



Education/Training Committee Oklahoma City, OK

April 25, 2012



Committee Members

Bob	Keith	CARSTAR
Gene	Lopez	I-CAR
John	Bosin	Fix Auto
Rudy	Aranda	I-CAR
Dominic	Brusco	PPG Industries
Rod	Enlow	CCAR
Jim	Evans	DuPont
Fred	Iantorno	CIECA
Tony	Molla	ASE
Jeff	Peevy	I-CAR
Richard	Perry	Chief Automotive Systems
Jeannie	Silver	CARSTAR
Rick	Tuuri	Audatex, a Solera Company



Vehicle Technology Changing the Present and Future

*Susanna Gotsch
Director, Industry Analyst
CCC Information Services Inc.*



Four Areas of Focus

- ⌚ Consumer Expectations

Population divergence between young and old

- 🌐 Volatility in the Economy

Return to hard market slower

- 🌐 Automotive Design Response to New Demands

Fuel economy and safety features paramount

- 🌐 Fewer but more complex repairs

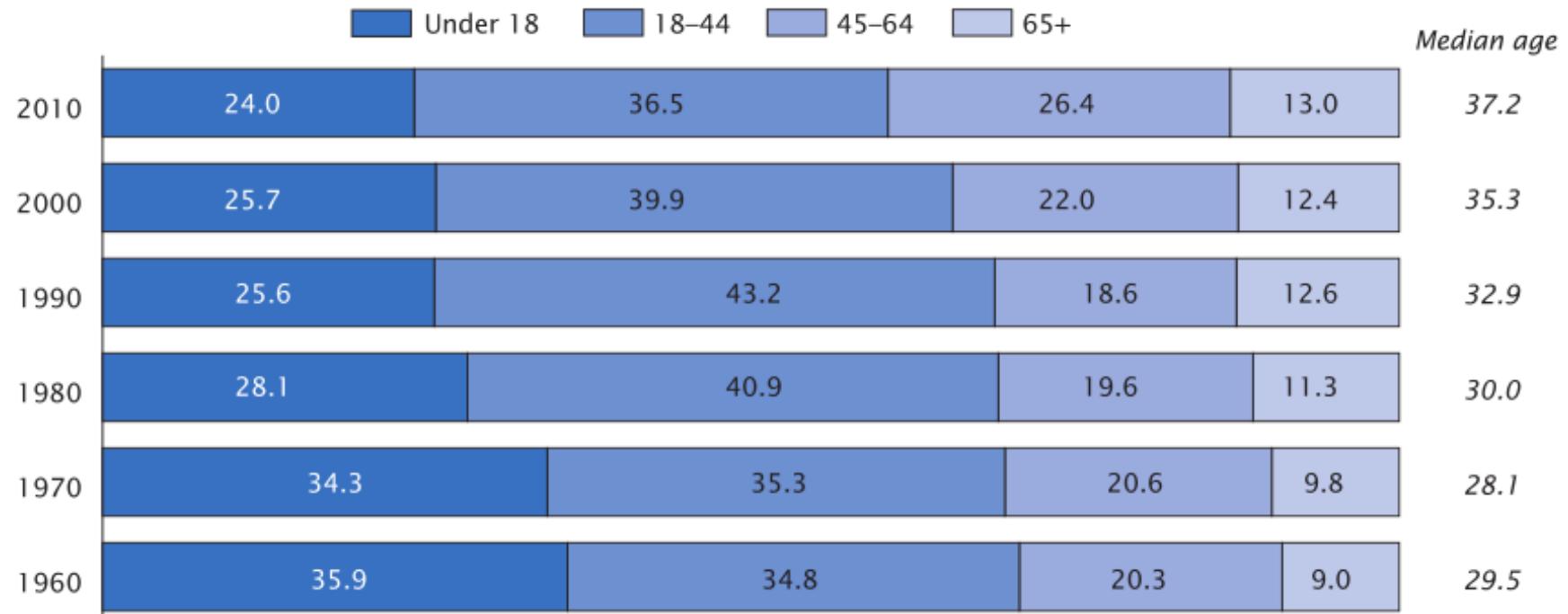
Divergent vehicle population old and new



U.S. Population Aging

Age Distribution and Median Age: 1960 to 2010

(In percent. For information on confidentiality protection, nonsampling error, and definitions, see www.census.gov/prod/cen2010/doc/sf1.pdf)

