

Virginia Commonwealth University
Transportation Safety Training Center
Virginia Multi-disciplinary Crash Investigation Team

Report Number 210 – October, 2009

ABSTRACT

A motorcycle traveling around a curve crossed the centerline and struck a second motorcycle headed in the opposite direction. The drivers of both bikes vaulted forward, striking body to body, and then tumbling to the ground. One driver died immediately from his injuries; the other died while in the process of being transported from the area. Both motorcycles were damaged extensively.

This crash illustrates the general vulnerability of motorcyclists in crashes, as well as issues with wearing novelty or non-compliant motorcycle helmets. Riding in groups, motorcycle operator endorsements, and how roadway issues may affect motorcyclists are discussed.

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SYNOPSIS

Day, Time, Season: Sunday, 12:24 p.m., summer

Road/Weather: Primary road, clear and dry

Vehicles Involved: 2005 Harley Davidson FXSTDI Softail Deuce motorcycle
2005 Harley Davidson FLHRCI Road King Classic motorcycle

Summary: One motorcycle crossed the centerline and struck the second motorcycle in a slightly offset head on collision.

Severity: Two fatalities; both motorcycles totaled.

Probable Cause: Failure to maintain the proper lane of travel, possibly due to inattention.

Significant Points: Motorcyclists' vulnerability in crashes, issues with non-compliant helmets, motorcycle endorsements, roadway conditions, group rides, and timing of toxicology reports.

VIRGINIA MULT-DISCIPLINARY
CRASH INVESTIGATION TEAM
REPORT 210
2005 Harley Davidson FXSTDI
Motorcycle
2005 Harley Davidson FLHRCI
Motorcycle

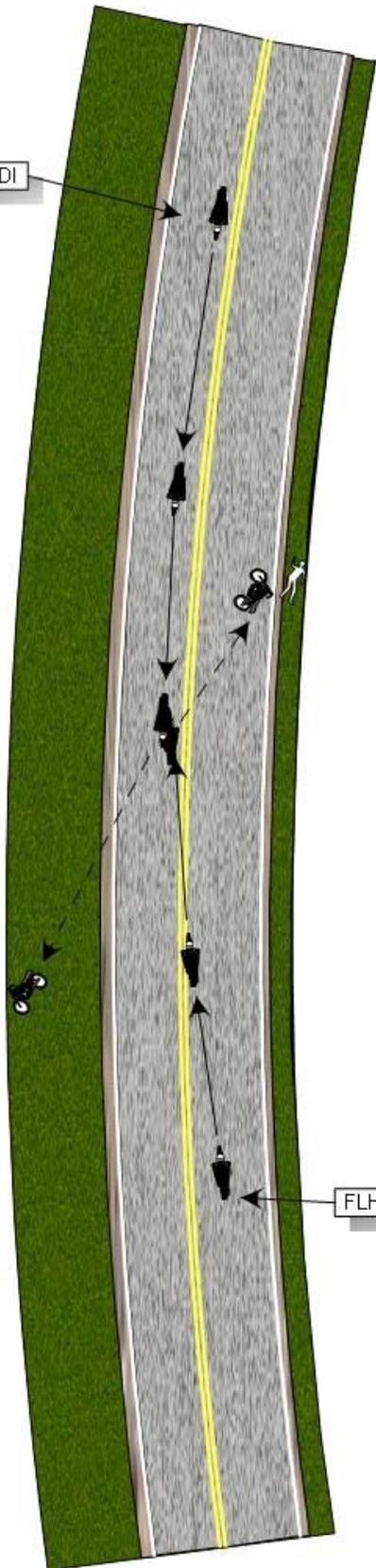
Not to scale



FXSTDI



FLHRCI



CRASH DESCRIPTION

On a sunny, dry Sunday, at 12:24 p.m., two motorcyclists were headed east on a rural two lane primary highway. The trailing motorcyclist was a 51 year old male, riding a 2005 Harley Davidson FXSTDI Softail Deuce. He wore a motorcycle helmet that did not meet or exceed U.S. Department of Transportation (DOT) standards (also referred to as “non-compliant” or “not DOT-compliant”). The two men had been riding all during the morning, taking a scenic drive into the mountains of an adjacent state. They were headed home, about an additional two hour drive.

