

MARK DOLSEN

Failure at Launch

April 2006

It was late in the afternoon on the last Friday in April when Brad Hedderson read the official announcement online. The unemotional title, “NHTSA Campaign Number 06V121000”, coupled with his prior knowledge of its release did little to ease his anxiety [*Exhibit 1*]. Toyota was recalling all Lexus IS and GS models sold in North America that had been produced between July 2005 and January 2006. The reason for the recall was a problem with the front seat belt retractor; some vehicle owners were finding that during normal operating conditions, the belt would become “stuck” in the retractor portion of the seat belt. When this happened, the webbing could not be extracted any further, nor would it return to the retractor. If this phenomenon occurred before the occupant had extracted enough webbing to properly fasten his seat belt, then the belt could not be fastened at all and the safety device was useless. Since the webbing could not return to the retractor on its own, the only solution for the driver was to return his vehicle to the dealership for a replacement retractor, and there had been an unusually high number of front retractors replaced under warranty in the first six months of sales of the new Lexus models.

Lexus is the luxury brand of the Toyota Motor Corporation. The brand was created in 1989 as method of entry for Toyota into the premium vehicle market in the United States.¹ The concept proved successful, and for the 2005 and 2006 model years, Toyota would be expanding the Lexus brand to Europe and even to Japan. The latter would be the most difficult challenge, as some of the actual Lexus vehicles had been available for years in Japan as high end Toyotas; the buying experience would have to be convincing enough to get the consumer to pay a premium for a “rebadged” vehicle. All Lexus vehicles were produced in Japan; the only exception was the RX350 SUV which was produced at TMMC in Cambridge, Ontario Canada. This was to ensure that the vehicles sold globally under this premium brand would exhibit the highest quality that Toyota was capable of producing. Toyota relied on their internal family of suppliers for components; the seat belt system was produced by Tokai Rika Co., of Aichi, Japan.

The front seat belt retractor in the 2006 Lexus models was Tokai Rika’s third generation of pretensioning retractors. The pretensioner is a device that uses a pyrotechnic charge to quickly take up any “slack” webbing in the seat belt in the instant that it receives a signal from a crash sensor on the vehicle. This purpose of this feature is to draw the occupant back into the seat so that the air bag can fully deploy without harming the occupant. Pretensioning retractors also have a feature called a force limiter, which gradually allows the locked retractor to allow a small

¹ Other major Japanese auto manufacturers used the same strategy: Honda with Acura, and Nissan with Infinity.

amount of forward movement if a force threshold on the occupant is reached. This device eases an occupant forward into the air bag during a crash, reducing force on the chest and potential head injury. Pretensioners are designed to work in conjunction with air bags to reduce the probability of injury during a vehicle crash. When they were first developed, pretensioning retractors were installed only on high end vehicles; today, they are common to most vehicles in production.

A thousand thoughts were going through Brad Hedderson's mind as he read the Defect Information Report that Toyota had submitted to the National Highway Traffic Safety Administration (NHTSA) [*Exhibit 2*]. Brad was the President of Quality Safety Systems Company (QSS) in Tecumseh, Ontario Canada. QSS was the North American subsidiary of Tokai Rika's safety business group, and because of that relationship, QSS produced the majority of the seat belts used in the various Toyota vehicles manufactured in North America. The original designs for the seat belts that QSS made came from Tokai Rika in Japan. QSS localized the production of those designs, and supplied full seat belt assemblies to the Toyota plants in North America using the Toyota Production System.

As a supplier of safety devices for automobiles, product recalls are never far from one's mind. On vehicles sold in the United States, seat belts must meet Federal Motor Vehicle Safety Standards, and suppliers of these devices have rigorous quality and manufacturing control plans in place to ensure that each assembly produced is in compliance. If the manufacturer discovers a compliance problem with product that has been shipped to customers, they must inform NHTSA and the product must be recalled and replaced. Also, NHTSA conducts their own vehicle investigations and is authorized to order manufacturers to recall and repair vehicles or items of motor vehicle equipment when investigations indicate they contain serious safety defects in their design, construction, or performance [*Exhibit 3*]. A recall is something that no vehicle manufacturer or parts supplier wants to have to go through. There are large costs involved, as the supplier must provide new defect free parts while continuing to supply current production; additionally, the supplier at fault will have to pay for the cost of the campaign to locate the affected vehicles as well as the labour cost to replace the parts at a dealership's garage. Some recalls can result in legal action, which can become a huge expense for which most manufacturers and parts suppliers carry liability insurance. Perhaps the most significant effect of a recall is the damage to a manufacturer's image; especially a car company like Toyota, who has developed a brand image based on high quality and reliability. To have to recall Lexus vehicles for any reason is potentially damaging to the brand whose slogan is "the relentless pursuit of perfection"; to recall the vehicle because the seat belt doesn't operate normally is more than potentially embarrassing.

