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GlobalAutomakers

June 23, 2016

Dear Senators Markey and Blumenthal:

The Association of Global Automakers (Global Automakers)[1] and the Alliance of Automobile Manufacturers (the Alliance)[2] would like to take this opportunity to respond to your May 25, 2016 letter to a number of automobile manufacturers concerning front seatback strength. We respond because the underlying issue raised in your letter poses an industry-wide question about the efficacy of imposing a specific seatback strength level beyond the current standard. While some of our member companies have specifically asked us to respond on their behalf, others may provide an individual letter in addition to this letter.

The information you requested includes highly proprietary and confidential intellectual property, including development testing and engineering. When similar information is sought in litigation discovery, it is produced under the protection of court orders that mandate confidentiality in order to protect the companies' intellectual property rights. Similarly, some of the information provided to NHTSA as part of the early warning program is protected under Exemption 4 of the Freedom of Information Act (FOIA), which protects Confidential Business Information that is submitted to the Federal Government as part of a regulatory program or investigation. Congress has recognized these legal rights by enacting the Trade Secrets Act and providing for FOIA exemptions, among other statutory protections. Any disclosure of the requested information could result in substantial competitive harm and obviate the intellectual property protections to which the manufacturers are entitled. Accordingly, those manufacturers that respond directly may do so without including detailed, proprietary and confidential data.

We appreciate your interest in seating system performance, and share your concern with ensuring that motor vehicle safety regulations appropriately focus on real world crash scenarios.

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[1] The Association of Global Automakers is a nonprofit trade association whose members include the U.S. manufacturing and distribution subsidiaries of 12 international motor vehicle manufacturers, including American Honda Motor Co.; Aston Martin Lagonda of North America, Inc.; Ferrari North America, Inc.; Hyundai Motor America; Isuzu Motors America, Inc.; Kia Motors America, Inc.; Maserati North America, Inc.; McLaren Automotive Ltd.; Nissan North America, Inc.; Subaru of America, Inc.; Suzuki Motor of America, Inc.; and Toyota Motor North America, Inc.

[2] The Alliance of Automobile Manufacturer is a nonprofit trade association comprised of twelve members who are manufacturers and/or distributors of passenger cars and light trucks, viz.: BMW Group; FCA US LLC; Ford Motor Company; GM; Jaguar Land Rover; Mazda; Mercedes-Benz USA; Mitsubishi Motors; Porsche Cars North America; Toyota; Volkswagen Group of America; and Volvo Cars of North America, LLC. Together, *the Alliance and Global Automakers* represent almost every automobile manufacturer whose vehicles are sold in the United States.

Automakers design their vehicles to provide high levels of protection to drivers and passengers in the event of a crash, and regret every instance when the crash forces imposed overwhelm the level of protection that is capable of being engineered into a vehicle. There are various types of crashes (frontal, side, rear, offset, rollover), involving various passenger conditions (belted and unbelted adults, children restrained or out-of-position), and various environmental conditions (particularly speeding vehicles and larger vehicles impacting smaller vehicles). Automakers design and engineer vehicles to achieve the best overall level of protection, and NHTSA weighs the potential benefits and harms when assessing whether new or additional requirements are needed.

Far from quiescent, both NHTSA and automakers have long studied and made significant improvements to rear impact occupant protection. For its part, NHTSA has promulgated upgrades to FMVSS 202 (head restraints) and to FMVSS 301 (rear impact fuel integrity). NHTSA has additionally considered the feasibility of combining the seatback standard, FMVSS 207, with the head restraint standard, FMVSS 202. The agency has also carefully weighed the potential benefits and the potential harms of simply increasing the strength requirements of FMVSS 207, noting that doing so involves reassessing the balance that currently underlies seat engineering.

Balancing Safety Considerations in Seat Engineering

Global Automakers' and the Alliance's members share your concern that all aspects of motor vehicles be engineered to high and appropriate safety standards, and that vehicle occupants, including children, be protected from unreasonable safety risks. As you know, substantial efforts were made in the late 1990s and early 2000s to ensure that children sit away from frontal airbags, and in car seats or booster seats appropriate for the age, weight and height. Ensuring that children ride in the back seat of a vehicle has contributed significantly to overall improvements when it comes to child passenger safety.