The road is a two lane east-west primary route located in a rural, mountainous area. The road is asphalt and in poor condition. The asphalt pavement is worn to the point the aggregate is exposed. There is a pothole near the centerline in the eastbound lane in the area of the crash. The eastbound lane is approximately 10 feet 5 inches wide and the westbound lane is approximately 9 feet 2 inches wide at the location of the crash site. There is a 1 foot gravel shoulder adjacent to the eastbound lane with a 3 foot grass shoulder adjacent to the gravel shoulder that slopes to a drainage ditch. This is bordered by a steep “cut” section (where the roadway was cut into the mountainside). The eastbound lane curves approximately four degrees to the right and has an approximately three percent downgrade at the location of the crash. The curve and cut section limits sight distance of approaching motorists. Adjacent to the westbound lane, there is a 2 foot gravel shoulder bordered by a 12 foot grass shoulder that slopes to a field. The lanes are separated by double solid yellow pavement markings. The road is controlled by pavement markings and signs. The signs are in good condition and the pavement markings are in fair condition. There is no overhead lighting. The speed limit is 55 miles per hour (MPH). In addition, there are horizontal alignment signs (indicating a winding road) with advisory speed plaques showing “45 MPH” in advance of the crash site for both directions of travel.

A group of nine motorcyclists was traveling westbound on the same section of highway, approaching the two eastbound cyclists. They belonged to a local motorcycle organization that often sponsored rides, and they had gathered earlier in the day for an excursion, including riding through an area of national forest and crossing into the next state. The last vehicle in the group was a 53 year old male driving a 2005 Harley Davidson FLHRCI Road King Classic. He wore a half helmet that was reported to meet DOT standards.

As the two groups of motorcyclists approached each other, they entered the curve. The Softail rider's path curved to the right and downhill. As he negotiated the curve, he passed seven of the nine westbound motorcycles and crossed the double solid yellow centerline. The driver of the eighth motorcycle reported that he moved his vehicle further to his right to avoid the encroaching Softail, which then continued into the path of the Road King. The Softail struck the Road King in an offset head on collision. The area of impact was in the westbound lane approximately 2 feet south of the double solid yellow centerline. This was determined by gouge marks found in the westbound lane. Both riders moved forward, their knees coming into contact with and denting the gas tanks. Their bodies then collided with each other and the opposing motorcycles. At some point, the Softail rider's helmet came off.



Photo #1: View looking west, direction Road King was traveling. Arrow points to area of impact, right of centerline.

After maximum engagement, the Softail and its rider went to the right side of the eastbound lane. This motorcycle came to rest at the right edge of the roadway approximately 21½ feet northeast of the area of impact. The driver was found in the ditch line approximately five feet northeast of the motorcycle. He died instantly from head and chest injuries. The Road

King and its rider went to the right shoulder of the westbound lane after maximum engagement. The motorcycle came to rest in the grass shoulder approximately 39 feet southwest of the area of impact. The rider's final rest location was not documented in this crash.



Photo#2: View facing eastbound. Arrow indicates area of impact.

Since only the last two riders in the group were involved in the crash, none of their companions observed the actual collision. The noise of the crash caught the attention of some riders, however, and they stopped to assist, calling for emergency help. Due to the rural location of the crash, it took the investigating trooper just over 30 minutes to reach the scene. By that time, local fire and rescue personnel had already arrived.

Emergency medical personnel declared the Softail driver dead at the scene. Emergency air transport was called for the Road King driver and he was moved by ambulance a short distance from the scene to a landing zone for the helicopter. Attempts were made to resuscitate him; however, he died in the back of the ambulance from head and chest injuries.



Photo #3: View facing east, direction the Softail was traveling, showing final rest of both motorcycles.

The investigating trooper asked dispatchers to notify the Medical Examiner of the two fatalities and requested the assistance of additional troopers and local law enforcement and emergency responders in managing traffic. He also contacted the Virginia State Police Divisional Crash Reconstruction Team to assist in the investigation. A reconstructionist responded and marked, measured, and photographed the scene. A full reconstruction was not completed due to both riders being killed and the area of impact was easily discernable by the gouge marks. Both bodies were transported by the ambulance to a county hospital morgue for examination by a Medical Examiner. A towing service also responded and removed the two motorcycles. The scene was cleared approximately 4 hours after the crash occurred. The investigating officer then ensured that next of kin had been notified of both fatalities, either by State Police troopers or local law enforcement officers.

REMARKS

The Virginia Multi-disciplinary Crash Investigation Team (VMCIT) first learned of this crash when it was reported on the Virginia State Police (VSP) Daily Activity Report, which provides information on all state traffic fatalities reported in the previous 24 hours. After contacting the investigating officer for more information and since head on collisions involving two motorcycles are rare, the Team decided to look further into the case.