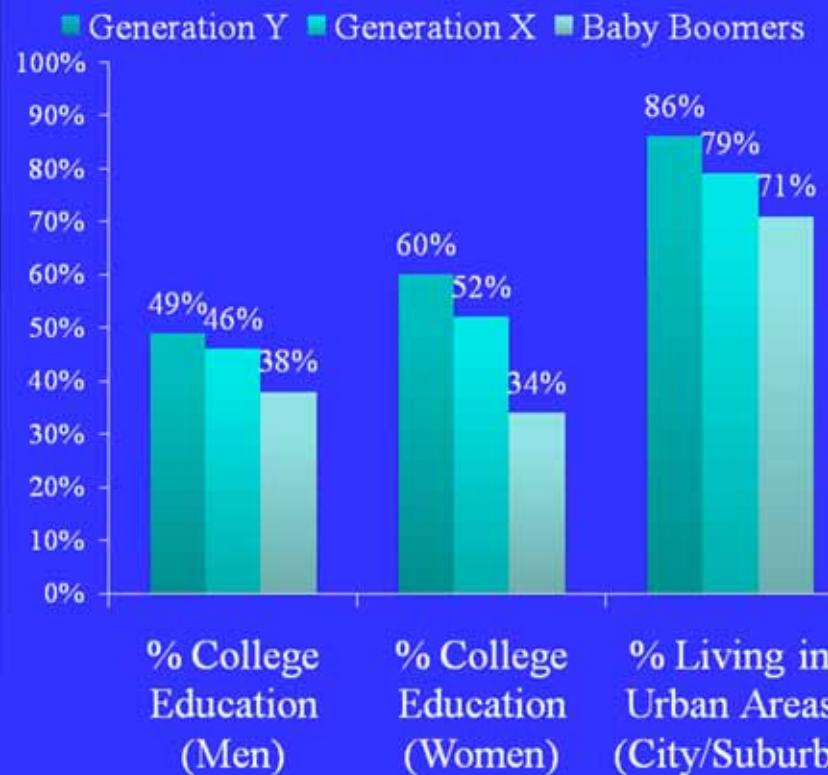


Sources: U.S. Census Bureau, 2010 Census Summary File 1, Census 2000 Summary File 1, 1990 Census Summary File 2C, 1980 Census Summary File 2C, 1970 Census of Population, Vol. 1, Characteristics of the Population, Chapter B, Table 50, and 1960 Census of Population, Vol. 1, Characteristics of the Population, Chapter C, Table 156.