Seat design and engineering exemplifies the engineering challenge implicit in crash protection decisions. Increased rigidity may reduce seatback deformation in high-impact rear-end collisions, but could also increase the risk of injury to front seat passengers.[3] Seatback deformation tends to protect the driver against neck and head injury, as well as instances of rebound and "ramping" (where the front seat occupants are propelled at an angle towards the roof or towards the rear of the passenger compartment). In fact, several studies have shown that certain front seat occupants have sustained paralyzing injuries in more rigid seats when their spines have used the seat frame as a fulcrum.[4] Ramping can also result in injury to rear seat occupants, and more rigid seats tend to create higher risk of injury to out-of-position occupants.[5]

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[3] Seating is not the only area where this challenge arises. The need in the United States to provide protection in frontal crashes for occupants not wearing their seat belts precludes the ability for engineers fully to optimize the protection that can be provided for occupants wearing their seat belts. Both Congress and NHTSA have long concluded, however, until there is technology that precludes occupants from riding unbelted, the safety balance weighs in favor of ensuring that unbelted occupants are protected.

[4] *See e.g.* Viano, D.C. Fracture-Dislocation of the Thoracic Spine in Extension by Upright Seats in Severe Rear Crashes, SAE 2011-01-0274 (2011).

Seating systems are subject to various requirements established in Federal Motor Vehicle Safety Standards (FMVSS). FMVSS 207 "establishes requirements for seats, their attachment assemblies, and their installation to minimize the possibility of their failure by forces acting on them as a result of vehicle impact."[6] When promulgating safety standards, or when reviewing the possibility of updating an FMVSS, NHTSA must ensure that the requirements meet and continue to meet "the need for motor vehicle safety" -- that is, that they "protect the public against unreasonable risk of accidents occurring because of the design, construction, or performance of a motor vehicle, and against unreasonable risk of death or injury in an accident."[7] NHTSA has reviewed the engineering considerations underlying FMVSS 207 often, but, in light of various studies and research by the agency and by others, has determined that the question of seat performance "is more complex than simply increasing the strength of the seatback."[8]

FMVSS 207 should not be considered in a vacuum. During the vehicle design and engineering process, the occupant restraint and protection system is considered holistically, as a subset of the vehicle's overall architecture.[9] The event of a rotating seatback, along with seat hardware, components and design factors, play a key role in energy absorption during a crash. Mandating a highly restrictive performance requirement for seatback rotation without regard to the seating system as a whole, or to occupant kinematics considerations, may not improve occupant safety or, may have the ill-intended consequence of substituting one form of harm for another. Research has confirmed the importance of ensuring that seats will continue to deform while absorbing crash energy, and the potential lost safety benefits of mandating too rigid seat backs.[10]

Nor does imposing a uniform requirement that a seat may not recline rearward in excess of a certain point, such as 15 degrees, account for individual vehicle design and engineering specifications and the seat's unique integration into each vehicle model. While the scientific basis for the suggestion that seatback rotation be limited to 15 degrees is unclear, this general issue was addressed in comments submitted in response to the agency's 1992 Request for Comments noting

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[5] *See e.g.* Warner, C., Stother, C., James, M., and Decker, R., "Occupant Protection in Rear-end Collisions: II. The Role of Seat Back Deformation in Injury Reduction," SAE 1991-91-2914 (1991).

[6] 49 CFR 571.207, S1.

[7] 49 U.S.C. §§ 30111(a)and 30102(a)(8).

[8] 69 Fed. Reg. 67,068, 67,069 (Nov. 16, 2004).

[9] Test results and technical engineering decisions constitutes highly confidential intellectual property which, when provided during the course of litigation or regulatory proceedings, is typically subject to protective orders and exemptions under the Freedom of Information Act.

[10] *See* Viano, Parentau, Prasad and Burnett "Occupant Responses in High Speed Rear Crashes: Analysis of Government Sponsored Tests," SAE 2008-01-0188 ("NHTSA crash tests and field accident data show that yielding seats of varying strength provide occupant protection in high-speed rear impacts."); Warner, M. & Warner, C., "Fatal and Severe Injuries in Rear Impact: Seat Stiffness in Recent Field Accident Data," SAE 2008-01-0193. ("[F]ield accident data shows that generally, in collisions where the majority of societal harm is created, yielding seats continue to provide benefits.").

that a single metric limiting seatback rotation could lead to outcomes that were not representative of real world crash events.[11]

Research and Rulemaking Considerations

As noted in your letter, NHTSA terminated potential further rulemaking on FMVSS 207 in 2004. That decision followed on the heels of the agency having upgraded both FMVSS 301 (rear impact fuel integrity) and FMVSS 202 (head restraints). The agency noted that its "eventual goal is to evaluate the performance of head restraints and seatbacks as a single system to protect occupants, just as they work in the real world, instead of evaluating their performance separately as individual components."[12]