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 volume is 1000 vehicles for this section of roadway. This is a light volume, which is not unusual for a rural area. A review of the crash data from the period of January 1, 2005 through September 21, 2008 indicates that nine crashes occurred within a mile of this crash site. Three were animal related. Five were run off the road/fixed object collisions, all involving the vehicles initially running off the road to the right. In one of these cases, the vehicle was then overcorrected and ran off the road to the left before striking a tree. The ninth crash was an angle collision that resulted when a driver lost control and crossed into the oncoming lane of travel. All but one of these last six crashes occurred in a curved section of roadway and three of the six involved wet or icy road conditions. Despite the shallow pothole, the roadway does not appear to be inherently unsafe and witnesses to the crash indicated that they did not perceive the roadway to be a hazard while driving their motorcycles.

The 53 year old male driving the 2005 Harley Davidson FLHRCI Road King Classic held a valid Virginia driver's license but he did not have a motorcycle endorsement. This is not unusual: about 24% of motorcycle operators involved in fatal crashes in the U.S. are operating without a proper license (NHTSA, 2006). His driving record revealed that this individual was never licensed to drive in Virginia until 2007. There is no record that he applied for or took a road test prior to that time. In the mid-1980's, however, he had three convictions for driving under the influence of alcohol, as well as a conviction for driving while his license was suspended or revoked. He was not licensed at the time, and these convictions would have prevented him from obtaining a license during the suspension period established by the court (two years on one conviction and 6 months on the third). The first conviction of driving without a license is a Class 2 misdemeanor, punishable by up to six months in jail and/or fines up to

\$1000. Although there was no fine information available on this conviction, this driver was not sentenced to any jail time. However, he was required to attend an Alcohol Safety Action Program (ASAP) course but the record did not contain any indication of his attending or completing the program. According to a Virginia Department of Motor Vehicles (DMV) official, if he had successfully completed the ASAP course, and if the recorded information was over 11 years old, it would have been purged from his driving history. Only outstanding requirements for ASAP would appear on an individual's record beyond the 11 year limit. In 1999, this driver was convicted of reckless driving as well as being found guilty again of driving with a suspended or revoked license. A second or subsequent violation of driving without a license is a Class 1 misdemeanor, punishable by fines up to \$2500 and not more than 12 months in jail. In this conviction, the judge fined the driver \$200 in addition to court costs and sentenced him to one month in jail. He also suspended the driver's license again, meaning he would not have been eligible for licensure for the six months following the conviction. His record has no further activity until spring 2007, when he was issued a learner's permit. Virginia requires that a never-licensed applicant over the age of 19 take a driving class or hold a learner's permit for at least 30 days before they are eligible to become fully licensed. There is no record of his having completed a class, but this individual applied for and was granted a regular license 32 days later, after meeting the time requirement for holding a learner's permit. A DMV official indicated that he would not have been eligible for this license if he had not met the ASAP requirements that had been set in the convictions two decades earlier. In June of 2008, this driver was involved in a property damage crash with no charges placed. Less than 3 weeks later, he was charged with operating an unlicensed motor vehicle. He was subsequently convicted of this offense and had a safety point balance of +1 at the time of his death.

This driver was riding with a group, and at least 10 other people rode on nine motorcycles. His son rode in the middle of the group. The group had met about 10:00 a.m. at a rural crossroads and then rode about 55 miles to a small town and stopped at a motorcycle shop. After socializing and taking time to drink some water, they resumed their trip, intending to drive through the mountains and cross into the adjacent state. Another motorcyclist offered to take the last position in the group, but the Road King driver declined and allowed them to precede him. They had traveled about 15 miles when the crash occurred.

The Road King rider was wearing a half helmet, a design that covers the top of the head but leaves the face and head area below the ears exposed. While the helmet was not available for

inspection, one of the riders—an off-duty police officer—thought that it was DOT-compliant. He stated, however, that he could not be certain. The Road King driver did not appear to have any physical impairments and he was the registered owner of the motorcycle. His familiarity with the motorcycle and the roadway is unknown.

The 51 year old male driving the 2005 Harley Davidson FXSTDI Softail Deuce held a valid Virginia driver's license with a motorcycle endorsement. His driving record revealed a safety point balance of -1. This balance reflects two speeding convictions: the first was in 2005, for travelling 1-9 miles over the speed limit (-3 points) and the second was six weeks prior to the crash, for traveling 15-19 above the speed limit in a 55 MPH zone (-4 points). This last conviction was finalized just 10 days before the crash.