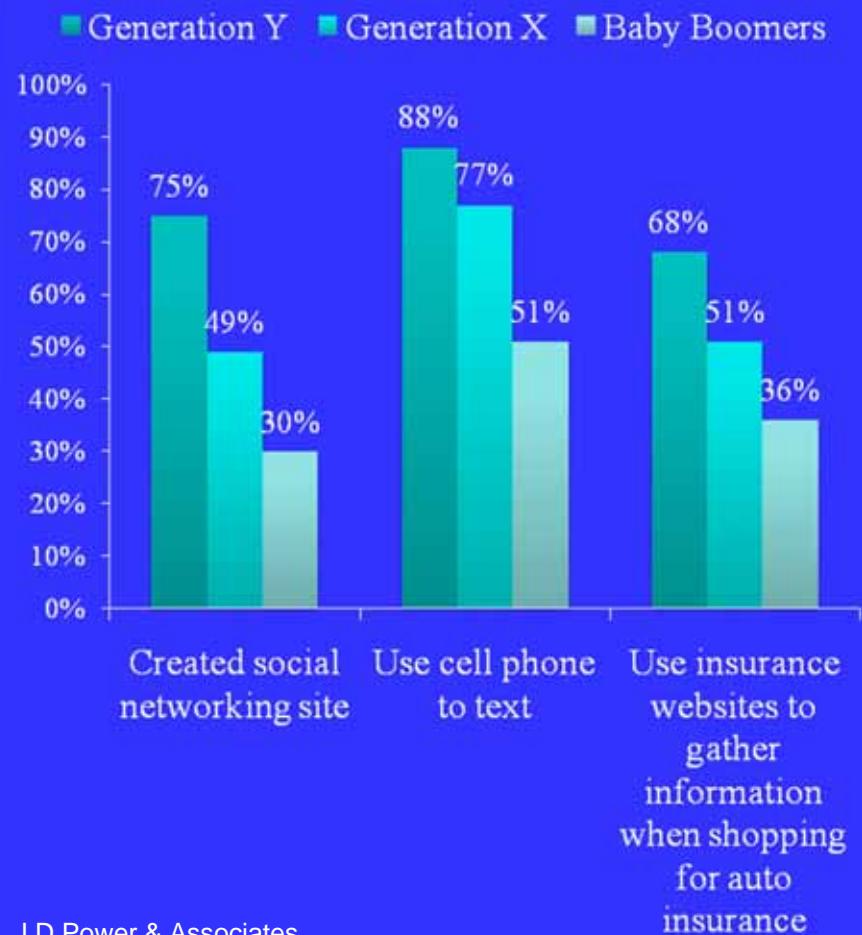


Post-PC World is Pervasive Computing

Demographics by Generations



Technology Use by Generation



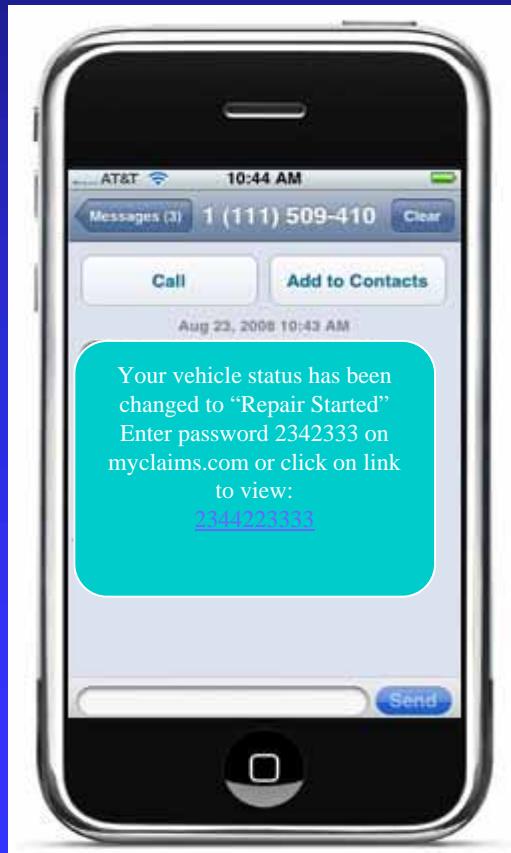


Ubiquitous Access Enhancing Service Delivery

Insurers and repairers are looking to service customers differently by leveraging technology

Services

- Online claim reporting
- Online claim scheduling
- Claim and repair statuses via text and online
- Customer support using live chat



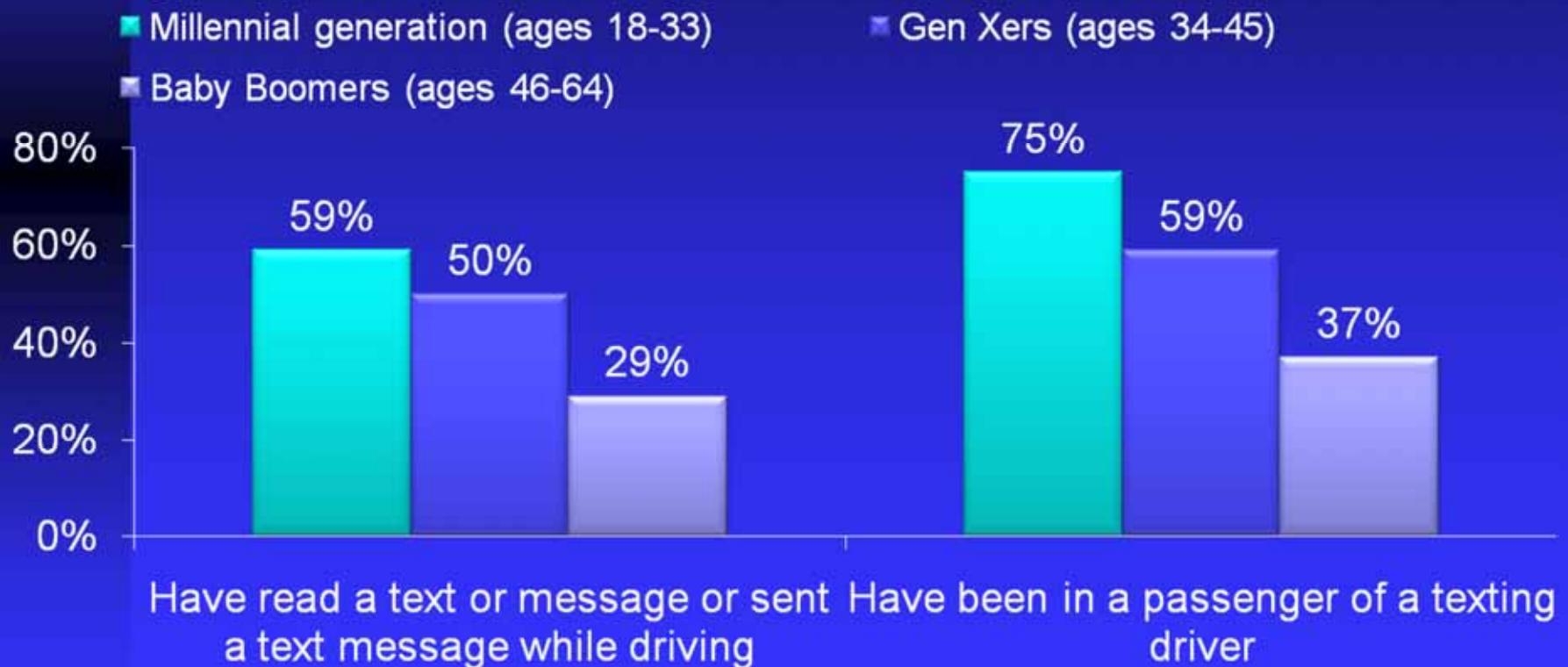
Screenshot of the ACME Insurance Online Claim portal. The page title is 'VIEW REPAIR STATUS'. It shows a timeline with phases: Estimate, Vehicle Arrived, Repair Started (highlighted in green), Refinish/Paint, Repair Completed, and Vehicle Delivered. Specific details for the 'Repair Started' phase include: Date (Aug 17, 2011), Current Phase (Body work), Estimated Completion (July 26, 2011), and Location (Motor Auto Helper San Francisco (815) 626-6994).