NHTSA's decision was made only after "extensive physical testing of seatbacks, computer modeling of seated occupants in rear impacts and dynamic testing of instrumented test dummies in vehicle seats."[13] The agency recognized the inherent difficulty of balancing the competing safety interests between more rigid and more flexible seatbacks, especially in light of the relative infrequency of the type of high-speed, rear-impact crashes that can cause extensive seatback deformation:

> It continues to be a challenge to assess the potential benefits of regulatory strategies for improving seat performance in higher speed rear impacts. Although there is anecdotal evidence of occupant injury due to poor seat performance resulting in occupant-to-occupant contact, contact with the vehicle interior, or even ejections, it remains a difficult task to assess the scope of this problem on a national level. According to the National Automotive Sampling System (NASS) Crashworthiness Data System (CDS), rear impacts represent about 8 percent of crashes severe enough to make it necessary for a vehicle to be towed from the crash scene. In comparison, frontal crashes represent 56 percent; side crashes, 26 percent; and rollover crashes, 8 percent (NASS annualized data 1992-2001). However, rear impacts cause less than two percent of moderate-to-severe injuries. Similarly, the Fatality Analysis Reporting System (FARS) shows that about 3 percent of all traffic crash fatalities involved occupants of vehicles struck in the rear (FARS annualized data 1998-2002). Thus, in comparison to other crash modes, there is considerably less data available to assess the potential benefits of upgrading FMVSS No. 207 for higher speed rear impacts. The problem associated with the relatively small number of moderate-to-severe injuries in rear impacts is compounded by the difficulty in determining the extent to which those injuries can be attributed to seat performance.[14]

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[11] *See* 57 Fed. Reg. 54958 (November 23, 1992).

[12] *See* 69 Fed. Reg. 67,068 (November 16, 2004)

[13] *Id.*

[14] *Id.* The injuries from these crashes often involve a combination of factors, including a substantially larger striking vehicle, a high rate of speed at the time of impact, and the failure to use occupant restraints such as seat belts or child

A subsequent study found that only 1/10th of the severe injuries in rear impact crashes could be attributed to seatback deformation rather than to other causes.[15]

NHTSA's 2004 decision was consistent with the decades of research and study that had preceded the regulatory push on rear impact occupant protection in the early 2000s. Far from disregarding seatback strength, safety engineers and researchers have actively been studying whether or not imposing additional seat rigidity requirements is, in fact, in the best interest of motor vehicle safety. The engineering community has recognized that vehicle seats operate as part of a collective engineering environment that also includes head restraints, in particular, and vehicle structural integrity as well as the overall architecture of the restraint and occupant protection system. Consistent with its mandate to promulgate standards that are objective, practicable and which advance motor vehicle safety, the agency has repeatedly considered the extent to which requiring a specified level of rigidity would meet the need for motor vehicle safety:

- NHTSA first considered consolidating the head restraint and seatback standards in 1974.[16] This initial effort to consolidate the standards was terminated by Administrator Claybrook in 1979 during a review of the agency's five-year rulemaking plan. At that time, NHTSA concluded that it could not dedicate additional resources towards unifying the two standards as it was a "low priority" for the agency.[17]
- NHTSA granted various rulemaking petitions in the late 1980s. Some of the petitions argued in favor of more rigid seatbacks; some argued against that approach and called for more research into the potential for front seat occupant injury as a result of the so-called "sling-shot" effect where a front seat occupant is pushed into the seatback and "then slung forward due to the recovery of elastic energy by the seatback."[18]
- NHTSA also received varied input in response to a 1992 Request for Comments on seatback performance during rear impact collisions. The comments were neither consistent nor conclusive with regard to seating system structural specifications, test procedures and performance requirements.[19]
- The agency thereafter remained deeply involved in studying seatback safety and the best interests of motor vehicle safety in multiple crash modes. As described in a 2001 letter

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and booster seats. The Texas jury in the *Jesse Rivera v. Gloria Cordova, et al.* litigation, for example, divided responsibility between the driver of the striking vehicle, the plaintiff and the manufacturer of the struck vehicle.

[15] That same study found that the rate of serious injuries (MAIS-4 injuries) sustained in rear impact crashes account for 2% of the total of seriously injured occupants. *See* Warner, M. and Warner, C., "Fatal and Severe Injuries in Rear Impact: Seat Stiffness in Recent Field Accident Data," SAE 2008-01-0193. While addressing these injuries remain a priority, a presumed solution should not present its own risk to motor vehicle safety.

[16] *See* 39 Fed. Reg. 10268 (March 19, 1974).

[17] *See* 44 Fed. Reg. 24591 (April 26, 1979).

[18] *See* 57 Fed. Reg. 54958 (November 23, 1992).

