



Virginia Commonwealth University

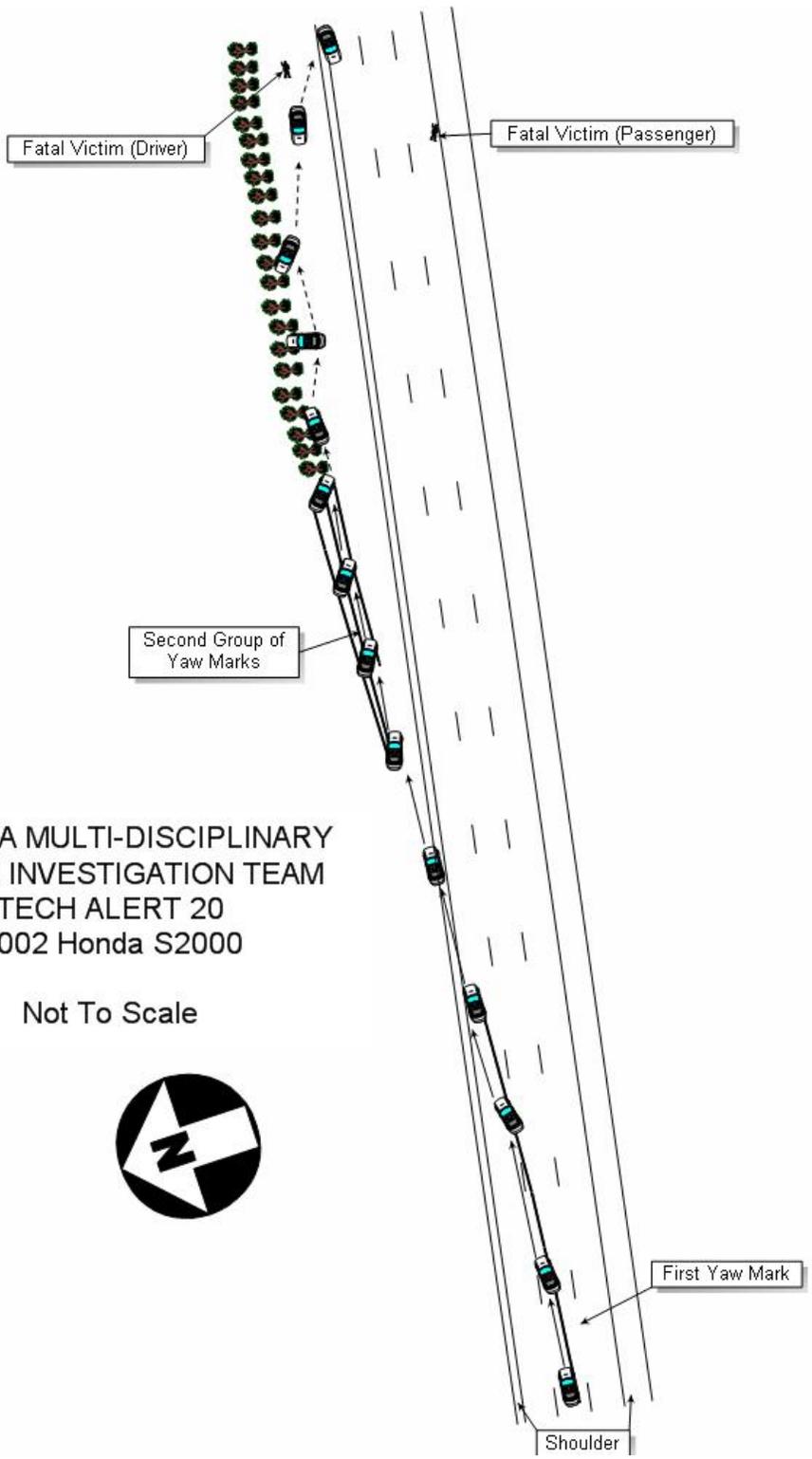
**Virginia
Multi-disciplinary
Crash Investigation Team**

**Technical Alert: Number 20
Two Fatality Single Vehicle Crash**

September, 2009

This Technical Alert describes a high speed single vehicle crash that occurred when the driver of a sports car lost control and ran off an interstate highway, striking several large shrubs in the median. The car, which had been altered to allow the introduction of nitrous oxide into the fuel system, then spun off the shrubs and back into the travel lane. Both the driver and his front seat passenger were ejected and killed.

On a sunny, dry Friday evening in early summer, a 2002 Honda S2000 two door convertible was traveling east on a three lane interstate highway. The 21 year old driver, who also owned the car, was accompanied by a 29 year old male in the front seat. There was no evidence to indicate that either occupant wore their lap/shoulder belts. Based on toxicological analyses of blood samples taken after the crash, neither was under the influence of alcohol or drugs at the time, and the driver was not known to have any physical impairments or deficiencies. A member of the U.S. Navy, the driver was stationed in the area. He was licensed to drive by his state of residence and his driving history showed a series of violations over the previous three years that are consistent with his actions the day of the crash. During that time period, he had five speeding violations, including one for driving 67 MPH in a 35 MPH limit, four convictions for unlawful noise and/or no muffler, one seat belt violation, one careless driving conviction and a reckless driving conviction.



VIRGINIA MULTI-DISCIPLINARY
 CRASH INVESTIGATION TEAM
 TECH ALERT 20
 2002 Honda S2000

Not To Scale



The passenger was a law enforcement officer in a neighboring city. He carried his badge and identification on him. A check of his driving history revealed that he had a +4 safety point balance. He had been convicted of speeding 10 to 14 miles above the speed limit about eighteen months prior, in the same jurisdiction as the crash.