Screenshot of the CCC OnSite repair history and contact form. The repair order number is 100349310. The vehicle status shows it is 17% complete and currently in the 'PAINT' phase. The repair history includes entries for a note left on August 17, 2010, at 3:04 PM, a repair plan change on August 18, 2010, at 9:37 AM, and photos taken during the 'Tear Down' phase. The contact form on the right allows users to send messages to Tony Stevens (815) 626-6994. The page is powered by CCC OnSite.



Right Time, Right Device Sometimes Leads to Distraction

Pew Internet & American Life Project 2010
Adults and Cell Phone Distractions





Technologies to Combat Distraction

Contact	Status
Clarice Smith	Available
Alice Jones	Driving
Bob Lafayette	Available
David Johnson	Driving
Eugene Crow	Offline
Fred Schmidt	Available
George Hayes	Available
Hannah Chan	Available

Distraction fighter: This in-development app draws on new technology that can distinguish between the driver and passengers in a moving car.

PhoneGuard
IT'S YOUR LIFE. DRIVE IT.
Take charge of your life – and protect the people you care about.

PhoneGuard and PhoneGuard Family keep you safe and always connected

- Auto Reply
- Panic Button
- Phone Lock
- Speed Control
- Time Out
- Upgrade

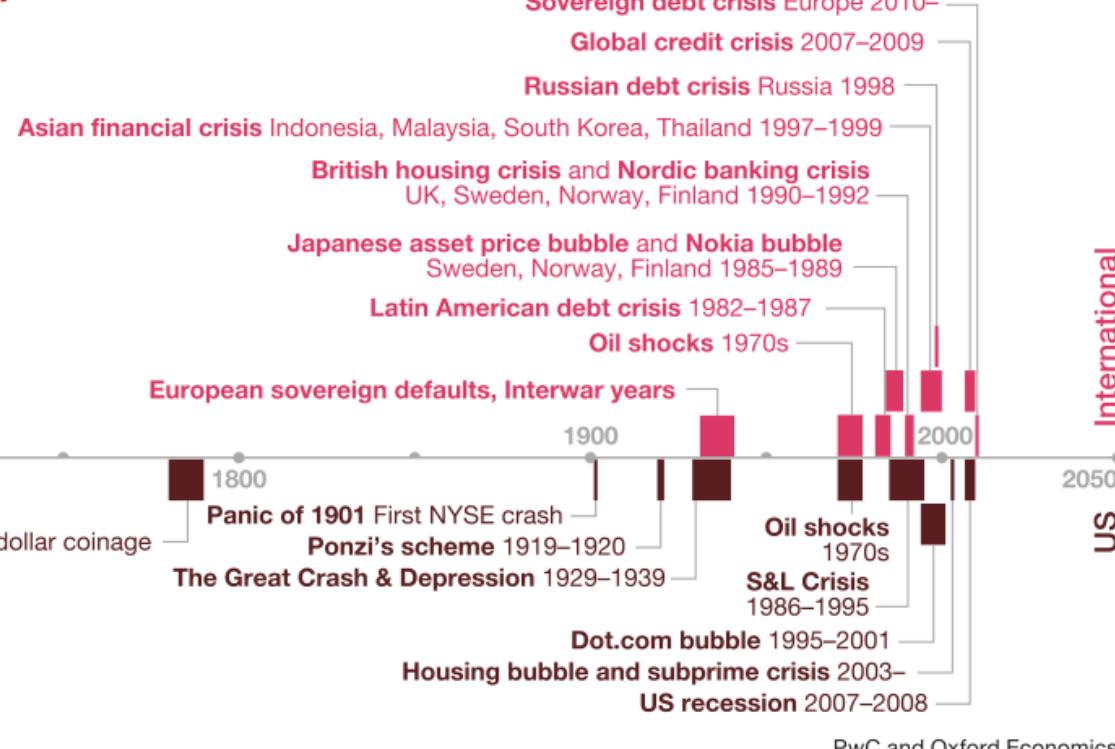
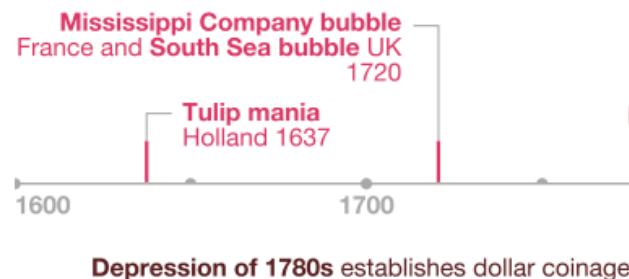


