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Forensic Engineering Investigation of an ATV Crash Involving Two Riders on a One-Rider ATV

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Abstract

An adult woman enticed a young girl to take a ride with her on her ATV. During the ride, the operator lost control of the machine and it became airborne. Both the driver and passenger were ejected from the ATV, and the young girl suffered a broken jaw and neck, becoming a permanent quadriplegic. The adult woman was criminally charged with contributing to the delinquency of a minor. The author was retained by counsel to inspect a drainage canal shelf where the crash took place to determine if it was reasonably safe for the operation of All-Terrain Vehicles (ATVs). The author was also asked to review the conduct of the adult woman ATV operator and provide opinions regarding ATV operation and safety. The author determined that the canal shelf was reasonably safe for ATV operation and that the adult woman ATV operator did not operate her ATV in a reasonably safe and prudent manner which caused the crash.

Keywords

All-Terrain Vehicle, ATV, ATV Safety

Introduction

The plaintiffs, the female minor and her mother, filed a law suit against five defendants, namely: (1) the estate of the ATV operator; (2) the property owner on which this ATV crash occurred; (3) the township that was in control and responsible for land maintenance of the canal shelf, and (4) eventually the electric power/gas utility and the federal agency that designed and built the canal and shelf.

The defendant operator owned a Type 1 Utility category All-Terrain Vehicle (ATV) designed for one rider and no passengers. She lived in a subdivision with access to a drainage canal designed and built for storm water and flood control. The canal was bordered on the far side by a paved walking trail that paralleled the canal and on the near side of the canal by an unimproved 30 to 50 foot wide shelf with easements for high voltage electric power and natural gas line utility distribution. The walking trail was posted with signs stating that no motorized vehicles were allowed.

The defendant enticed some neighborhood children into going on a ride with her on her ATV. The first child to volunteer was a fifteen year old female minor. Both boarded the ATV without wearing helmets or ATV safety riding gear. The defendant drove the ATV from her back yard through an existing

handmade trail out to the unimproved canal shelf. She then drove along the unimproved canal shelf for approximately one mile. It had just rained, and the canal shelf was soft and muddy with watery puddles in various locations. She eventually entered a trail that was gated and defeated the gate by driving around it. She then drove down the trail approximately one quarter of a mile until she came to another gate. She also defeated this gate as well by driving around it. She then drove across a city street and entered a nature walking trail that was part of the public school property. She drove on this nature walking trail for some time, eventually turning around to drive back the way she came. The defendant again defeated both gates by driving around them. Once she made her way back to the canal shelf, she then rapidly accelerated her ATV.

The canal's shelf was unimproved and had tall grass with soil, mud, and gravel that was unsmooth. The shelf also had small depressions that would hold water. As the defendant drove her ATV back up the shelf, witnesses on the walking trail stated that the female minor was holding onto the defendant's waist and was bouncing up and down while sitting on the ATV's rear cargo rack. The female minor became frightened and began screaming at the defendant to slow down. The defendant driver did not slow down and eventually attempted to steer her ATV around a large puddle of water. She then lost control of the ATV which then became airborne. The ATV pitched forward and tumbled into and landed in the watery canal below on its wheels. At the same time, both the defendant and the female minor were ejected from the ATV and landed near the water's edge on a bank with tall grass. Witnesses who saw the accident immediately called 911. It was later determined by physicians that the female minor had a broken jaw and neck and was a quadriplegic with a full time need for life support.

Police Department Investigation

It was determined during a police investigation that the ATV was in fourth gear and that it was being operated by the defendant at approximately 40 mph. The investigating police officer stated that it was unlawful for ATVs to be ridden anywhere on the canal shelf or the walking trail. It was determined through the investigation by the defendant's recorded statement and analyzed blood samples that she was taking prescription medication for emotional problems and had traces of THC (marijuana) in her blood.

The defendant had a history of depression and bi-polar disorders and was seeing a physician who prescribed the pharmaceutical medications Adderall, Valium and Geodan. The bottles had written warnings stating that these medications may lessen the ability of the user to drive or perform hazardous tasks. The defendant admitted during the police interview that she had also been smoking marijuana to help calm and relax her. After the police investigation was complete, the defendant was formally charged with contributing to the delinquency of a minor. Afterwards, she went into a depression and was then admitted by her husband into a psychiatric hospital for severe depression. Once she was released, she committed suicide.



Figure 1

Police distance photo of the location where the ATV was driven off of the shelf.



Figure 2

Police photo of the resting location of the ATV.



