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Comments on the NPRM concerning: Federal Motor Vehicle Safety Standards; Roof Crush Resistance- Docket No. NHTSA-2005-22143

Abstract:

The proposal should be rejected out of hand. The suggested reduction of the harm (serious injuries and fatalities) associated with rollover accidents is far to modest to merit serious consideration much less implementation of the proposal. The agency's methodology is fundamentally flawed. The proposed standard might actually result in a weakening of vehicle roofs and could easily be circumvented. The agency is attempting to promulgate a regulation that is supposedly based on technical consideration but actually reflects a cost based value judgment. The agency's regulatory powers in this and possibly other crashworthiness areas should be terminated and the issues decided by independent entities, market forces and civil litigation.

1. Benefits and Limitations of the Proposal:

The agency estimates "that 23,793 serious injuries and 9,942 fatalities occur in 272,925 non-convertible light duty vehicle rollover crashes each year", and that " the proposed requirements would prevent 44 fatalities and 498 non-fatal injuries. We estimate 55 equivalent lives saved annually."[1.] It is difficult to understand why such a modest improvement should be tolerated. Why is it that we cannot save at least the belted occupants in rollover accidents? "The single vehicle rollovers with belted, not-ejected occupants constitute about 60% of the exposed population, but only 23% of the MAIS 3+ Fatal injuries "[7.] Why is it that this 23 % at least cannot be eliminated? It is not due to the inherent severity of the accident modality. Single vehicle rollover for the most part involve only ground contact without planar impacts. Most occupants, belted or not survive them without serious injury. The vehicle produces the injury when it occurs, either by allowing ejection or exposing the occupant to an injurious second collision. Most of these case can be eliminated by changing the vehicles that are producing the injuries. The principle required change is a large increase in roof strength, a requirement not met in the received proposal.

The first requirement for vehicle crashworthiness is the structural integrity of the occupant compartment in foreseeable accidents. This requirement is prior to that for restraints or packaging systems which require occupant compartment integrity to function adequately. This fundamental requirement is not met in the new proposal. Vehicle roof will still collapse and occupants exposed to serious injury if it is adopted. This despite the fact that, as the agency well knows, there are many vehicles on the road whose roofs will not suffer the catastrophic failure that those built only to the current standard or to the proposed revision can be expected to experience. The agency has not determined the efficacy or benefits associated with the structural characteristics of this class of vehicles, a fundamental methodological error.

2. Methodological Errors:

We note that most vehicles are currently being upgraded structurally for frontal offset and side impact protection. This isn't being done across the board for rollover accidents, however It is not being done by all manufactures because of lax regulation, cost considerations and because some still represent that they believe that roof crush is not important in rollovers, even that it makes no difference, or perhaps even that it is beneficial. The proponents of the view "roof crush doesn't matter" view then, somehow, advance a theory that says that the fundamental requirement for crashworthiness as identified above, doesn't apply when the impact is not planar. If the impact force vector has a component along the vertical axis of the vehicle, nothing else counts. (Notice that it is not even rotational components which distinguish rollover accidents from planar impacts- most highway vehicle accidents involve rotational elements.) The agency seems to be of a somewhat contrary few, based on stochastic analysis, and concedes that it is relevant to a minor degree but takes no well defined position on the question, a fundamental methodological error.

The agency's analysis is constrained to statistics and testing that compare bad against worse, not bad against good; roofs that are crushed a lot versus those that are crushed less, and extrapolations based on the experience with defective vehicles. What happens when roofs don't collapse, when occupant are contained and not ejects, when strike surfaces are properly padded? How many belted occupants would have to die in a well designed vehicles each year? How about non belted occupants? These questions cannot be answered by statistical analysis of the results of current practice, because most of the vehicles studied lacks optimum or even acceptable levels of protection. The agencies statistical methodology then is fundamentally flawed, at least because it lacks significant information concerning well designed vehicles, and as a statistical approach using a population consisting largely of inadequately designed vehicles, it has no way of determining what maximum or even optimal performance is.

The agency assumes that there is really nothing wrong with vehicles built to the current regulation, and recommends very modest improvements. It assumes that the roofs that crush less in tests done according its protocols, are good or better than the ones that crush more – a relative standard . But what if they are all bad on objective standards? That is, what if all vehicles built or evaluated according to current regulations, are really defective in that injure occupants unnecessarily ? The agency knows that much better performance is possible, that vehicles that perform much better that regulations require are already on the road and have been for a long time. Yet it wishes to regulate relative to a standard that is far from optimal, indeed is in fact, ineffective as its own research has shown. Rule 216 has prevented 3,466 deaths by eliminating " true hardtops", ie., four door hardtops [14, pg xxi.] This in the 30 years since the adoption of the regulation. In other words the agency would recommend new regulations based on a old standard that has done virtually nothing for vehicles which did not lack a "B" pillar prior to its introduction. The agency proposes fractional increases – 1.5 to 2.5 – for a test load value that is completely irrelevant with respect to actual highway accidents.

The net result of these and other methodological limitations are conclusions like this:

" Thus, although the number of serious and fatal injuries resulting from rollovers is very high, the number of occupants who could potentially benefit from upgraded roof crush resistance requirements is considerably more limited." [1., pg16] - *596 occupant fatalities actually considered eligible for harm amelioration*. *Belted, front seat occupants exposed to overhead roof crush*.