The thought that really made Brad queasy was the product launch that QSS was going through at that moment. Toyota was preparing to start producing the new 2007 model year Camry at their TMMK facility in Georgetown, KY. QSS had always been a supplier to the Camry built in North America; this was the flagship vehicle for Toyota in the US, and the annual production volumes were around 400,000 vehicles in the competitive midsized sedan market that was dominated by Toyota and Honda. QSS would be supplying the seat belts for the new Camry, and the front retractor was a localized version of the design that was the reason for the Lexus recall.

Like all of QSS' products, this pretensioning retractor was designed in Japan by Tokai Rika. The pattern of activity was typical of past projects; when the design was completed, and had been verified through the prototyping stages, production drawings of the components and assemblies were released. Production drawings represented the validated design and were used to design and produce the tools for the component parts. Manufacturing and assembly equipment was procured and installed to meet the anticipated production rates. It was a Toyota requirement that the production capacity be in place by the time of the first preproduction build; that way, any previously unforeseen problems might reveal themselves as the production system was exercised on a controlled small volume build [*Exhibit 4*]. This requirement was always difficult to meet; with many previous programs there were some exceptions on the first preproduction build, but everything was usually in place for the second preproduction build, which typically occurred about 3 months prior to the launch.

In addition to the new product design, this launch involved installing two new automated assembly lines at QSS; one for the front retractors and a second one for the rear retractors. Automated assembly was a key component in QSS' production strategy; other North American seat belt suppliers had previously moved assembly operations to Mexico, where compensation rates were about 25% of those in the US and Canada. Since QSS continued to operate in Canada, automation was necessary to keep total labour costs competitive. The new automated lines had been designed by Tokai Rika and were built in Japan; essentially they were duplicates of the machines that Tokai Rika had procured for their own production, but built to North American hardware and safety specifications.

Brad recalled the difficulties that QSS experienced with the localization of the components for the two new retractor designs. Especially troubling was an injection molded component, key in the locking mechanism for the new front retractor. Because of the shape of the part, it had a feature that was prone to dimensional variation in the injection molding process. Brad remembered the satisfaction that everyone felt when the production engineers had reduced the variation with some innovative features in the tooling design, and they decided to proceed with a single cavity tool for the start of production. Although this would satisfy the Camry production requirements, additional tooling capacity would be required as more vehicles adopted the new third generation pretensioner with their respective model changes, as was forecasted to happen.

At the second preproduction build, QSS engineers raised some concerns to the design engineers in Japan. Some of the measurements of internal clearances between subassemblies in the front retractors did not match their predicted values after assembly when using the preproduction components that had been measured prior to assembly. Retractor performance appeared normal, but this dimensional unpredictability was a concern on such a small volume of assemblies. By this time however, Tokai Rika and Toyota had launched the product in Japan on Lexus vehicles destined for the Japanese and European markets; already they were receiving a few field claims about "stuck" webbing. QSS engineers had not observed any of the "sticking" symptoms that were being found on the retractors in the Lexus vehicles, but they were concerned enough with the variation in the assemblies that urgent requests were being sent to Tokai Rika design for some direction. In a video conference with Tokai Rika engineering and top management, Brad himself had made the bold suggestion that QSS and Tokai Rika should change direction on the Camry program and stop the launch of the new pretensioning retractor; instead, retrofitting the existing second generation retractor that was currently in production for use in the new model

Camry to protect the vehicle launch schedule. This was at a pivotal point, as there was just enough time to retrofit the current product, although this would require a tremendous amount of cooperation from Toyota. While Brad's team in North America viewed this as the best way to have a defect free launch, the engineers at Tokai Rika knew that while the existing product could easily be modified to fit the new vehicle, it would not satisfy some of the performance claims that they had promised Toyota for the new Camry, and that it would be an admission of failure to change direction now. They believed that there was still time to find the problem with the new design and implement a countermeasure. Ultimately, Tokai Rika chose the second course of action. As Tokai Rika was inundated with a rapidly increasing number of field claims on the small number of Lexus vehicles that had been sold, the problem solving effort in Japan increased to unprecedented levels. Answers to QSS' requests for direction would have to wait until the problem was solved. The only immediate action that QSS could take was to implement a more rigorous inspection program.