Figure 3

Police closer photo of the location where the ATV was driven off of the shelf.



Figure 4

Police photo of where the ATV tumbled down the bank of the canal.



Figure 5

Police photo of where the ATV tumbled down the bank of the canal.

Author's Inspection of the Accident Site

The author rode the canal shelf with his exemplar ATV to determine if the shelf was reasonably safe for ATVs. The author determined that the shelf was safe for an ATV as long as it was being operated responsibly and at a speed of no more than approximately 20 mph. The subject ATV and exemplar ATV were of the same brand and model designed by the manufacturer for only the driver/operator and no passenger.



Figure 6

Author's photo of the canal (middle), walking trail (left) and canal shelf (right).



Figure 7

Author's photo of the canal shelf.



Figure 8

Author's photo of canal shelf trail surface.



Figure 9

Author's photo of his ATV at the location where the accident occurred.

ATVs Mechanical Design Characteristics

A factory stock Type 1 General or Utility category ATV has a relatively high center of mass for its wheel base and wheel track. This type of ATV for an adult has a center of mass that is typically about 18.5 inches from the ground and has a wheel base of approximately 48 inches with a wheel track typically about 36 inches. Because of these mechanical design characteristics, an ATV can be overturned even during routine maneuvers. Additionally, a rider could lose control of or fall off of the ATV that can create a danger not only for the rider but also for persons in the area in which the ATV is being operated.

A Type 1 General or Utility category ATV is designed to be operated by a driver/operator without a passenger. This type of ATV does not have foot pegs, a rear seat or back rest for a passenger, so therefore a passenger has no hand holds, has nowhere to place her feet and has nowhere to sit other than the rear cargo rack. It is the author's opinion that a passenger should never be allowed to ride on the rear of this type of ATV.

Standard Warnings Stated in an ATV's Owner's Manual

Typical warnings in an operator's manual for ATVs include:

“Warning – Operating this ATV at excessive speeds increases your chances of losing control of the ATV, which can result in an accident. Always go at a speed that is proper for your vehicle, the terrain, visibility and other operating conditions, and your experience.”

“Warning – Operating this ATV after consuming alcohol or drugs can seriously affect your judgment, cause you to react more slowly, affect your balance and perception, and result in serious injury or death. Never consume alcohol or drugs before or while operating this ATV.”

“Warning – Operating this ATV without proper instruction could increase your risk of an accident which could lead to serious injury or death.”

“Warning – Operating this ATV without wearing an approved motorcycle helmet, eye protection, and protective clothing could increase your chances of severe injury or death in the event of an accident.”

“Warning – Failure to use extra care when operating this ATV on unfamiliar terrain could result in the ATV overturning or going out of control. Go slowly and be extra careful when operating on unfamiliar terrain. Always be alert to changing terrain conditions when operating the ATV.”

“Warning – Carrying a passenger on this ATV greatly reduces your ability to balance and control this ATV and could cause a crash and you or your passenger could be injured or killed. Never carry a passenger on this ATV.”

An ATV should never be ridden when the rider is under the influence of alcohol, over the counter or prescription medication and recreational drugs. According to the treatise “Forensic Vision With Application To Highway Safety”, studies have shown that the consumption of alcohol affects a person's ability to operate a motor vehicle safely, and it has been shown that alcohol will impair a person's vision and perception reaction time. According to these studies, alcohol consumption has been shown to affect a person's visual contrast sensitivity, affects a person's visual acuity, and has detrimental effects on the

brain's ability to process information, risk judgment and brain/muscular motor performance. Drugs and alcohol can have other undesirable side effects that can (1) impair a person's riding abilities by making a person feel weak, dizzy, drowsy, (2) give a person a false sense of euphoria or (3) make a person overly aggressive. These substances can also affect the person's vision, coordination and judgment. A person should also not ride an ATV when tired or fatigued since this can affect a rider's ability to safely control and operate an ATV.

ATV Rider's Training 1

When a person purchases an ATV from a dealership, the dealer is required by regulations set forth at the Consumer Product Safety Commission through the ATV manufacturer to introduce and recommend to the buyer to sign up for and take the ATV Rider's Course created by the Specialty Vehicle Institute of American (SVIA) and ATV Safety Institute. The cost associated with this course is included in the purchase price of the ATV. It is highly recommended by the author that a person who has never operated and ridden an ATV and plans on purchasing and riding one of these machines should first register and take this course. There was no evidence that the defendant participated in such training.