On the day of the crash, this driver and his brother left home early in the morning and drove at least 150 miles into the mountains and across the state line. They were returning when the crash occurred. The driver did not have any known physical problems or impairments that would have affected his ability to drive and he was an experienced rider, according to his brother-in-law, who was riding with him. This driver was riding a motorcycle owned by his brother-in-law and his familiarity with the vehicle is unknown.

The Softail rider was wearing a helmet at the time of the crash that did not meet DOT standards. The retention system, a poor quality plastic clasp, failed, causing the helmet to come off of the rider and rendering it ineffective. The Federal Motor Vehicle Safety Standard regarding motorcycle helmets (§571.218) speaks to the Retention system and its testing requirements. The standard calls for a retention system (to include all of its components) that attains specific load standards specified without separation, and the adjustable portion of the system shall not move more than one inch (2.5 cm) measured from the preliminary and test load positions. The testing of the retention system requires applying a “static tensile load to the retention assembly of a complete helmet, which is mounted on a stationary test headform and by measuring the movement of the adjustable portion of the retention system test device under tension.” The preliminary test load of 50 pounds is applied to the retention assembly for 30 seconds and the measurement is taken. Then an additional 250 pounds test load is applied for 120 seconds and a second measurement is taken. If the retention system moves more than one inch, then the helmet retention system has failed the test.

In this helmet, the clasp broke, probably upon impact. There was minimal scarring on the shell of the helmet, due to the fact that it was thrown free of the driver's head before it struck the

ground. This is considered a catastrophic failure of the retention system. Had the retention system worked and the helmet stayed on, it would have offered little protection due to lack of a sufficient impact-attenuating liner and sturdy shell. However, even a helmet that met DOT standards may have made little difference in the outcome of this crash.



Photo #4: Helmet worn by Softail driver, showing broken clip for chinstrap.

This driver, like the Road King driver, suffered massive trauma to the chest and exposed areas of the head, injuries which a helmet could not have prevented. While helmets can provide significant protection to the head, they are not a guarantee against head injury, especially if crash forces are severe. Additionally, the exposed areas of motorcyclists' bodies are vulnerable to the abrupt changes in energy forces during crashes. Unlike restrained occupants of enclosed motor vehicles, they have no protective "cage" within which they can ride out the forces and nothing to protect them from striking the ground, pavement, or obstacles in the environment. This places motorcyclists at higher risk in crashes. In 2008, motorcycles were involved in 2% of all motor vehicle crashes in Virginia. However, that proportion jumped to 3.5% of all injury crashes, and was even higher for fatal crashes: 9.6% (Virginia Highway Safety Office, 2008). The higher

proportions indicate that once a motorcyclist is involved in a crash, they are at greater risk for injury and death than occupants of other types of vehicles.

Neither driver was reported to have been drinking prior to the crash or to have been under the influence of any substance that might have affected their driving. However, toxicology reports that could substantiate or refute these reports were not available at the time this investigation was completed. In the past, such reports have been completed by the Department of Forensic Science within 4 to 12 weeks and sent to the Medical Examiner's Office. They were then combined with information gathered by the Medical Examiner during their examination (view of the body and sometimes autopsy) and sent as a completed case. However, as a consequence of the June 25, 2009 Supreme Court ruling on the *Melendez-Diaz v. Massachusetts* case, the toxicology reports may not be completed and released to the Medical Examiner for as long as six months after the samples are submitted.

Both motorcycles appeared to have been in good working order prior to the crash. The Softail had a current state inspection but was due for re-inspection in the month following the crash. The motorcycle displayed heavy front end contact damage; the front tire and wheel were detached from the motorcycle. The front wheel was heavily deformed and the brake rotors were broken and dislodged from their wheel connections. The right front fork was broken off of the triple tree (connection between the handle bars and front forks). The left front fork was bent toward the rear of the motorcycle, where it made contact with and damaged the left front corner of the gas tank. There was a dent on the left side of the tank from contact with the rider's knee during the collision. Scratches, blood and tissue spatter, and induced damage were located throughout the remainder of the motorcycle.

