## C7 Go-Cart Fatality, Engineering Case Analysis

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The goal of this presentation is to present a typical product liability case which illustrates many aspects of engineering design for consumer products, and considers the special requirements and duty of care when the consumer market includes children.

This presentation will impact the forensic community and/or humanity by demonstrating the complete cycle of consumer product design, marketing, consumer injury (fatality), litigation, engineering investigation, trial, jury verdict, and government (CPSC) response to remedy the product by recall. All too often, the process is short circuited by settlements, without addressing the possible latent hazards in consumer products.

**Summary/Outcome:** This paper presents the findings of an investigation into the circumstances of a go-cart fatality. A 13-year-old girl was driving a go-cart when her long hair was caught in the rotating machinery behind the seat. The case (Woodburn v Manco) went to trial, and the plaintiff's verdict resulted in a recall of the go-carts. The presentation will include exhibits from the investigation and trial, with data and commentary. This typical product liability case illustrates many aspects of engineering design for consumer products, and considers the special requirements and duty of care when the consumer market includes children.

The young driver was presented the cart, her brother's, and instructed in its use. She was provided with her father's motorcycle helmet, and tucked her long braided hair into her T-shirt, and then proceeded to drive the go-cart in a completely fenced dirt corral. The tire tracks show regular large circles, about 75 feet in diameter in an unobstructed venue. Her brother, nearby, investigated when he heard the engine idling for a prolonged time.

Preliminary work included the examination of coroner's photos that were taken at twilight and included a cover over the victim. Photogrammetric techniques were used on an exemplar go-cart to determine the victim's actual position in the go-cart. An autopsy was not performed, and the cause of death was attributed to a neck fracture at C1C2. Further photogrammetric studies helped determine the likely length of the victim's hair prior to the accident. A key element of this case was to establish the likely seating position of the victim, and the range of positions that the foreseeable go-cart user population may assume. Exemplars of wigs were used in conjunction with a subject pool of young and older male and female drivers of varying statures. The wig enabled a study of the location of the long braided pigtail, both in a tucked-in location in the driver's T-shirt, and in the free position, dangling behind the go-cart seat.

A further study illustrated the foreseeability of long hair in the general population in both male and female drivers. The evidence presented showed that the go-cart industry and their component suppliers had a longstanding knowledge of prior scalping incidents involving long scarves, long hair, and other clothing. However, the testing by the manufacturer and remedial actions were cursory, incomplete, and ineffective. These included a recall based on a rear axle entanglement accident.

One of the consequences of the prior cases was the attempt by the manufacturer to warn the user by means of a label, and instructions. These Human Factors engineering related issues proved to be inadequate, given the well understood hierarchy of remedial engineering safety actions, namely that a warning is not an adequate resolution of a known hazard when a design change can eliminate the hazard. One of the engineering aspects of this case was the demonstration that a simple guard, at a nominal cost was sufficient to eliminate the nip point, the physical root cause of this fatality. Indeed, after this accident, the go-cart industry adopted a safety standard that incorporated just such a guard.

The accident itself was linked to the speed of the vehicle, largely unknown since there were no witnesses at the time. However, a simple analysis suggests that even at moderate to slow speed the entanglement occurred in fractions of a second. The neck fracture was thus almost instantaneous. An opposing expert argued that a proper fitting helmet would have somehow ameliorated the situation, while another offered the opinion that based on his questionnaires, the girl was operating the vehicle in an unsafe manner, and that her parents were negligent in letting her drive. This was part of the defense strategy to allocate blame to the plaintiffs, Idaho being a comparative fault State, wherein a 50% negligence finding negates any award in favor of the plaintiffs.

The verdict of the jury trial found in favor of the plaintiff's, but the defense succeeded in persuading the jury to find 50% contributory negligence thus negating the damage amount. On the basis of the verdict however, the Consumer Products safety Commission (CPSC) directed a product recall in August of 2000 for 91,000 Go-Carts manufactured by Manco Products Inc., of Fort Wayne, Ind. The jury verdict

 

regarding the negligence was appealed to the Idaho State Supreme Court, but did not prevail.

**Go-Cart, Human Factors, Anthropometry**

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