By minimizing the potential number of beneficiaries, the agency has reduced the significance of the roof crush problem. This allows the agency to relegate most of the harm reduction to other areas, those not involving manufacturer's responsibility. The other 9400 fatalities a year will have to find some other way of staying alive. For its part, the agency intends only trying to talk them into not getting killed, i.e., telling them to drive better and wear their seatbelts. But why is it that unbelted non- ejected occupants are not benefited by improvements in greenhouse structural integrity? Seat belts don't prevent roof contact, ordinary belts allow about 5" of upward movement in static tests, more in dynamic tests, the agency knows this. Their benefit is chiefly in the prevention of complete ejection. Non-belted, non- ejected rollover victims maybe at greater risk than belted occupants, as the statistics suggest, but this is a question of degree. It does not mean that they would not benefit from increase roof strength. Further, the number of potential beneficiaries is substantially reduced by excluding ejected occupants, but ejections are most often caused by structural failure of the vehicle, broken glass and popped doors. If greenhouse integrity is preserved, largely by requiring adequate roof strength, ejections will be reduced or eliminated. Finally, many ejectees are injured before they leave the vehicle, others would have been hurt if they stayed in. By ignoring these facts, and excluding ejected occupants, the agency has arbitrary reduced the significance of the roof crush problem and the importance of a real solution.

But again, why is it that there are 1403 seriously or fatally injured BELTED occupants. in the agency's count? Concerning this potentially privileged 1403, "The agency believes that some of these occupants would benefit from this proposal." [1.pg 6.] Why only some, and why so little benefit. Evidently the 55 equivalent lives saved come from this select group, still 541 have to die. Why? What mechanical process is there in a rollover accident that does not involve roof crush and produces fatal injuries for belted occupants? Perhaps the agency's answer is found here:

"During rollover crashes, all occupants, even those who are belted, can sustain head or neck injuries when their upside down body weight places forces on the neck when their head hits the roof, particularly when the roof is in contact with the ground. This is true even in the absence of a significant amount of roof crush."15.,pg15]

This statement is false if it is suppose to mean serious or fatal injuries, as has been argued elsewhere. It

is industry propaganda. But it need not be completely false to have a serious impact on the overall harm analysis. If it does not identify a predominant mechanism, if it does not mark a serious problem then we still lack an explanation for the harm done to belted occupants and an excuse for it. It is not true because the drop or fall theories the industry promulgates are not true. This has been proven in the literature and is well illustrated in accidents involving school buss rollovers [16.] If the agency believes the contrary then it must prove the contrary. It is not entitled to assume the contrary and promulgate rules based largely on the assumption. .But this is what it is currently doing. Without proof of an important injury mechanism that does not involve roof crush, current and proposed regulation on this issue are obviously woefully inadequate.

Kinematics and Restraints:

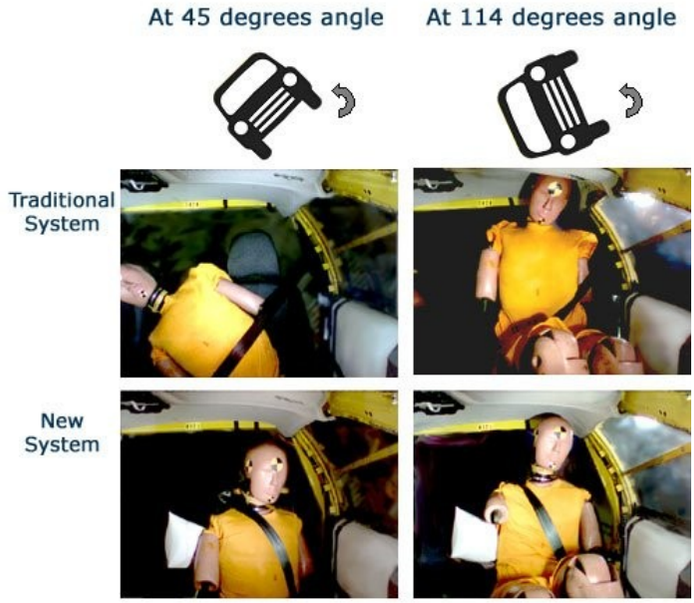
The agency apparently hopes that increased seat belt usage and improvements in restraints will markedly decrease the harm generated by rollover accidents. This is part of the overall plan and given the limited efficacy of the roof crush proposal it must be the most important part. The principle effect of increased belt usage will be a decrease in complete ejections. But the net effect here is rarely if ever accurately quantified. Instead there seems to be a tacit assumption that no (complete) ejection means no injury. But this off course is not true, belted, contained occupants are also injured, and partial ejection is still possible for contained occupants. The chief problem with estimating the harm reduction is that is difficult without careful biomedical analysis to determine if the victim was hurt after being ejected or was hurt while still in the vehicle before they were ejected. Some estimates put the pre-ejection injury rate at 50% for ejected occupants. An even more difficult problem is to estimate what would have happened to non pre-injured ejectees if they would have stayed in the vehicle and not been ejected. Would they have been hurt anyway?

