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An Engineering Evaluation of a Bicycle Center-Mount Child Carrier

Introduction

This report represents the conclusion of an engineering evaluation of the "Centric Safe Haven Center Mount Child Carrier for Bicycles." This product is produced in Canada and is designed to permit an adult to ride an adult bicycle with a child seated within the carrier directly in front of the rider in the space between the bicycle saddle and handlebar. This evaluation considers the design and manufactured quality of that product with consideration to safety aspects of that child carrier. The scope of this engineering evaluation will be more fully detailed below.

Background

An engineering evaluation of the safety aspects of a product must contemplate the applicable regulations and standards. The child carrier considered in this study is not a bicycle; but, rather, a bicycle accessory. As such, it is not regulated by the United States Consumer Product Safety Commission[1]. The ASTM Bicycle Accessories Task Group [F.08.10.19.] has addressed the safety aspects of the child carriers for bicycles and promulgated standard F 1625. It should be noted, however, that the 1995 edition of that standard pre-dates the introduction to the marketplace of the innovative product considered in this report. It is clear from review of that standard that it was intended only for rear-mounted child carriers and, accordingly, many provisions of that standard are inapplicable to the subject child carrier. In response to the changing marketplace, ASTM reissued standard F 1625 in 2000 with a specific statement within its scope to preclude application of that standard to the subject center-mounted child carrier in order to correct the prior oversight.

Scope

This is a limited review of the Centric-Safe Haven center-mounted child carrier. It is not intended to imply that every safety compromising condition has been

[1] "Requirements for Bicycles", 16 CFR 1512, United States Consumer Product Safety Commission, Washington, DC.

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considered; that would not be possible. This report does not warrant the product to be safe. Indeed, all bicycle riding possesses inherent dangers based upon the manner of use of the bicycle, the maintained condition of the bicycle, the terrain upon which the bicycle is ridden and a myriad of external influences. This report considers the incremental change in the safety of the two occupants of the bicycle by comparison to more common, rear-mounted child carriers. In performing this evaluation, it is assumed that the user will have read, understood and complied with the instructions provided in the product Owner's Manual. No one can predict or anticipate any and all potential misuses of or abuses to the child carrier/bicycle system. This evaluation is predicated on the use of the center-mounted child carrier for recreation use on paved surfaces only and not for off-road or competition level riding[2]. Similarly, it must be recognized that the evaluated child carrier is intended to provide a reasonably safe, secure seating position to permit a properly sized child to accompany an adult on a bicycle in a comfortable and entertaining manner. It is not intended to be "crash worthy" or offer protection to the child in the event of an accident. Neither is the bicycle intended to protect the adult rider during an accident, either. The use of approved bicycle helmets is mandatory for all bicycle riders and occupants.

Analysis

DURABILITY

The child carrier evaluated was found to be built of accepted materials (polymers, plated steels, etc.) and suitably finished. Threaded fasteners employed standard thread forms and reflected readily available products, available for local replacement, if lost or damaged. It is understood that the structural aspects of this child carrier system have been evaluated under the extremes of potentially encountered environmental conditions by a laboratory specifically charged to do so. No adverse aspects were found. Accordingly, those tests are beyond the scope of this evaluation and were not repeated.

MECHANICAL ATTACHMENT

Mechanical considerations concerning the carrier relate to the secure attachment of the carrier to the host bicycle and the propensity for it to remain attached, when desired. The child carrier is affixed to the bicycle by means of a plated steel frame bracket joining the bicycle frame head tube to the seat post. To accommodate bicycle variability, the two-part, overlapping 0.120" thick, frame bracket members telescope to permit length adjustment. The components were found to be durable

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[2] The use condition described is more fully delineated in ASTM F 2043, "Standard Classification for Bicycle Use" as Condition 1. Specifically, it is a use condition where the bicycle wheels do not leave ground contact.

and of workmanlike quality. Properly assembly, the equipment would readily accommodate the maximum permissible child weight of 40 pounds. Two means were provided to affix the molded polymeric seat assembly to the frame bracket. A semi-permanent option employed a standard hex-head bolt. The exposed bolt head was deemed to present no inordinate hazard to the child-occupant. An alternate attachment means to permit more convenient installation and removal employed a nut encapsulated in a molded plastic knob for manual use. It was found to be simple to attach and remove by an adult. Repetitive testing with suitably sized children revealed no ability for the child to loosen the attachment nut when suitably tightened by the adult.

CHILD RETENTION

Once affixed to the bicycle securely, it is important to retain the child within that carrier. It is most significant to note that the mounting position permits beneficial child monitoring by the cycling parent. In addition to being cradled within the carrier, the child is also located within the arms of the parent/cyclist. The parent is also not an obstacle to the line of vision of the child, thereby precluding the tendency of the child to lean sideward for vision. The molded polymer portion of the carrier was evaluated with respect to children weighing less than the maximum of 40 pounds. It was found that as long as the child is of appropriate size to fit the seat and foot retention areas, that the restraint provided by the seat would keep the child from contact with hazardous areas.

The principle child restraint mechanism is the harness/strap system. When utilized in accordance with the instructions, the restraint device was found to suitably confine the child within the seat. The seat back was judged to be of adequate height to offer some utility to the child without impeding the actions of the cyclist. It supported the restraint system at a suitable level to hold the child in place. As opposed to a higher seat back, the padded pedestal positioned in front of the child offered appropriate place for the child to hold, lean or rest.

BICYCLE USE

When properly installed, the child carrier was found to not significantly impede the use of the bicycle by the cyclist. Naturally, there was a brief period of accommodation as the presence of the carrier and slight added weight of the child became familiar to the cyclist. Bicycle handling was less affected than that observed through the use of a rear mounted carrier.

INSTRUCTIONS

The instructions for the child carrier seat were found to be clear and easy to follow. Those and the support diagrams were written in the multiple languages commonly spoken in the countries of sale. The step by step instructions take small steps and

limit the actions taken in anyone step. This keeps the confusion during the assembly process to a minimum and ensures proper assembly of the child carrier so that it maybe assembled and used in a safe manner. All thought it should be apparent to the purchaser as to where the child carrier attaches it may need to be specified in the instructions. In all, the instructions include most of the applicable ASTM F 1625 recommended specific instructions. It is stated numerous times to adjust the shoulder and waist straps until they are comfortably snug.

CONCLUSIONS

The evaluated Centric-Safe Haven center mounted child carrier is reasonably safe for its intended use when utilized in accordance with the manufacturer's instructions. It reflects an understanding that the child passenger will be more fully and safely served when under the more direct supervision of the adult rider. The overall assessment was that the center mounted carrier system was a significant improvement in safety, ease of use and parent/child satisfaction compared with common rear mounted carrier systems.

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