Now the assembly automation installations were complete. Production components were tooled and ready. And the troublesome plastic part was explicitly mentioned as the faulty component in the Defect Information Report that Toyota filed with NHTSA.

As Brad finished reading the report and recollecting the events of the previous nine months, he felt sick. But he didn't have time to commiserate. He had to lead QSS through an imminent product launch, and the organization had to protect the Camry from the fate that befell the Lexus.

As he scheduled the meeting with the senior staff to plan the course of action for the next few weeks and months, he couldn't help but think that the whole thing shouldn't have happened this way.

Background

The Company: Quality Safety Systems Company (QSS)

Quality Safety Systems Company (QSS) is a supplier of seat belt assemblies located in Tecumseh, Ontario Canada, that commenced operations in 1987 as a joint venture between TRW and Tokai Rika. TRW, a global auto parts supplier now based in Michigan, owned 60% of the joint venture. Tokai Rika Co. Ltd., based in Nagoya, Japan, is a global auto parts supplier and a member of the Toyota group of suppliers, operating everywhere in the world that Toyota does, using the Toyota Production System (TPS) in all of its factory operations. Although Tokai Rika supplies several customers, Toyota is the major customer, and the owner of 31% of Tokai Rika's stock. In the 1980s, Toyota was beginning to establish assembly operations in North America, having participated with GM in the NUMMI joint venture since 1984. TRW supplied seat belts to the Big 3 US automakers, but did not have any business with the new Japanese "transplants". Tokai Rika supplied the majority of the seat belts used in Toyota vehicles, and was beginning to establish operations in the US along with Toyota. The goal of the joint venture QSS was to target all of the joint venture vehicle assembly plants in the US that were at least 50% Japanese owned. TRW was interested in the possibility of having their seat belt designs used in Toyota vehicles; Tokai Rika was interested in an experienced partner to help establish seat belt operations in North America. The management structure reflected the ownership; the President of QSS was a

TRW appointee, and the Vice President was a Tokai Rika executive. A few Japanese expatriates served as coordinators in key departments to ensure that the Toyota Production and Quality systems were being implemented and taught [*Exhibit 5*]. A result of the venture was the development of a capable local technical and management staff. In 2003, Tokai Rika purchased TRW's shares of the joint venture, and QSS became a wholly owned subsidiary of Tokai Rika Company; Brad Hedderson, who had joined QSS in 1989 as a product engineer, was named President. This was a unique situation for a Tokai Rika subsidiary anywhere in the world; QSS was the only operation where the top executive was not Japanese.

By 2006, QSS was operating two manufacturing plants in Tecumseh, Ontario and was using a warehouse operation in Windsor that was owned and operated by a third party logistics firm. The manufacturing operations consisted of injection molding of plastic components, assembly of retractor and buckle base assemblies using asynchronous pallet transfer systems, and finishing assembly of the seat belt systems for specific vehicles. The finishing lines consisted of metal staking, sewing, assembly, and testing machines. The finished assemblies were packaged in returnable containers and shipped to the customers in multiple daily shipments. QSS employed 1200 people in a non-union environment with sales of approximately \$200 million (Canadian).

In addition to manufacturing operations, QSS had technical support staff for production and product engineering. Although all of the original product design work for the seat belt devices was done at Tokai Rika in Japan, the QSS Product Engineering department had leverage to make suggestions based on Value Analysis and Value Engineering (VA/VE), and small component variations to accommodate the needs of vehicles specific to North America as well as the capabilities of the local supply base.

Production engineering at QSS also worked to leverage the local manufacturing conditions. Since local conditions varied throughout the world, different operating locations may realize some differences in production processes, although they were based on the same quality planning tools. Some critical components were sourced globally, and some other components that were manufactured in different locations may share a common tooling source. Automated systems were usually common between Tokai Rika Japan and QSS, but assembly equipment for finishing lines was locally designed, sourced and implemented.

Toki Rika also has two manufacturing facilities in Michigan and a small assembly operation in Indiana for their other product lines (automotive switches and security products and steering wheels), as well as a corporate office and test facility in Plymouth MI, that provides corporate services to all the North American factories including QSS . The corporate office is called TRAM.

The Product: Seat Belts

Seat Belts were first offered as options in Ford and Chrysler cars in 1956, although these were only lap belts secured at 2 anchor points and available only in the front seats. In 1958, Volvo design engineer Nils Bohlin patented the 3 point seat belt, which consisted of a lap and shoulder belt; in 1959, Volvo installed the 3 point belt as standard equipment in Sweden. From this point on, most of the significant innovations in seat belt design would come out of Europe. In 1961, the Society of Automotive Engineers (SAE) adapted a standard for seat belts, and by 1965 lap

belts for the front outboard seats were provided as standard equipment on cars built and sold in North America.