Author's Courtroom Testimony and Jury Verdict About This Case

The plaintiffs sued (1) the estate of the ATV operator; (2) the property owner on which this ATV crash occurred; (3) the township that was in control and responsible for the land maintenance of the canal shelf, and (4) eventually the electric power/gas utility and the federal agency that designed and built the canal and shelf.

The author was first retained as an ATV expert by the defense counsel of the property owner on which the crash occurred. Counsel asked the author to inspect the canal shelf and determine if it was reasonably safe for ATVs. The author inspected the canal shelf and rode his exemplar ATV along the shelf at various speeds and determined that the shelf was in fact reasonably safe for ATVs as long as an ATV driver/operator rode responsibly and at a speed no faster than approximately 20 mph with no passenger.

The author was then retained to testify at trial as an ATV expert by the defense counsel of the township defendant in control of land maintenance of the canal shelf easement on which the crash took place. The plaintiff alleged that the canal shelf easement was not suitable for ATV traffic, that the grass and canal shelf was not maintained properly and that there were no posted signs stating that ATV's were not allowed.

During the trial, the author was questioned by opposing counsel concerning the investigation methods of a traffic accident reconstruction and was then qualified by the court to testify as a traffic accident reconstruction engineer and ATV expert. The author testified that the canal shelf was safe for a Type 1 General or Utility category ATV designed for one rider and no passenger as long as the driver/operator operated the ATV responsibly and at a speed no faster than approximately 20 mph without a

passenger. The author testified that if a passenger were allowed to ride on the rear of a Type 1 General or Utility category ATV, it would shift the ATV system's center of mass upward and reward making the ATV more prone to a rollover. The author testified that federal law through the Consumer Product Safety Commission required all ATV manufactures install warning labels on ATVs and that these warnings had to be printed in the owner's manual for the operator's reference. The author testified about the safe operation of ATVs and the substance of these warnings. The author testified that the police investigation demonstrated that the defendant ATV owner/operator was under the influence of prescription medication that contained warnings of adverse side effects and that the owner/operator was also under the influence of marijuana. The author testified that one of these warning labels stated to never operate an ATV while under the influence of alcohol or drugs.

Two other defense experts testified at trial in this case; an on-duty investigating police officer and a landscape architect. All experts were sequestered during other experts' courtroom testimony. The police officer testified that it was unlawful for any motorized vehicles, including ATVs and motorcycles, as well as bicycles, to be ridden on the walking trail and unimproved canal shelf, and an offender would be asked to leave and/or be issued a citation. He testified that the only vehicles that were allowed onto the canal shelf were service vehicles owned and operated by the township to service the canal and the electric power and natural gas utility company to service their equipment.

The landscape architect testified that a proliferation of warning signs on the canal shelf easement was not a standard and ordinary practice in light of the fact that this shelf was occupied with high voltage power line towers and natural gas piping systems. He testified that the grass had to be allowed to grow tall in its natural state in order to create healthy grass with deep roots to prevent soil erosion on the canal banks and canal shelf. He testified that if the grass were to be cut too short, it could create health issues for the grass and ultimately soil erosion problems. He also testified that short grass would also be more inviting for hikers, bicyclist, motorcyclist and ATV riders. After this case was heard by the jury, their verdict was in favor of the township defendant in control of land maintenance of the canal shelf easement. The plaintiff was not successful and lost the case.

The law suits filed against all other defendants were either settled or dismissed prior to trial.

Professional Opinion

In my professional opinion, based on a reasonable degree of engineering and scientific certainty, the canal shelf was safe for use by a Type 1 General or Utility Category ATV as long as the ATV was being operated responsibly and safely and ridden no faster than 20 mph by a single operator with no passenger.

It was demonstrated to the court that the defendant ATV owner/operator was under the influence of prescription medication that contained warnings of adverse side effects and was also under the influence of the recreational drug marijuana. It is the author's professional opinion that an ATV should not be

operated when a rider is under the influence of alcohol, over the counter or prescription medication and/or recreational drugs. The warning printed on a warning label and adhered to a body panel of the ATV is in clear view of the operator's position. Drugs and alcohol can (1) have undesirable side effects that can impair a person's riding abilities by altering a person's perception/reaction time, make a person feel weak, dizzy, drowsy, (2) give a false sense of euphoria or (3) cause a person to become overly aggressive. These substances can also affect the person's vision, coordination and judgment. A person should also not operate an ATV when tired or fatigued. These things can affect a rider's ability to safely control and operate an ATV.

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