But while there is still little doubt that preventing rollover ejections would reduce harm to some extent, the current proposal contains nothing vehicle specific which will effect this. In particular, the agency must realize that glass will be broken in rollovers in the "improved" vehicles just as it is currently broken in the vehicles that already meet the revised standard. Side window ejection is the most common type of glass related ejections. There is then, absolutely no justification for not mandating laminated glass at least for side windows in any revision to the regulations. Consider this slide from a Power Point presentation entitled "Changing the Auto Glass Safety Paradigm" by Michael Sanders, Dupont Co. presented at the Global Automotive Safety Conference 2/05/01.

Moreover, the laminated glass option is now no more expensive than cruise control. (EPGAA website, FAQ, 1018-05) It is then cheaper than multiple anti- ejection air bag systems and should be mandated even if the air bags are not.

Other problems suggest themselves when we consider the "mostly seatbelts" mitigation strategy now being advanced by the agency. It has long been thought possible that belted occupants were potentially subject to more exposure to injuries generated by roof collapse than non-belted occupants because they would tend to

be more upright in their seats. While this may be of minor concern with current belts, newer restraint systems may cause this to become an important phenomenon. Consider the Autoliv test illustration below:



"Autoliv Shows New Rollover Protection System"
from the Autoliv web site

Notice that even with the new inside shoulder, seat mounted, pretensioner belt –what many would consider to be an optimal design- the dummy still moves up out of the seat and if not in contact with the roof is at least in close proximity to it. Worse, the head and neck are fairly well aligned thus increasing the chances of a serious spinal cord injury. Any roof encroachment here might still result in serious injury.

It is also unclear what benefit head air bags will be if the roof is allowed to collapse. How do we guarantee that the occupant hits the bag? Are the entire roof and all possible interior strike points to be covered with air bags? What happens to the air bag under the collapsing roof? Does it get punctured? Does it bottom out and allow more or less direct contact with the roof? Does it transmit high overpressures to the head as it is driven down with roof collapse? Vehicle and component manufacturers seem reluctant to test these rollover bags in protocols which include the effects of roof encroachment, perhaps with good reason.

In summary, even with 100% usage of the type of belt currently in use, their will be harm generated by roof encroachment in rollovers. For this the agency has no answer and no fix. And even with the best restraint systems possible, we must still suspect there will be injuries associated with roof encroachment.

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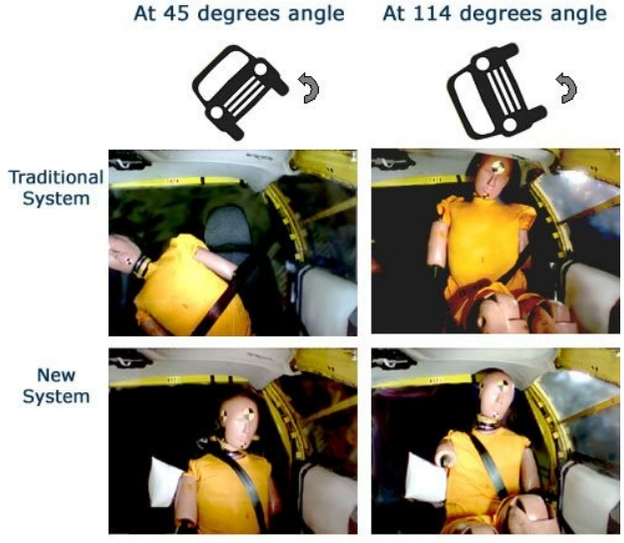

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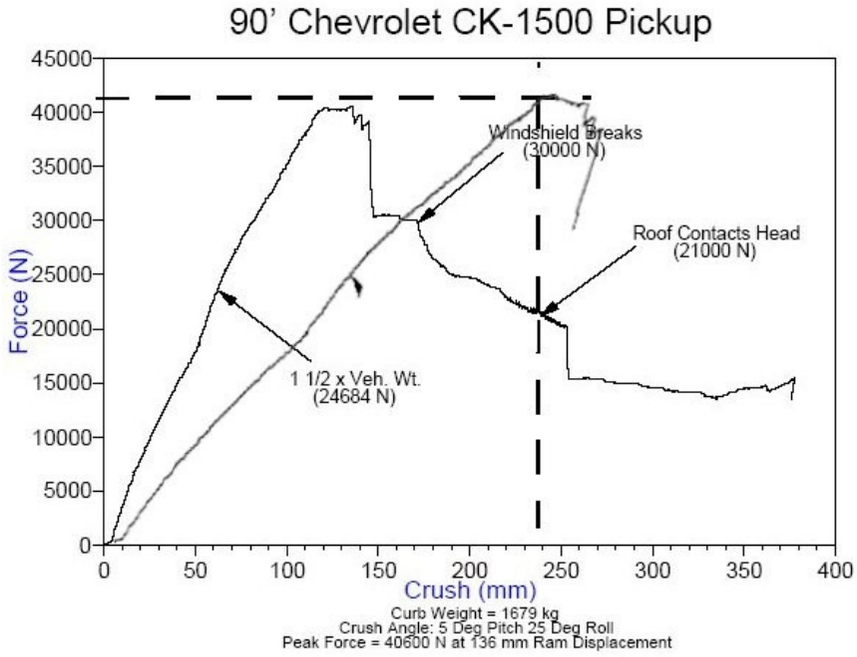
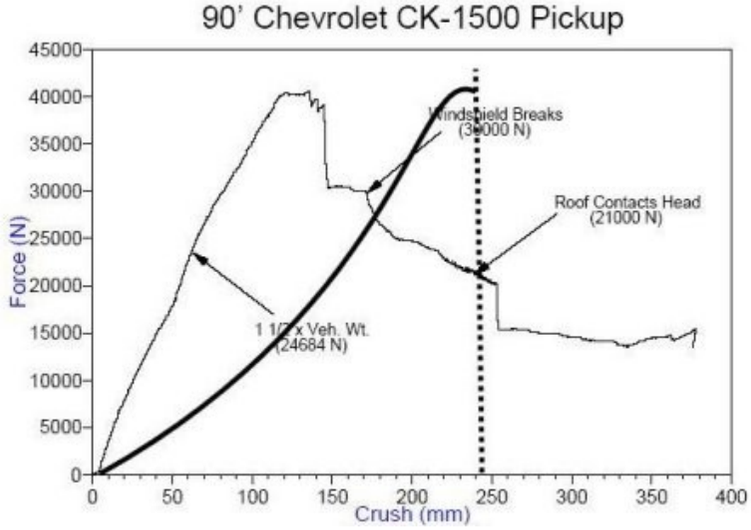
In summary, even with 100% usage of the type of belt currently in use, their will be harm generated by roof encroachment in rollovers. For this the agency has no answer and no fix. And even with the best restraint systems possible, we must still suspect there will be injuries associated with roof encroachment.

