UNIVERSITY OF
WINDSOR

May 12, 2006

Bruce Mather
President
Lap belt Cinch, Inc
50 Slashpine Circle
Hockessin, DE 19707-1027
U.S.A.

Dear Bruce:

Motor vehicle accidents are the leading cause of death in children over one year old (Johnston, Rivara, Soderberg, 1994). Surprisingly, most parents know that child car seats are important, but more than 80% of car seats are misused and installed improperly (Biagioli, 2002). When used properly, child car seats can reduce death by 71% for infants and 54% for toddlers. It is not known exactly why they are not installed correctly. It could be a number of reasons, such as engineering/design problems, physical limitations of the user, and/or poorly written instructions (Wegner, Girasek,2003).

For the past six years, I have been funded through the Auto21 Network Centre of Excellence that is,itself, funded by the Canadian Government in collaboration with the private sector.

My research has focused on the physical demands on parents as they install child safety systems (CSS). The two studies cited below have shown that there is a substantial percentage of the population that may not have the strength to properly install forward facing CSSs.

> Potvin, J.R., Brown, S.H.M., Grondin, D., Gonzalez, M. Physical demands of installing forward facing child safety seats into vehicles. Assoc. of Canadian Ergonomists, London, Ontario, 2003
>
> Fox, M., Sarno, S., Potvin, J.R. A Biomechanical evaulation of child safety seat installation: Rear and forward facing. Canadian Society of Biomechanics Conference, Halifax, Nova Scotia, August 2004

This may, in part, explain the large number of seats that are not installed correctly. Obviously, this is not due to a lack of effort on the part of the installer, given the potential consequences of poor installation. Thus, it may be necessary to provide an engineering solution to this issue in the form of new CSS designs or mechanical devices to enhance the capacity for an installer to develop the seat belt tensions necessary for safe use.

I was recently introduced to one such device, your CG-Lock SeatSnug, which can be attached to a single pass tongue seat belt. We proceeded to conduct an independent pilot study of the SeatSnug to determine its potential for increasing seat belt tension and reducing lateral slack for forward facing child safety seats in motor vehicles. Both parameters have a meaningful and direct effect on proper child seat attachment and, therefore, safety. The following will provide a brief description of the methods used and a summary of the results of the pilot study.

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Based on the results of this study, including an average increase of 43% in seat belt tensions and an average decrease of 56% in the seat's lateral displacement associated with a constant force, it was concluded that the SeatSnug has the potential to be an effective device for facilitating a more secure installation of forward facing child safety systems into motor vehicles. Both belt tension and lateral displacement provide an indication of the quality of seat installation. One of the key elements in properly securing the seat it developing a high enough tension in the seat belt to ensure a snug fit. The lateral displacement is a direct measure of this fit.

It should be noted that these data are based on a relatively small sample size. A larger study will be required to validate these findings. We did not test whether the SeatSnug has the capacity to retain these advantages on impact.

Note: This Pilot Study was not of sufficient magnitude to allow for publication or for promotion to the public. However, it is my opinion that a larger study is likely to replicate and validate the findings, so the Pilot Study results may be used to support continued development of the SeatSnug for child seat attachment in non-public communications, such as to possible licensors of the technology or company shareholders.

Sincerely

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Methods

This pilot study investigated the potential mechanical benefits of using a SeatSnug to install forward facing child safety systems (CSS). This involved the collection of data in 9 different vehicles (see Table 1 for details).

Table 1: Description of tested vehicle parameters
A research entered each vehicle to install the forward facing CSS in the driver side rear seat, either with, or without (control), the SeatSnug. A total of five trials were conducted under both conditions and averages were taken of the seat belt tension and the lateral displacement associated with 10 lbs of force applied laterally at the top of the seat. Belt tensions were measured with a belt tension transducer applied to the belt through a cutout at the back of the seat. The same experimenter performed all trials with all vehicles to maintain consistency. In each case, the CSS was installed with the goal of developing the highest belt tensions and the most secure fit of the seat.

VEHICLE VARIABLES						INSTALLATION SPACE VARIABLES					
						Door Spec.	Head Clear.		Seat Spac.	Seat Angle	Step Height
Make	Model	Year	Type	Latchplate	Retractor		Door	Interior			
Volvo		2002	Sedan	Sliding	ELS	4-door	37.8	44.0	11.3	25.0	14.0
Toyota	Corolla	2004	Sedan	Sliding	SLS	4-door	38.8	48.0	9.0	25.0	13.5
Chevrolet	Malibu	2004	Sedan	Sliding	SLS	4-door	46.0	53.5	9.5	28.0	15.5
Chevrolet	Equinox	2005	SUV	Sliding	SLS	4-door	44.0	47.0	14.0	35.0	18.0
Honda	Civic	1993	Hatch	Sliding	ELS	2-door	36.0	42.0	10.8	20.0	12.0
Kia	Rio	2002	Wagon	Sliding	SLS	4-door	37.0	45.0	9.0	30.0	13.0
Toyota	Forerunner	2004	SUV	Sliding	SLS	4-door	42.3	43.3	10.5	30.0	22.0
Honda	Accord	1998	Sedan	Sliding	SLS	4-door	39.0	47.0	8.0	25.0	12.8
Ford	Taurus	2001	Sedan	Sliding	SLS	4-door	35.8	48.3	7.5	35.0	13.5

Results

Table 2 and Figure 1 present the averages for seat belt tension and lateral movement taken across the multiple trials performed in the nine motor vehicles. In summary, when compared to the control conditions, the SeatSnug resulted in an average increase in belt tension from 24.3 to 34.7 lbs (42.5%) and an average decrease in lateral movement from 0.92 to 0.41 inches (55.9%). Both of these changes would represent substantial improvements in securing the CSS.

Table 2: Means and standard deviations for belt tension and lateral movement, with and without the SeatSnug. Percent differences are also shown

	Belt Tension (lbs)		Lateral Movement (inches)	
	Control	SeatSnug	Control	SeatSnug
Mean	24.3	34.7	0.92	0.41
StDev	10.7	9.0	0.60	0.19
% Change	42.5%		-55.9%	

Figure 1: Average increase in belt tension and decrease in lateral movement with the use of the SeatSnug