In 1967, the National Highway Safety Bureau (NHSB) issued the initial Federal Motor Vehicle Safety Standards 208 and 209, which set standards in North America for lap and shoulder belts in front outboard seating positions and lap belts in all other positions. In 1968, Volvo was providing retractors as standard seat belts in the front seats. Retractors were a 3 point belt in which the shoulder portion was not detachable, but retracted onto a spool which stored the webbing behind a trim panel inside the vehicle. By 1974, retractors were required in front seats in North America. Today, retractors are standard in all seating positions in all vehicles manufactured and sold in the major automobile markets in the world.

It is mandatory in North America for passenger vehicles to have a seat belt system for every seating position in the vehicle. A seat belt system consists of a retractor and a buckle. The main body of the retractor is mounted on the 'B' pillar of the vehicle frame and is covered by the interior trim in the vehicle. The anchor, which is attached to the exposed end of the webbing, is mounted to the floor of the vehicle. The occupant secures him/herself by taking the exposed webbing and extracting an appropriate amount to allow him/her to use the metal "tongue plate" to form an attachment with the buckle, which is mounted on the opposite side of the vehicle seat. The hidden portion of the retractor contains the sensing and locking mechanism that prevents the webbing from extracting further in a situation where the vehicle momentum changes suddenly.

Seat belts are designed to integrate with the interior trim of the vehicle, and as such, color matching and cosmetic appearance are important; but seat belts are primarily a safety item, and if they do not function properly, the fault could result in the vehicle manufacturer having to recall product under National Highway Traffic Safety Administration (NHTSA) rules [*see Exhibit 3*].

Development of the third generation Retractor Pretensioner

Basic Retractor Function

The retractor assembly consists of fabric webbing wrapped around a spool which is mounted horizontally in a metal frame [*Exhibit 6*]. On one side of the frame, a "window shade" style spring is attached that interfaces with one end of the spool. The spring provides a slight resistance as the occupant extracts the webbing from the spool; when the webbing is released, the spring rewinds the spool, and the webbing retracts back onto the spool in the retractor. On the side of the frame opposite the spring there are two mechanical sensing mechanisms, and a locking mechanism. During normal seat belt operation, the spool moves freely as webbing is extracted by the occupant or retracted by the spring. One sensing mechanism monitors change in vehicle acceleration and change in horizontal position, while the second one monitors a change in webbing acceleration. If any of these conditions exceeds designed thresholds, then the locking mechanism is engaged and spool rotation is stopped.

Pretensioning Retractors

QSS introduced the first generation pretensioning retractor designed by Tokai Rika in 1997 on the Corolla vehicle. At that time, pretensioning retractors were available on high end vehicles, but this was the first high volume installation on a mass market car. The product was quickly adopted the following year by the Camry. Soon, every Toyota vehicle in North America adopted the technology at the first available model change. QSS was supplying all of these retractors and receiving premium pricing for this desirable feature. This also realized a Toyota strategy of (basically) common technology across all vehicle lines.

The first pretensioner used a cable wrapped around a collapsible clutch to engage the spool and reverse its direction when activated. The pretensioner was a small modular subassembly that was mounted to the retractor frame on the spring side; the spring was merely adapted to mount on the pretensioner housing instead of the frame. This did not pose a problem, as most of the time, the spool end moved freely through the clutch of the pretensioner [*Exhibit 7a*].

In 2001, the second generation pretensioning retractor was introduced. It was also a small module mounted on the spring side of the retractor. However, the mechanism was changed to a rack and pinion device, resulting in a smaller overall package with fewer component parts that were easy to assemble using automated systems. This resulted in a lower cost product, which again yielded increased profits for the company.

In the early 2000s, new vehicle designs and stricter standards for occupant protection demanded better performance from the pretensioning retractors in Toyota vehicles. Specifically, some vehicles required faster web retraction, and simultaneously, less force imparted by the seat belt on smaller occupants in a crash situation. This was the impetus for the development of the third generation pretensioning retractor.

Third Generation

In order to achieve the design objectives in the third generation product, the architecture was changed from previous designs so that the pretensioner was on the sensor/locking side of the retractor frame [*Exhibit 7b*]. This architecture enabled the faster retraction coupled with reduced force during a crash; however, the basic sensing and locking mechanisms had to be redesigned. This was not insignificant as the basic design of these mechanisms had not changed for 15 years.