Future Effects on the Fleet

The proposed standard might well result in weaker roofs in some cases, if the manufacturers build down to the standard. In a case where roof stiffness increases linearly as the roof is crushed, the 10 inch deflection - already noted by NHTSA as required to reach the dummies head in some vehicles - in the new protocol will result in a roof strength of 1.25 g's at the 5" (actually 4.92") deflection level if 2.5 g's is required at 10" of deflection. This is less than the current standard requires. If roof stiffness increases at a rate greater than linear, as is generally the case now, the results could be even worse. The basic problem is revealed when we note that that the average roof crush at the point of head contact noted in reference [4] was 194 mm or 7.64". Now: 2.5 / 1.5 = 1.66, and 1.66 x 5"= 8.33". In other words, the proposed increase in force is close to the increase in allowable crush distance on the average. Increasing the crush distance allowed in the test tends to negate the effects of the increase in peak force requirements, a fact that in the future could have repercussions on the entire installed fleet. Consider the following illustrations:



The force- deflection diagram was taken directly from reference [4.] The curve was copied, reoriented and stretched until it met the new peak force requirement at 2.5 x vehicle weight - 41,123 N. at the head contact distance noted in the original test. Note that the '90 model year vehicle almost met the new load requirement at the old distance:125mm, 5". But under the proposed criteria, GM could now stretch it out so that the load requirement is met at about 236 mm or 9.29". This means more crush at lighter loads and a net decrease in performance. GM might even do this, further decreasing the strength of the roof at light loads:



Even for currently poor performing vehicles, which must be improved to meet the new standard, the overall benefit is less than clear. Consider the following illustrations:

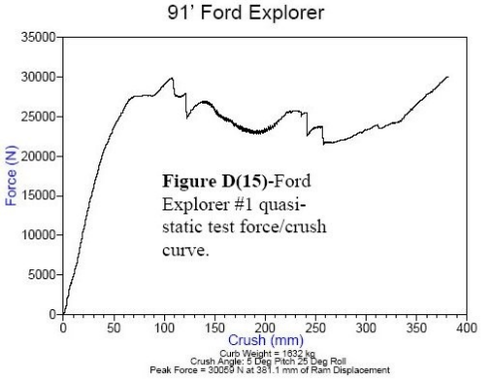
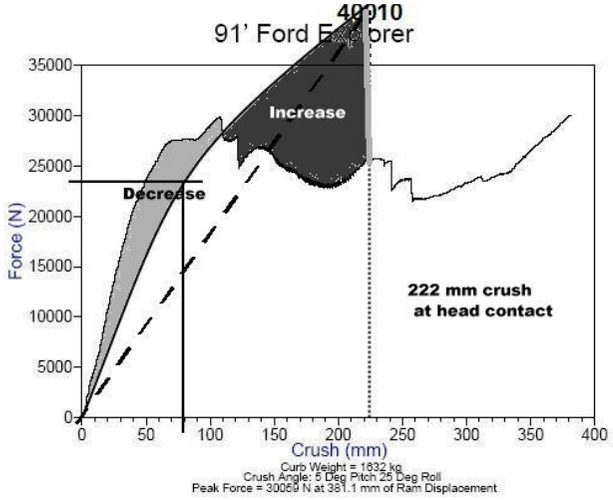


Figure D(15)-Ford Explorer #1 quasi-static test force/crush curve.



While the old Explorer met the peak load requirement of 24,000 N at about 80mm and could not pass the proposed new requirement without a strength increase to 40,000N, the required change using the old curve actually results in more crush at lower force levels than the old roof exhibited, even while requiring increased stiffness at the upper levels. The net difference is given by the differences in areas between the light and dark shaded areas of the curve. If Ford effected a linear increase (dashed line), the net improvement might even be negative.