Economic Crises More Often and Bigger Scale

Crises have been occurring more frequently

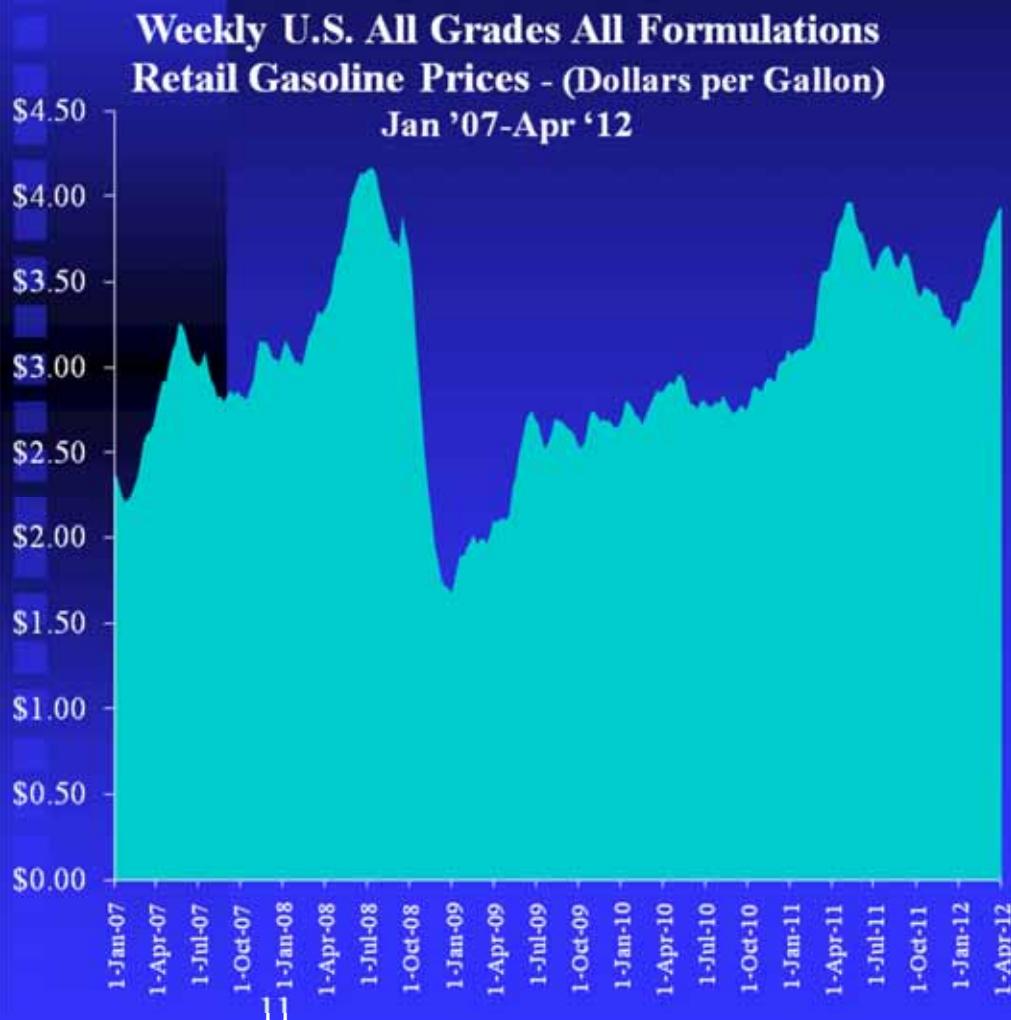
More financial crises have occurred in the past 30 years than in the preceding 350 years

Vertical bars represent a selection of major US or international crises and their thickness reflects the duration of the crisis.





