extended time in the 800-1000 degree F temperature range and the green bars are the Speed Engineering rotor showing greater running time in the cooler 500-800 degree F temperature range.



This testing accurately demonstrates the cooling efficiency of the directional vaned rotors versus the factory straight vane rotors. Subjectively, compared to the factory rotors which demonstrated a small amount of brake fade – the directional vaned rotors were consistent throughout the day exhibiting no fade.

A cooler running rotor has many benefits including:

- Increased durability of brake components including rotors, pads, fluid, and caliper seals.
- Increased durability of suspension & steering joints and wheel bearings.
- Decreased long term operating costs due to extended life of components.

The reverse mount rotor design has several benefits including:

- Access to air flow on wheel side of rotor.
- Ability to retain factory heat shield to provide protection against suspension & steering joints.

The Speed Engineering Directional Rotors are available at a price less or equivalent to other slotted non-directional vaned aftermarket rotors making them an ideal choice for both street and track driven S2000s.