The question is: Will manufacturers build down to the new standard? The basic problem with answering this question is that meeting the strength requirements of the current regulation is the automotive engineering equivalent of falling of a log –it is far easier to do than not to do. It happens automatically in the design process for the most part, normal requirements for structural integrity produce 216 compliance without much if any additional effort. This is why, as the agency well knows, there is so much variance in production roof strength when measured according to the current protocol –they aren't designing to it, they are just designing and meeting it easily and essentially automatically. (Did the agency really think that GM and Fischer Body would propose a standard that was <u>difficult</u> to meet?) This is also why vehicles designed without regard to FMVSS 216 or the Japanese equivalent, i.e., for markets not covered by these regulations, also meet the requirements. Thus Australian researchers discover that "that 98% of currently marketed passenger cars are believed to comply with FMVSS 216"., even though there is no Australian roof strength standard. [12.] Note also "the main conclusion of this review is that the FMVSS 216 is an inadequate standard, and that there would be little or no incremental benefit in introducing an Australian Design Rule based on it."[12].

But while they don't build <u>up</u> to the current standard, could they, would they build <u>down</u> to the

requirements in the current proposal, thus producing the negative results illustrated above? The older model vehicles were designed without the computerized design and analytical tools currently available. Model year '90 vehicles were designed no later than the mid 1980's in general and perhaps earlier. Today it is possible to design and analyze automotive structures in ways that were not possible then. Thus, vehicle designers might engineer down without as much expensive prototype design and physical testing. But will they?. There is some evidence that even some older models were brought down to the current standard. Consider for example the '91 Ford Explorer test documented above, compare it to the CK pickup test. Both the maximum strength and the associated crush distance are suspiciously close to the minimum requirements. Is this an accident or the result of an engineering effort designed to reduce costs while accommodating normal production and test variations? How does the agency know that vehicle makers will not design down to the new proposed standard when they can based on the head contact distance? Does the agency assume good faith efforts and noble intentions?

Actual practice would probably be determined by general body structural integrity requirements when serious design evaluations with respect to the proposed standard are made. Problems like windshield retention and brakage, NVH requirements, torsional stiffness requirements etc. will probably be the deciding factors. These may or may not be sufficient to prevent engineering down. Perhaps strengthening below the belt line for frontal offset and side impact protection will ameliorate some of the problems associated with weaker roof. We don't know yet. But what we do know is that the overwhelming pressure to reduce basic platform costs for cheaper models, to save a dollar or two, may well result in the overall decline in roof structural integrity compared to current practice.

Circumventions:

The agency has apparently not yet considered the complications inherent to introducing a new kind of performance standard with respect to allowable roof crush. The introduction of variable displacement in the test protocol leads to many complications requiring much more specification in the procedure. Even with greater detail in the protocol, it might still be possible to avoid structural changes and still pass the test. Since the new distance involves the test dummies head position, the easiest way to meet or circumvent the revised standard will be to change the dummies head position relative to the roof, i.e., to increase the distance from the head to the roof.

This could be done in a number of ways, including the use of a thinner or more recessed headliner, thinner seat cushions, adjustable height seats (using cheap manual adjusters) set to the lowest (uncomfortable, unusable) seat position or by changing the seatback angle. Do SUV manufacturers get to use the seatback rakes found in sports cars? If an upright 18-19 degree angle is mandated, will the dummy "fit comfortably" in a low roof vehicle or will manufacturers be able to increase the angle for a " typical comfortable" seating position? Who decides what a "comfortable" seat back angle is? If the middle setting is specified for the seatback angle, what is to prevent the manufacturer from adding a few notches in the down direction? Worse, with a fully reclining bucket seat in an SUV, a midpoint setting might allow two feet of crush. If the most upright setting is specified, why can't they take a few notches out? Does the agency anticipate having to regulate seat back angle adjustments or make reclining seats illegal? (Here's a plan to pass to pass anything and everything: Allow seatbacks to recline to more than horizontal, allow 120 -130 degree angles relative to vertical, if the seatback hits the rear seat, remove the rear seat, many are removable now anyway. The midpoint between 10 degrees and 130 degrees is 70 degrees, 20 degrees above pure horizontal, the head might be below beltline level !)

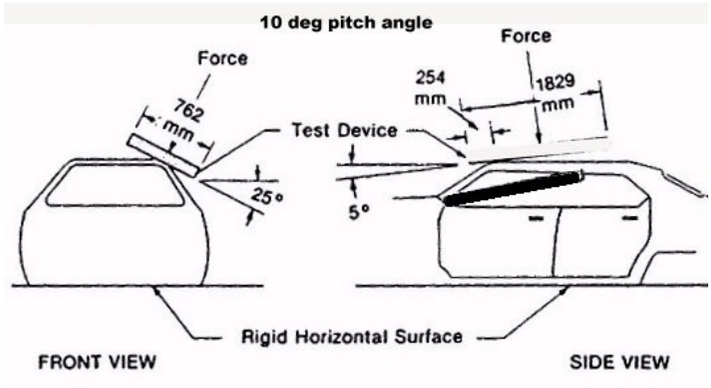
. One can easily imagine a base model, with a special cheap interior used to certify the vehicle platform, which the manufacturer knows will never represent more than a small percentage of the production run, most of which will have upgraded interiors which would not have passed. The difference between powered and manual seat height alone might be enough. The agency's proposal would probably then produce as much interior reengineering as structural improvements, especially if most of the 30% of the fleet requiring improvements are close to making the proposed revised standard.