Continuous Volatility in Gasoline Prices

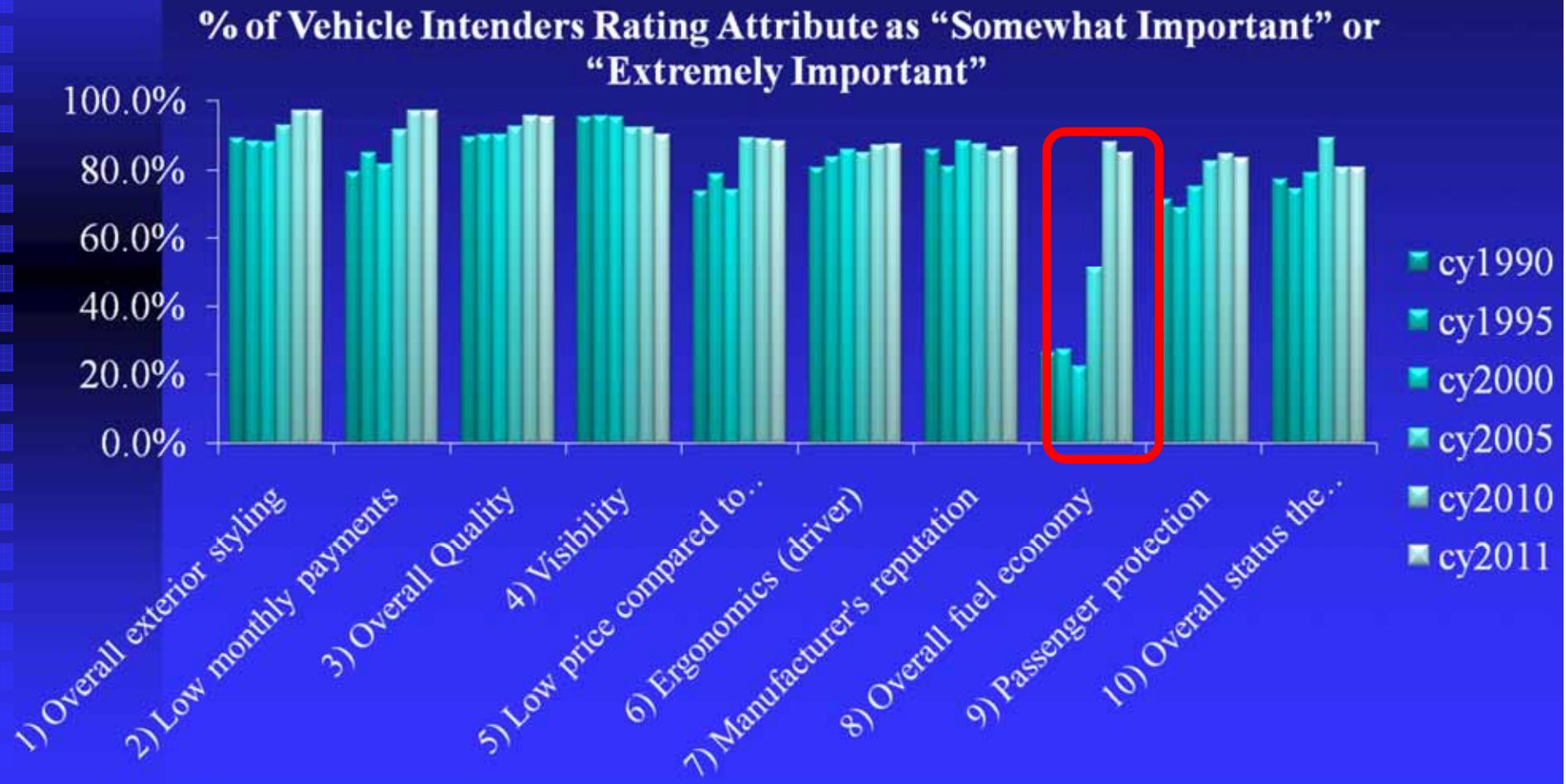


CY	Low Price	High Price	Swing High to Low
2006	\$2.200 6-Nov-06	\$3.038 7-Aug-06	\$0.838
2007	\$2.165 29-Jan-07	\$3.218 21-May-07	\$1.053
2008	\$1.613 29-Dec-08	\$4.114 7-Jan-08	\$2.501
2009	\$1.684 28-Dec-09	\$2.694 5-Jan-09	\$1.010
2010	\$2.608 27-Dec-10	\$3.052 4-Jan-10	\$0.444
2011	\$3.07 26-Dec-11	\$3.965 3-Jan-11	\$0.895
2012	\$3.299 2-Jan-12	\$4.01 Est. May 2012	\$0.711 Est.

Source: www.eia.doe.gov



Vehicle Attributes considered “important”

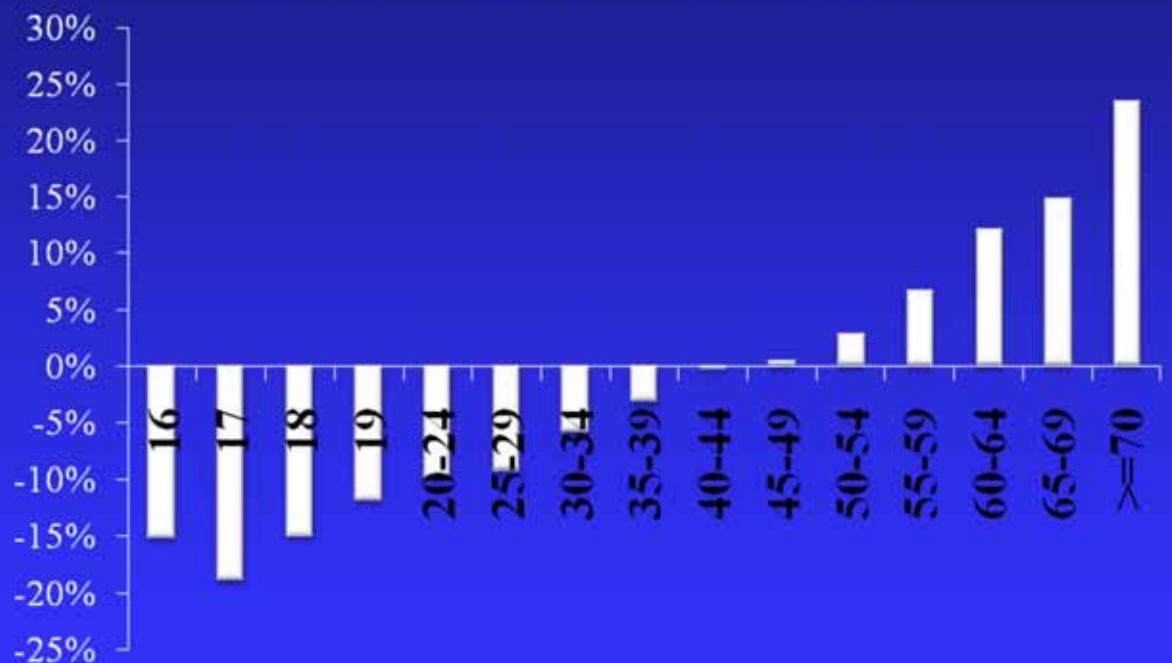




Technology replaces the vehicle as rite of passage

- Fewer young people had driver's licenses in 2008 than in 1983
- Those aged 16 to 30 were the least likely to use their vehicles to commute to work in 2009
- By 2033 there would be an increase in the oldest drivers by 2033