The resulting sensor mechanism design was successful in mechanically transferring the sensor information through the pretensioner to the locking mechanism that interfaced with the spool. The key component in this transfer was the sensor gear; a plastic component produced by the injection molding process. The shape of the sensor gear was such that holding the design tolerances was a challenge given the accepted limits of variation in the injection molding process, but producing the component by any other process would mean that the cost would increase, and the retractor assembly was already exceeding cost targets. After several prototype builds, the sensor gear was ready for production in a single cavity tool.² This tool would be

² The number of cavities refers to the number of parts that are produced from the tool with each cycle of the molding machine (single cavity = 1 part per cycle).

capable of producing the required volume for the Camry vehicle, but subsequent vehicle programs would require additional capacity. A larger tool with eight cavities was being developed; this was an economical way to provide capacity, but there was growing concern that on certain dimensions, the variation between the different cavities would be too great. That issue would have to be resolved later.

Summary

When a pretensioning retractor was first introduced by QSS in 1997 for the front seat of the Toyota Corolla, it was unique in the respect that it was one of the first (if not the first) mass market vehicle in North America to boast this feature; as such it commanded a premium price, and QSS enjoyed healthy margins on this product. By the time the third generation pretensioner was introduced in 2006, this feature had become common on most passenger vehicles sold in North America. Once unique features were now customer expectations, and this was reflected in the sales price that the customer was willing to pay.

All of this history was on Brad's mind as he started thinking about the upcoming actions that would be required of the entire organization. Clearly, the Lexus recall was a black eye for the company. The new generation retractor that was designed to better protect occupants in a crash was susceptible to problems when performing the most mundane of tasks. Questions would be forthcoming about the new Camry launch. QSS would have to institute secondary operations and inspections that hadn't been included in the initial manufacturing cost estimates. And the problem didn't appear to be solved yet.

Exhibit 1- NHTSA Recall Report

<http://www-odi.nhtsa.dot.gov/recalls/results.cfm>

Make: LEXUS Model: IS

Model Year: 2006

Manufacturer: TOYOTA MOTOR NORTH AMERICA, INC.Mfr's Report Date: APR 12, 2006

NHTSA CAMPAIGN ID Number: 06V121000 N/A

NHTSA Action Number: N/A

Component: SEAT BELTS: FRONT

Summary:

ON CERTAIN PASSENGER VEHICLES, IF THE FRONT SEAT BELT RETRACTORS (BOTH DRIVER AND FRONT PASSENGER) BECOME LOCKED, THEY MAY NOT RELEASE DUE TO A COMPONENT OF THE EMERGENCY LOCKING SYSTEM. IF THE SEAT BELT IS LOCKED IN THIS CONDITION, THE OCCUPANT MAY NOT BE ABLE TO PROPERLY FASTEN THE SEAT BELT.

Consequence:

AN OCCUPANT NOT PROPERLY WEARING A SEAT BELT MAY HAVE AN INCREASED RISK OF INJURY DURING A CRASH.

Remedy:

DEALERS WILL REPLACE THE FRONT SEAT BELT ASSEMBLIES. THE RECALL BEGAN ON APRIL 21, 2006. OWNERS MAY CONTACT LEXUS AT 1-800-255-3987.

Notes:

CUSTOMERS MAY ALSO CONTACT THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S VEHICLE SAFETY HOTLINE AT 1-888-327-4236 (TTY 1-800-424-9153), OR GO TO [HTTP://WWW.SAFERCAR.GOV](http://www.safercar.gov).

1200 New Jersey Avenue, SE, West Building Washington DC 20590 USA

1.888.327.4236 TTY 1.800.424.9153

Exhibit 2 - Manufacturers Defect Information Report

TOYOTA

TOYOTA MOTOR NORTH AMERICA, INC.

WASHINGTON OFFICE
601 THIRTEENTH STREET, NW, SUITE 910 SOUTH, WASHINGTON, DC 20005

TEL: (202) 775-1700
FAX: (202) 463-8513

April 12, 2006

Mr. Daniel C. Smith
Associate Administrator for Enforcement
National Highway Traffic Safety Administration
400 Seventh Street, S.W., Room 5321
Washington, D.C. 20590

*06V-121
(4 pages)*

RECEIVED
NHTSA-215
2006 APR 13 A 10 13
OFFICE OF
DEFECTS INVESTIGATION

Re: Lexus GS and IS Seat Belt Retractor Issue
Part 573, Defect Information Report

Dear Mr. Smith:

In accordance with the requirements of the National Traffic and Motor Vehicle Safety Act of 1966 and 49 CFR Part 573, on behalf of Toyota Motor Corporation ["TMC"], we hereby submit the attached Defect Information Report concerning a voluntary safety recall of certain Lexus GS and IS vehicles to address an issue with the seat belt retractor.