The road is a major east-west interstate route located in an urban area. It has three lanes eastbound and is on a slight downgrade at the location of the crash. The road is concrete and is in fair condition, although the surface is “polished” and has numerous pothole patches. Each lane is approximately 12 feet wide. There is an asphalt shoulder approximately 10 feet wide adjacent to the right lane; a 3 foot asphalt shoulder runs adjacent to the left lane. The eastbound and westbound lanes are separated by a grass median. At the location of the crash, mature shrubs with thick trunks grow in the center of the median. The road is controlled by signs and pavement markings. The signs are in good condition and the pavement markings are in fair condition. There is overhead lighting. In addition snow plowable reflective pavement markers are installed to help delineate the roadway at night and during inclement weather. Some of the reflective elements on these markers are in poor condition (The Virginia Department of Transportation (VDOT) should review the snow plowable reflective pavement markers and replace all the damaged/missing reflective elements.) The speed limit is 55 MPH.

Witness statements indicated that the Honda was traveling at a high rate of speed in the left travel lane in moderately heavy traffic. According to the “AVERAGE DAILY TRAFFIC VOLUMES with VEHICLE CLASSIFICATION DATA ON INTERSTATE ARTERIAL AND PRIMARY ROUTES” (Commonwealth of Virginia Department of Transportation, 2008), the average daily traffic is 25,000 vehicles for this section of roadway. As the driver approached a slower moving vehicle in the same lane, he changed lanes to the middle lane to pass. After passing the slower moving vehicle, the driver attempted to steer back to the left lane. This maneuver caused the rear wheels of the Honda to begin slipping sideways and the vehicle yawed counterclockwise towards the median on the left. The driver attempted to regain control by overcorrecting to the right, but his momentum had already carried him off the left edge of the roadway and into the grass median. The Honda furrowed through the median until the left front impacted

the first of the treelike shrubs. The vehicle then spun throughout the median, contacting the shrubbery several more times in different locations along the body of the Honda.

The unbelted front seat passenger was ejected from the vehicle and came to rest in the right travel lane adjacent to the right emergency shoulder. The unbelted driver was also ejected from the vehicle and found in the median near the final rest of the Honda, which was partially in the left travel lane facing the opposite direction of travel. A nitrous oxide bottle was also found in the median, adjacent to the Honda at final rest.

The Honda sustained major damage throughout the entirety of the vehicle. The left front quarter panel was sheared off from contact with the shrubbery. Contact damage with the shrubs was evident along the entire left side to include the "A" pillar. The left front, left rear, and right front tires were all broken off at the axle joint and detached from the vehicle. The right rear tire was still attached and the tread on the tire showed excessive wear, down to the level of the wear bar indicators. This wearing was across the entire tread pattern and was in violation of safety standards set forth in the Code of Virginia (§ 46.2-1043). A CARFAX Vehicle History Report revealed the Honda was last purchased approximately one year preceding the crash in the driver's state of residence. A four wheel alignment was performed in that same state four months before the crash.

The investigating trooper and reconstructionist both reported that the Honda was equipped with a nitrous oxide delivery system. The Code of Virginia (§ 46.2-1088.4) states: "It shall be unlawful for any person to operate any motor vehicle on the highways of the Commonwealth if such vehicle is equipped with any device that supplies the vehicle's engine with nitrous oxide, unless the device has been disabled such that the supply of nitrous oxide is disconnected and not readily accessible to the source of delivery."

When VMCIT members examined the car, the nitrous oxide system was not present and the exact delivery system type was not determined. In speaking with an expert in the area of motor vehicle equipment from the Virginia Department of State Police (VSP), the VMCIT learned the likely system used by this type of vehicle was a Direct Port system. In this type of system, the nitrous oxide is introduced into the fuel injectors (in a fuel injected vehicle). A nitrous oxide system is designed to introduce additional oxygen into the fuel intake system. Upon introduction to the intake system,

the combustion created to burn fuel breaks down the chemical bonds between the nitrogen and the oxygen. This allows the engine to utilize the oxygen molecules to increase its power output and aids in the acceleration of the vehicle. In addition, speed calculations from the yaw mark produced by the Honda as it ran off the roadway indicate the vehicle was traveling at least 95 MPH prior to the crash. This section of roadway is posted at 55 MPH.

Immediately after the crash, traffic on the highway stopped and bystanders tried to assist the two men. Others notified emergency personnel and fire and rescue units responded within minutes. The driver had suffered blunt head trauma and was declared dead at the scene. He also had multiple lacerations, fractures of his left arm and dicing injuries on the left side of his face, which is consistent with driver positioning in the vehicle. The passenger in the roadway had severe head injuries, but emergency medical personnel were able to resuscitate him. They transported him to a nearby hospital, where he was pronounced dead just over an hour after the crash. This young man sustained dicing injuries at multiple locations on his body, including both knees, his right hip and left arm, so it is difficult to determine his exact position in the vehicle through his injuries. It appears that he was ejected through the right side passenger window as the vehicle spun, however.

In summary, this crash was the result of a driver recklessly operating his vehicle at a very high speed. The vehicle had been outfitted for faster speeds and street racing, and the driver had a history of speed violations in his state of residence. However, it is unknown if he was actively engaging the nitrous oxide delivery system at the time of the crash. Even though the lack of restraint use resulted in the ejection of both occupants, the vehicle suffered extreme intrusive damage, and it is unlikely that either would have survived the crash even if they had remained inside the occupant compartment. It is important to stress, however, that ejected occupants are four times more likely to be killed as those who remain inside the vehicle during crashes (National Highway Traffic Safety Administration, 2006).

REFERENCES

Commonwealth of Virginia Department of Transportation (2008). *AVERAGE DAILY TRAFFIC VOLUMES with VEHICLE CLASSIFICATION DATA ON INTERSTATE ARTERIAL AND PRIMARY ROUTES*. Richmond, VA.

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