Licensed Drivers as a percentage of their age-group population
Difference CY 2008 versus 1983



Source: Sivak and Schoettle. Recent Changes in the Age Composition of U.S. Drivers. UMTRI



Car Ownership of the Future?

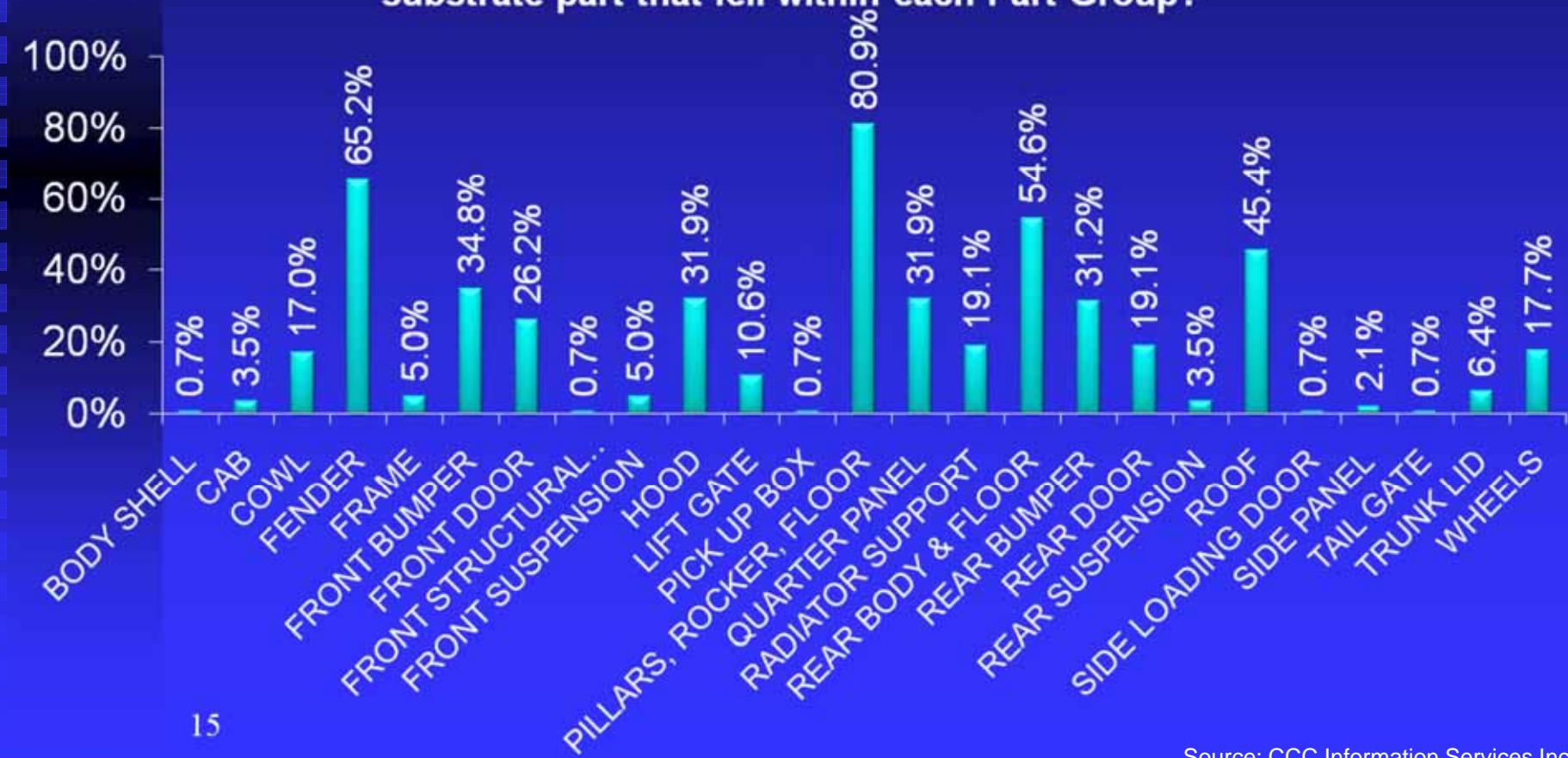
- Gartner analysts predict that 10 percent of the U.S. urban population will use some form of shared automobile within four years.
- The North American car-sharing market – ‘collaborative commerce’, is projected to grow to 1.4 million members in 2012, up from 600K in 2011.
- Frost & Sullivan predicts there will be 20 million members in car sharing clubs by 2020