Should you have any questions about this report, please contact Mr. Chris Santucci at (202) 775-1707.

Sincerely,

TOYOTA MOTOR NORTH AMERICA, INC.

for 
Chris Tinto
Vice President
Technical & Regulatory Affairs

CT:cs
Attachment

DEFECT INFORMATION REPORT

1. Vehicle Manufacturer Name:

Toyota Motor Corporation ["TMC"]
1, Toyota-cho, Toyota-city,
Aichi-ken, 471-8571, Japan

Affiliated U.S. Sales Company

Toyota Motor Sales, USA, Inc. ["TMS"]
19001 South Western Avenue, Torrance, CA 90509

2. Identification of Affected Vehicles:

Based on production records, we have determined the affected vehicle population as in the table below.

Make/ Car Line	Model Year	Manufact- urer	VIN		Production Period
			VDS	VIS	
Lexus/ IS	2006	TMC	BK262	62000010 – 62006901 65000018 – 65009068	August 23, 2005 though December 23 2005
			CK262	62000003 – 62001923 65000013 – 65003465	
			BE262	62000000 – 62002347 65000018 – 65004449	
Lexus/ GS	2006	TMC	BH96S	65018433 – 65030998	July 27, 2005 though January 17 2006
			CH96S	60010196 – 60015891	
			BN96S	65007515 – 65012657	

Note: Although the involved vehicles are within the above VIN range, not all vehicles in this range were sold in the U.S.

Component containing defect: Front Seat Belt Assembly

Manufacturer Name: TOKAI RIKA CO., LTD.

Address: 3-260 Toyota, Oguchi-cho, Niwa-gun, Aichi, 480-0195 Japan

Telephone: +81(587)95-5211

3. Total Number of Vehicles Potentially Affected:

28,947

4. Percentage of Vehicles Estimated to Actually Experience Malfunction:

Unknown

5. Description of Problem:

Some front seat belt retractors in the subject vehicles may have been produced with an inappropriately sized part for the emergency locking system. This can prevent the locking system from releasing when it is activated. If the seat belt is locked in this condition, the occupant may not fasten the seat belt, increasing the risk of injury.

6. Chronology of Principal Events:

October 2005 – December 2005

Toyota received some field information from the Japan market which indicated that a driver side seat belt could not be pulled out of the retractor. Toyota immediately began an investigation and recovered the seat belt assembly for confirmation of the problem and an examination of its retractor. As a result, it was found that there was no abnormal condition in the operation of the retractor and the emergency locking system. However, during the examination of the inside of the retractor, it was discovered that the edge of a gear sensor (one of parts of the emergency locking system) could scrape on the retractor housing when the locking system is activated or released. In order to eliminate a possibility of interference between the gear sensor and the housing, the size of the gear sensor was modified in December, 2005.

January 2006 – March 2006

Toyota continued its investigation to identify the cause of the problem. As a result, it was found that there is a possibility that the frictional force generated (as a result of the interference between the gear sensor and the housing) could exceed the return spring force, causing the gear sensor to stick in the locked position. In this condition, the emergency locking system may not release when activated. In such instances, the occupant will not be able to pull the seat belt out of the retractor.

Early April 2006

As a result of the investigation above, Toyota decided to conduct a voluntary safety recall of all vehicles in the affected range.

This safety campaign will also be conducted in Japan, Canada, Australia, Europe, China, Taiwan and other countries.

7. Description of Corrective Repair Action:

All known owners of the subject vehicles will be notified by first class mail to return their vehicles to any Lexus dealer for replacement of the front seat belt assemblies (both the driver and the passenger side).

Reimbursement Plan for pre-notification remedies

The vehicles involved were produced between July 27, 2005 and January 17, 2006. As the owner notification letters will be mailed out well within the active period of the Lexus New Vehicle Limited Warranty ("Warranty"), all involved vehicle owners for this recall would have been provided a repair at no cost under the Lexus's Warranty.

8. Recall Schedule:

Mailing of the owner notifications will commence in early May 2006, and will be completed in early June 2006.

Copies of the owner notification and dealer instructions will be submitted as soon as they are available.