Further: What does" prohibit any roof component from contacting a seated 50th percentile male dummy " (NPRM, pg.33) mean anyway? Suppose the headliner pops out during the test and hits the dummy's head before the sheet metal reaches it. Does this count as a failure? Suppose a roof bow breaks loose and hits the head before the rest of the roof makes contact, is this a failure? Suppose the roof bow pops out before the test load is reached and then retracts or bounces back as load and deformation increase and local forces on various components change - contact then non-contact- is this a failure? What about interior trim or fastener contact? The agency suggest that "any part of the roof" coming in contact with the dummies head counts as failure, what about extremely light components with very low velocity impacts, i.e., inherently non –injurious contact? Does it expect

to hear no objections in situations like this?

Optimum design strategy for the proposed test protocol is thus clear: Get the dummies head as far back and down as possible, at least in the shadow of the “B” pillar. Tilt the “B” pillar more upright (to support vertical loads more easily), and move it forward a little (easily done with four door vehicles). Take out all roof reinforcing elements forward of the “B” pillar. Spray some foam on a few spots on the inside of the front of the roof panel for NVH. Remove as much material as possible from the “A” pillars. The roof can then collapse more completely over the front of the occupant compartment – where victims heads will really be in an actual rollover – and the crush will be stopped by the “B” pillars alone which are being strengthened now anyway for side impact protection. New vehicles might wind up looking like old Ford Explorers or Jeep Comanche Sports after multiple roof hits when tested and still pass anyway. One can almost see the simulation and FEA workstations at GM and Ford grinding out solutions along these lines for low end models already.

The only regulatory defense against this currently is the 5 degree pitch angle on the loader. The problem is that 5 degrees is an unrealistic angle for most real rollovers. A 10 degree angle is more realistic but it allows deformation patterns like this:



As the pitch angle is increased, the front to rear position of the seat becomes more important. This means that shorter occupants who will sit closer to the front of the vehicle might be at greater risk. Since the protocol calls for a 50th percentile adult male dummy, most women, 50% of adult males and many adolescent males, i.e. about 75% of the population, might be at greater risk if actual collapse patterns follow a 10 degree or greater pitch angle. The maximum effective pitch angle is largely determined by the geometry of the vehicle, i.e., hood length versus greenhouse height. The net effect of all these variables with respect to future or even current vehicle designs is at best very unclear.

Rationale:

Concerning some drop test reported in reference 3.: “For these dynamic tests, the peak force-to-weight ratio ranged from 2.1 to 3.1. In sum, the agency concluded that 2.5 was a good representation of the observed range of peak force-to-weight ratio.”[1., pg 30] So what? The tests were to determine a relationship between static and dynamic crush, actual crush performance was a given, they did not attempt to determine if less crush was possible or desirable. The force to weight ratios measured were intermediate transient values for failing structures. They relate what the current fleet is, not what it should be. How was it decided that the observed crush levels were acceptable?

Now: “The agency believes that reduction in roof intrusion would better protect vehicle occupants.”[1., pg 30.] How much reduction, why not as much as possible, why not zero or no structural failure, i.e., for example, no more than 5% loss of interior volume? The revised standard would only effect about 32% of the fleet. “ We estimate that approximately 32 percent of the current vehicle fleet would need improvements…” [1. pg 46.] How was it decided that the other 68% deliver adequate protection? Is this why there are 10,000 dead every year in rollover accidents in this country, because the performance level of current vehicles is so high? One would think the idea was to improve performance not sanctify current practice. How is this an appropriate response to congressional mandates or the current situation with highway vehicle rollovers?

However: “Increasing current roof crush resistance requirements too much could potentially result in added weight to the roof and pillars, thereby increasing the vehicle center of gravity (CG) height and rollover propensity. In order to avoid this, we sought to strike a careful balance between improving roof crush resistance and potentially negative effects of too large an increase upon the vehicle’s rollover propensity.”[1., pg 53.] “ Where

is this balance? Let us see the analysis that reveals what ”too much” is. Adding 100 lbs of steel at an average height of 50” increases the cgh of a 4000 lb vehicle with a pre-modification cgh of 25” to 25.6”. This corresponds to a change in the SSF of about 3 points- a negligible difference. If is about the difference between a full and empty gas tank, or a single adult passenger. And, the agencies proposal would add about 29 lbs in the worst case; 100 lbs. is a lot of structural steel if used correctly. This idea- an increase in the number of rollover accidents- is an ad hoc introduction of a standard industry canard completely without merit. Moreover, it makes sense only if the regulatory change is essentially ineffective; that is, if the harm produced by increasing the number of rollover accidents is greater than the harm reduction generated by structural improvements. If rollover safety is increased significantly, a small increase in rollover accidents is an irrelevant concomitant effect.