[19] *See* NHTSA Docket No. 89-20, notice 3.

from NHTSA's then Acting Chief Counsel, the agency undertook considerable efforts to understand "the relationship between seat performance and injuries." The letter noted that NHTSA would likely publish a new rulemaking proposal in the near future.[20]

- The results of NHTSA's research, however, found that the sophisticated relationship between seatbacks and head restraints required a "proper balance" and that the issue was "more complex than simply increasing the strength of the seatback."[21] A research paper by NHTSA engineers in 2003 noted that the upgrade of FMVSS 202 was intended to be preliminary to a review of future regulatory action in light of the agency's ultimate goal "to evaluate the performance of head restraints and seatbacks as a single system to protect occupants, just as they work in the real world, instead of evaluating their performance separately as individual components."[22] NHTSA terminated the rulemaking activity on FMVSS 207 in 2004 in order to allow for further study which would ensure that appropriate decisions concerning seatback strength requirements resulted.

- The ongoing research since that time continues to demonstrate the benefits of energy absorbing seats and the potential for a disproportionate amount of harm that could result due to an across the board mandate of more rigid seatbacks. Multiple independent studies published by the Society of Automotive Engineers have confirmed the safety benefit of seat deformation.[23] These studies also continue to articulate that addressing concerns related to seatback deformation should be considered on a system based and not component based level.[24]

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[20] *See* Letter from J. Womack, Acting Chief Counsel, to J. Sillery (October 25, 2001).

[21] 69 Fed. Reg. at 67,069.

[22] *See* Saunders, J., Molino, L., Kuppa, S., McKoy, F., "Performance of Seating Systems in a FMVSS No. 301 Rear Impact Crash Test," 18ESV-248, 2003.

[23] *See* Viano, Parentau, Prasad and Burnett "Occupant Responses in High Speed Rear Crashes: Analysis of Government Sponsored Tests," SAE 2008-01-0188 ("NHTSA crash tests and field accident data show that yielding seats of varying strength provide occupant protection in high-speed rear impacts.") A pending study by the Society of Automotive Engineers confirms this findng.; Warner, M. and Warner, C., "Fatal and Severe Injuries in Rear Impact: Seat Stiffness in Recent Field Accident Data," SAE 2008-01-0193 ("field accident data shows that generally, in collisions where the majority of societal harm is created, yielding seats continue to provide benefits.")

[24] *See* Padmanaban, J. Burnett, R. and Levitt, A. "Relationship between Seatback Stiffness/Strength and Risk of Serious/Fatal Injury in Rear-Impact Crashes" 2009-01-1201 (noting seatback performance is part of a two pronged approach: ensure the integrity of the seat as well as the effectiveness of the seat belt); Padmanaban, J. Burnett, R. and Levitt, A., "Seatback Strength as a Predictor of Serious Injury Risk to Belted Drivers and Rear Seat Occupants in Rear-Impact Crashes,"2016-01-1512 (updating previous research and concluding that "seatback strength is not a statistically significant predictor of the odds of serious/fatal injury for belted drivers or belted rear seat occupants in rear-impact crashes.")

Our Members are Committed to Ongoing Safety Improvement

Global Automakers' and the Alliance's members share the goal of improving safety and advancing motor vehicle technologies. We look forward to continuing this dialogue and considering ways to further enhance rear seat occupant safety while simultaneously protecting the safety of all vehicle occupants. Our members are additionally working on the development and deployment of advanced, crash-avoidance systems – such as Automatic Emergency Braking – to reduce the number of crashes that occur and to enhance overall motor vehicle safety.

Notably, vehicle design and engineering has not remained stagnant. Most vehicles built today well exceed the standards' strength requirement and do so by a considerable margin. Automotive engineers will continue to consider, with each vehicle design, an appropriate balance between seatback rigidity and deformation, taking into account the totality of the engineering environment and the varying types of crash modes and potential injuries that must be considered.

Research and development with regard to rear seating is garnering considerable focus as vehicles become substantially lighter and more compact, and as rear seat use grows with the popularity of ride-sharing programs. NHTSA is currently considering ways in which rear seat occupant safety may be incorporated into the NCAP program.[25] Any further regulatory activity on seating system performance must take these emerging considerations into account to ensure that the best interests of motor vehicle safety are achieved.

We appreciate the opportunity to present our views with regard to this important issue.

Very Truly Yours,

Michael Cammisa
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Global Automakers

Robert Strassburger
Vice President, Safety and Harmonization
Alliance of Automobile Manufacturers

Cc:
The Honorable Mark Rosekind
Administrator, National Highway Traffic Safety Administration

[25] *See* 80 Fed. Reg. 78522 (Dec. 16, 2015); Fed. Reg. 20597 (April 5, 2013)(considering studying rear seat safety within NCAP).