9. Distributor/Dealer Notification Schedule:

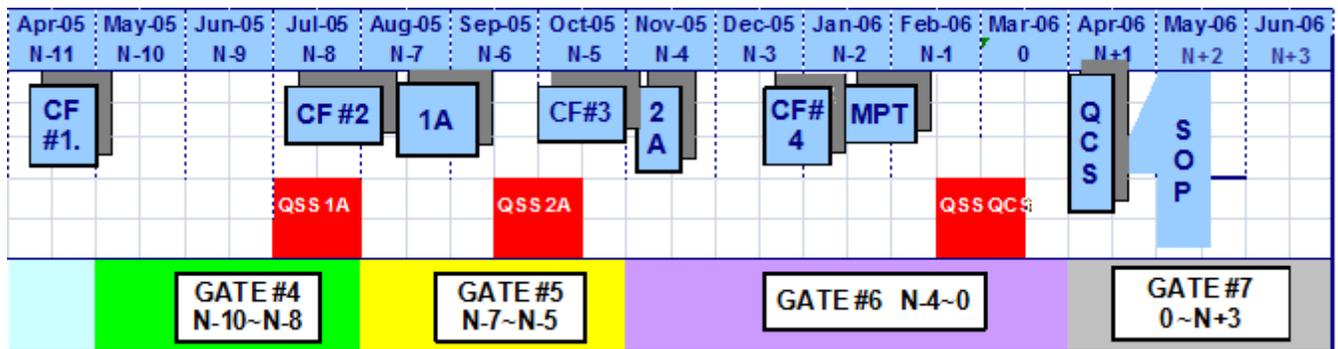
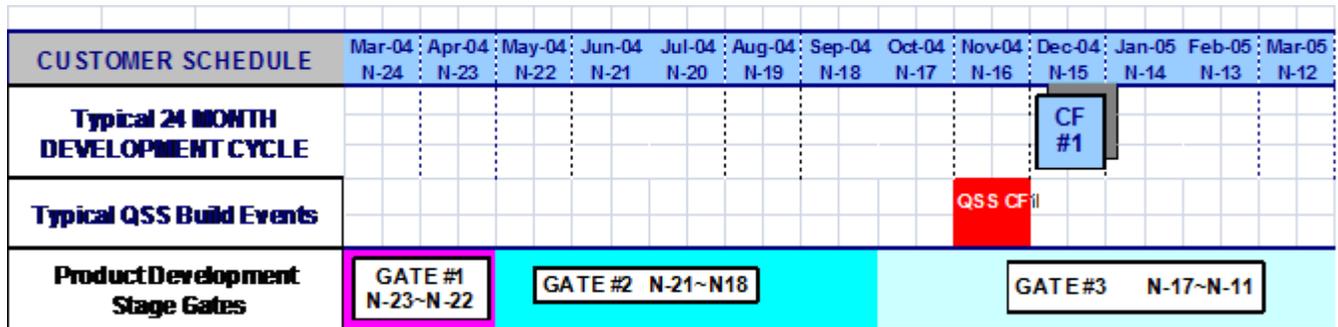
Notifications to distributors/dealers will be sent in mid-April 2006.

Exhibit 3 - The Role of NHTSA

<http://www.nhtsa.gov/Vehicle+Safety/Recalls+&+Defects>

Improving Safety On Our Nation's Highways - NHTSA conducts defect investigations and administers safety recalls to support its mission to improve safety on our nation's highways. NHTSA is authorized to order manufacturers to recall and repair vehicles or items of motor vehicle equipment when investigations indicate they contain serious safety defects in their design, construction, or performance. NHTSA also monitors the adequacy of manufacturers' recall campaigns. Before initiating an investigation, NHTSA carefully reviews the body of consumer complaints and other available data to determine whether a defect trend may exist.

Exhibit 4 – Typical Toyota Vehicle Development Schedule



Legend of Abbreviations

QSS = Quality Safety Systems Co.