Further, the agency assumes that increased strength means increased weight. Where is this written in the corpus of automotive engineering, especially with respect to body engineering? The generation of vehicles evaluated by the agency used low strength steels for cost and formability reasons; open sections, elements with holes in them and generally poorly designed structural elements. (See reference [13.]for example.) Significant improvement could be made using virtually the same amount of material and improving the structural design elements, something not generally done today because of the minimal requirements of the current regulation. Further, new materials, e.g., boron steel or other high strength steels, already in wide use, allow greatly improved structural designs without increased weight. Finally, WEIGHT = COST in automotive technology, automotive systems are never weight optimized, unlike aerospace system for example, and any weight based objection to a change in the design is really a cost objection.

We anticipate objections to the effect that while “vehicle producers could do it they might not….”; that is, they could improve roof strength without penalties in other areas - except for cost-, but they might not, some penalties might accrue. Fine, let them decrease the SSF and let the agency’s star system for rollover stability reflect that fact. Then let consumers decide whether or not the increase in rollover protection is worth the increased risk of having a rollover accident. Of course, manufacturers will never lose a star and suffer the associated loss of marketability of their products when it is easy to avoid it with superior engineering and even if it involves slightly increased manufacturing costs.

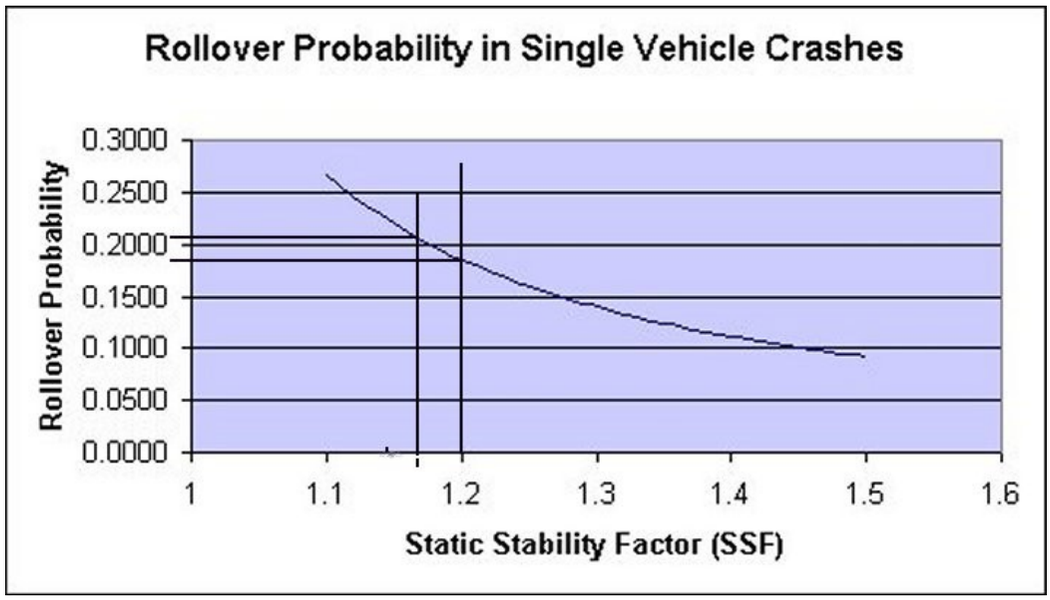
Did the agency pursue any of this in its analysis? Yes in fact it did, in the **Preliminary Regulatory Impact Analysis,** we note:

“The structural changes that were estimated by NCAC for specific models were not based on a design goal to minimize cg impact. Manufacturers can mitigate or neutralize adverse impacts on cg by using high strength lightweight materials, by adjusting track width, by utilizing slightly wider tires, or by reducing the placard pressure of their tires. It isn’t clear what design strategy the manufacturers might take. Assuming they choose to avoid changes in rollover risk, they could offset any weight added above the cg by removing a similar weight elsewhere above the cg, or by increasing weight by an offsetting amount below the cg.”[15.]

And, what’s more:

”Manufacturers generally strive to maintain or improve their NCAP ratings to help market their vehicles. ***The Agency believes that this concern over NCAP ratings would preclude a design strategy that unnecessarily increases cg and degrades SSF.*** Support for this conclusion can be found in recent vehicle designs”[15.]

Did the agency change its ”belief “ after August, 2005? Or is it that anything above what the agency now deems appropriate in terms of what it imagines to be a necessary weight increase is inherently unmanageable along the lines suggested above. Where is the breaking point, 10 lbs, 20 lbs., 30 lbs average weight increase per vehicle? What value necessarily results in an unacceptable change in the CGH? Consider the agency’s own chart:



The example given above, 4000 lb vehicle, 100 lb., weight increase results in “Rollover Probability” increase from 0.18 to 0.21, a 16% change for what is probably a worst case scenario, involving little or no effort to minimize the increase in CGH. Obviously, objections to structural improvements along these lines are irrelevant unless the structural changes result in very little safety improvement. But this, of course, is an assumption the agency made going in.

“While the agency is aware of at least several current vehicle models that provide greater roof crush resistance than would be required under our proposal, requiring greater levels of roof crush resistance for all vehicles could, depending on the methods of construction and materials used, and on other factors, render other vehicles more prone to rollovers, thus frustrating the agency’s objectives in this rulemaking.”[1., pg.54] Again: Has the agency determined the benefits of the “current vehicle models” that have superior roof strength, or determined what the increased rollover propensity for these vehicles is and compared the two determine the change in harm? Do BMWs, Mercedes, Volvos and other European makes and models with far stronger roofs than U.S. regulations require, rollover more often than domestic or Asian brands of the same basic dimensions? If not, then the agency must conclude that effective engineering techniques exist here that overcome the problem they envision might develop. The agencies rationale then becomes that it must allow for poor engineering practice, cheap construction techniques and inferior design as a matter of basic policy.