The Road King displayed heavy front end contact damage. The front wheel and tire were detached from the motorcycle and the wheel was deformed. Both front forks were pushed rearward and displayed heavy damage. The left front corner of the gas tank displayed heavy damage from contact with the Softail. The right side of the gas tank displayed damage from contact with the rider's knee. Scratches, blood and tissue spatter, and induced damage were located throughout the remainder of the motorcycle. The Road King did not appear to have a state inspection (no sticker was found on the motorcycle), but a CARFAX report indicated a safety inspection was performed approximately 3 months prior to the crash. The report indicated mileage at that time of 12,589 miles. CARFAX reports did not indicate any other problems or



Photo #5: Harley Davidson Road King motorcycle.



Photo #6: Harley Davidson Softail motorcycle.

crashes for either motorcycle. Neither odometer was readable when examined by members of the VMCIT.

Since the two fatal victims were at the rear of each of their respective groups, there were no witnesses to the crash, although several riders did hear the collision. One off duty police officer was in the group of nine riders, riding in the sixth position. When he realized that the last part of his group was no longer following, he rode ahead to warn the leaders of the group, then rode to the scene. He quickly ascertained that a member of his group had been involved and that at least one fatality had occurred. He did not believe that the Road King driver would survive either, since he was unresponsive and having trouble breathing. The officer stated that he left the scene briefly, going to the first home he could find to call for emergency help because his cell phone did not have service in the area. He then returned and began gathering information that would be helpful to the investigating officer.

There is no evidence that would provide clues as to why the Softail rider crossed the centerline. Witness statements by both westbound and eastbound riders indicated that neither of the drivers was travelling in excess of the posted speed limit. While one member of the group of nine stated that he had waved at the oncoming motorcyclist, a common custom when passing in opposite direction, he did not recall either eastbound motorcyclist waving in response.

The issue of failing to maintain one's lane of travel is a common factor in fatal motorcycle crashes in the Commonwealth. In 53 of the 79 (68.3%) fatal motorcycle crashes that occurred in 2008, the motorcycle driver failed to stay in his lane of travel (VMCIT analysis of FR300 reports for fatal motorcycle crashes in 2008). This usually resulted in the motorcyclist running off the road, often then striking fixed objects. In five cases, the motorcyclist crossed the centerline and struck another vehicle head on, similar to this crash. In a nationwide survey of light passenger vehicle crashes, pre-crash events involving lane deviation or loss of control were indicated in a significant proportion of cases (NHTSA, 2008). This included 22% of the vehicles running off the edge of the road, 11 percent failing to stay in the proper lane, and 9% losing control prior to the crash. The sum of these categories is 42% (which may include overlapping conditions), which is lower than the proportion reported for motorcycle crashes. However, these two sets of statistics were compiled differently and cannot be seen as a definitive comparison to conclude that motorcyclists tend to leave their lane of travel more often than other vehicles prior to crashing.

In this specific crash, failing to keep his motorcycle in the correct lane of travel may have been a result of the driver failing to respond appropriately to the curvature of the roadway by leaning and guiding his motorcycle more to the right. In addition, he may well have been looking at the group of motorcyclists that was passing to his left and, as a result of not making a deliberate effort to maintain his lane, drifted in the same direction in which he was looking. This crash illustrates that it is critically importance for motorcyclists—indeed, for all drivers—to maintain a strong focus on the driving task.

RECOMMENDATIONS

1. The Department of Motor Vehicles, motorcycle enthusiast groups and driver educators should continue efforts to educate motorcyclists about the importance of developing and maintaining good motorcycle driving skills. They should also continue to stress the critical need for all drivers to always keep a strong focus on the driving task as a requirement for maintaining vehicle control and decreasing perception-response time for roadway hazards.

2. The Department of State Police and local law enforcement agencies should continue to enforce current regulations on motorcycle operators not having the proper licensing endorsements.

3. Law enforcement officers and judges are encouraged to continue to aggressively enforcing Virginia's motor vehicle codes.
 - a) Law enforcement officers are encouraged to take a proactive role in identifying, stopping, and charging individuals in their communities who are known to drive without a valid driver's license.
 - b) Judges are encouraged to apply strong sanctions in cases of repeated misdemeanor violations. While leniency in sentencing after a first conviction may promote positive changes in some driver's behaviors, others will interpret the outcome as a sign that the laws are not necessarily enforced and that they do not have to take responsibility for their actions. Repeat offenders may need to experience more severe consequences to reinforce compliance with the laws of the Commonwealth.

4. Legislators and law enforcement officials should continue to work to strengthen the Virginia statutes on motorcycle helmet requirements (see *VMCIT Report Number 207*).

5. Although the condition of the pavement does not appear to have played a role in the cause of this crash, the Virginia Department of Transportation should resurface this section of road and apply new pavement markings.

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