CF = Check Fixture

1A = First Pre-Production Build

2A = Second Pre-Production Build

MPT = Mass Production Trial

QCS = Quality Confirmation Stage

SOP = Start of Production

Exhibit 5 – QSS Organization Chart

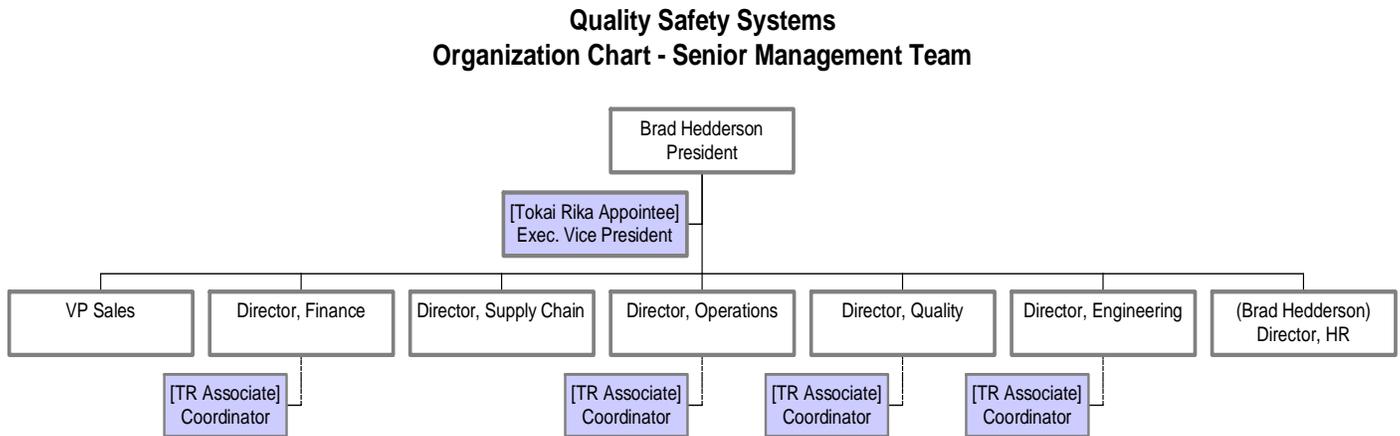


Exhibit 6 – Picture showing the Retractor Architecture

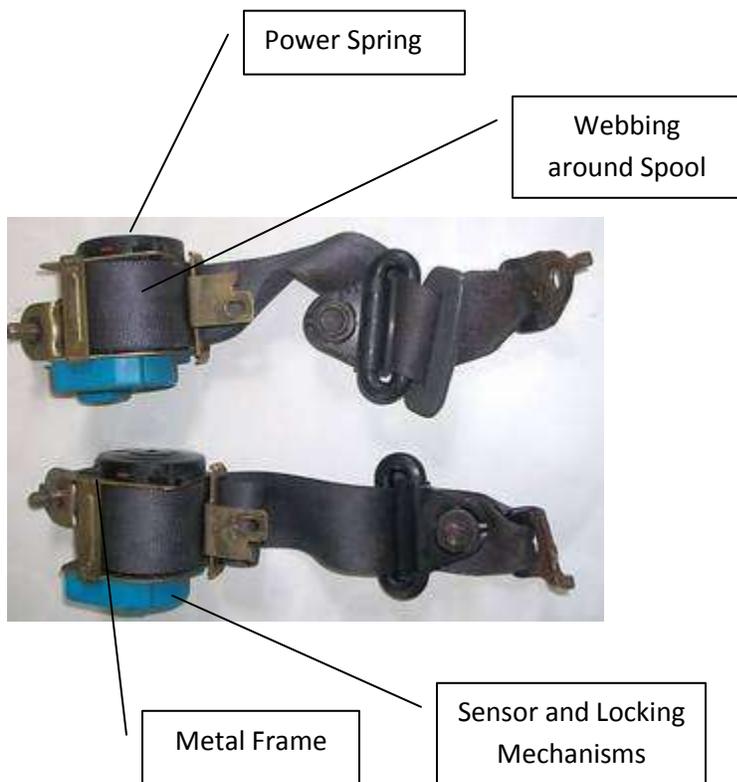
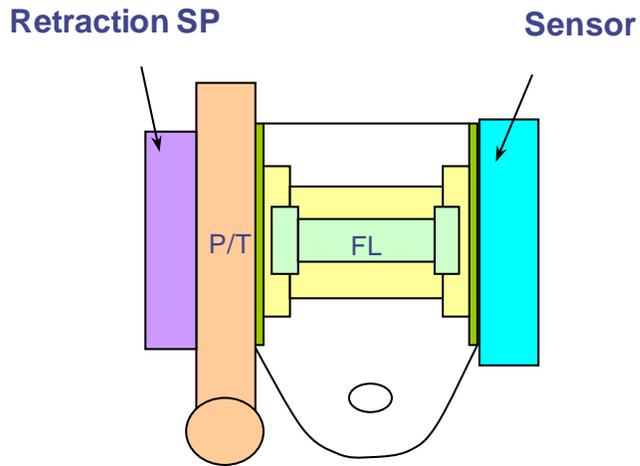


Exhibit 7 – Pretensioning Retractor Architecture

a) Generation 1 & 2 – Pretensioning device is located between retraction spring and frame



b) Generation 3 – Pretensioning device is located between sensor mechanism and retractor frame