“The resources diverted to increasing roof strength using one of the costlier methods could delay or even prevent vehicle manufacturers from equipping their vehicles with advanced vehicle technologies for reducing rollovers, such as Electronic Stability Control.”[1. pg 54.] So, anything more than $10.00 per vehicle in structural improvements will reduce the installation of systems costing hundreds of dollars. First of all, the level of harm reductions generated by these systems for most of the fleet, i.e., non SUV’s and other vehicles without highway rollover ,i.e., untripped rollover, potential is unknown and likely to be minimal. These systems control on road stability and as the agency knows, most rollovers occur off road. Secondly these systems are marketable, manufacturers use them to promote their vehicles, and profitable to install, even as standard equipment, and certainly as options which is still generally the case. Does the agency really expect vehicle makers to decrease the marketability and profitability of their vehicles as a result of trivial cost increase associated with structural improvements?.

Based on this thin, confusing, technically void or erroneous, and essentially irrelevant rationale for what is at best an ineffective and at worst harmful, proposal for “increased roof strength”, the agency seeks to deprive Americans of their basic right to pursue civil actions against manufactures of unnecessarily dangerous highway vehicles. In addition, to being essentially a “consulting firm” for the industry, to borrow Mr. Naders label, the agency now seeks to become its legal advocate, doing what lawyers do, keeping the client out of court. This pretentious, presumptive, paternalistic, preemption is suppose to be justified by the agencies expertise in balancing the protective value of roof strength improvements against the presumed danger associated with what it imagines to be the necessary weight increases which is suppose to cause increased rollover accidents. Most of these issues have been addressed above, but let us address one final consideration. The agencies position at least somewhat arbitrary, if not completely arbitrary, because it rests on quantitative information. Judgments

based on quantitative information, numbers, always require the line be drawn along some point along the mathematical continuums of the variables involved. The selection point is finally arbitrary regardless of the level of information or level of argument involved. Greater or lower values for cost, weight, strength, injury levels etc. are always possible except when the numerical values involved are infinite or perhaps, zero. Arbitrary decisions are always questionable, especially when ultimately based on value judgments rather than technical considerations. The agency's pretense to the contrary is unsupported and unsupportable, in theory and in fact.

Further, the information basis of any technical judgment is mutable; we can learn more, discover new things. The agency then, proposes to allow the regulated entities to effectively ignore new information by insulating them from the civil liability associated with doing so. Is the public to expect a review of the regulation every time a new paper is published, or is it more likely that another substantial interval -in the current case, about thirty years- will pass before the new information is incorporated into revised standards? Civil litigation is a constant, ongoing phenomenon that incorporates all current information when it is competently done. There is no update or improvement remedy in the agencies proposal; it proposes not only to cast in concrete current inadequacies, but to discourage future improvements based on increased knowledge of the phenomenon involved by eliminating a corrective mechanism. We are instead to wait until the agency deigns to again consider the problem.

Let us then consider a more effective way of ameliorating the harm associated with rollovers, and highway accidents in general. One that does not eliminate the public's right to redress in civil procedures. The agencies regulatory function, at least on this topic, should be eliminated. The rules it attempts to promulgate are always conflicted, inadequate and untimely (late). Ever since it lost the "X" car parking brake case against GM over twenty years ago, it has lacked the will or courage to seriously challenge the automotive industry on safety issues. It gives the consistent impression that its regulation are determined more by political pressure generated by economic interests than by technical considerations or a commitment to improving automotive safety.

The current proposal is but the latest, and probably the worst, example of the agency's consistent regulatory failures. We would be better off without any further regulatory efforts from the agency on this issue, and perhaps without any automotive safety regulations at all. The public is increasing aware of safety issues, exposure of problems by organizations like the IIHS, industry advertising and information from general media sources has led to pressure to improve safety beyond that mandated by regulatory requirements. A role back is unlikely, given the current marketing pressure to improve safety in most areas. The sole major remaining problem is rollover safety, which is currently promoted chiefly with optional features like rollover airbags. Without regulatory influences that allow and indeed promote minimal structural requirements, we should expect improvements in this area based on the exposure of the limitations of much current roof design. The industry's chief defensive move against this public exposure has been and will be the " but we're legal" refrain. Without it they may have to face the consequences of their design inadequacies without the cover of Federal protection in the form of an inadequate regulation. This approach has worked well in Europe we note, there are no EEC regulations regarding light vehicle roof strength, manufacturers rely on internal standards and the results are frequently much better than those produced under the cover of FMVSS 216.

Let market forces, evaluations by independent entities and public opinion then judge the adequacies of protective measures for highway vehicles, not Federal regulation, at least with respect to the current issue. In the past thirty years, about 200,000 Americans have died in rollover accidents and millions have been seriously injured. In the next thirty years, at current rates, another 300,000 will die and many more millions seriously injured with the received proposal. This is 500,000 dead and many millions injured in less than a lifetime. We should hope to do better.

Respectfully Submitted

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