Rapid Growth in Automotive Use of Substrate Materials

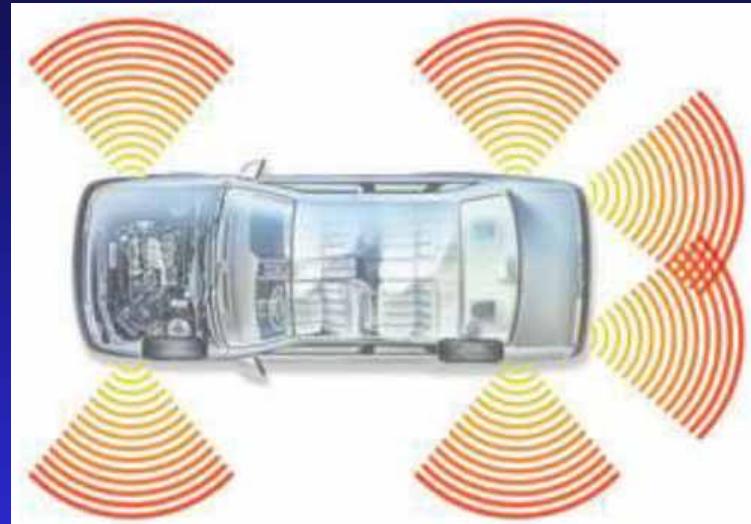
Over 80 percent of all new vehicles sold in first quarter 2012 included a substrate metal component – what percent of the vehicles included a substrate part that fell within each Part Group?





Accident Avoidance Technologies

- TRW and other suppliers working on next generation safety systems
- Focus on lowering cost of these devices
- Use of short-range radar and low-cost sensors each reporting to a central control unit





IIHS/HLDI Study of Volvo XC60 City Safety System

vs. other Volvos	claim frequency			claim severity			overall losses		
property damage liability	-24.5%	-19.2%	-13.7%	\$488	\$646	\$794	-\$5	\$2	\$7
bodily injury	-62.3%	-49.2%	-31.4%						
collision	-20.2%	-16.7%	-13.0%	-\$362	-\$147	\$58	-\$72	-\$53	-\$36
vs. other midsize luxury SUVs	claim frequency			claim severity			overall losses		
property damage liability	-29.3%	-26.6%	-23.9%	\$174	\$270	\$362	-\$21	-\$166	-\$125
bodily injury	-58.9%	-51.1%	-41.8%						
collision	-23.8%	-22.0%	-20.1%	-\$645	-\$517	-\$392	-\$109	-\$98	-\$86

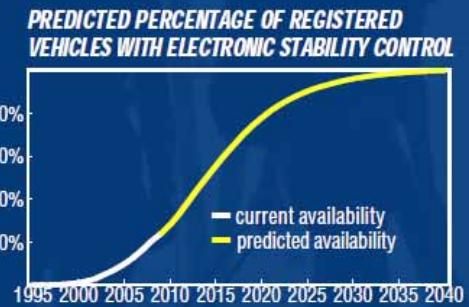
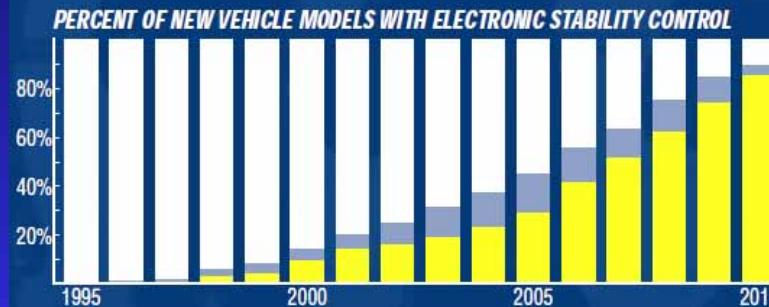


Safety Features are coming but slowly

- HLDI reports it typically takes up to three decades before 95 percent of the vehicles on the road have a given safety feature offered as either a standard feature or available option

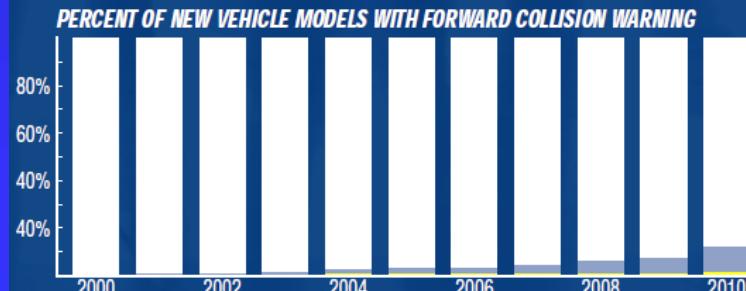
ELECTRONIC STABILITY CONTROL

ESC was introduced in 1995 models and was standard on 10 percent of 2000 models and optional on 4 percent. The technology dramatically cuts crashes, particularly rollovers. As a result, NHTSA required that ESC be standard on all passenger vehicles as of model year 2012. HLDI predicts that 95 percent of registered vehicles in 2029 will have either come with ESC standard or had it available as an option.



FORWARD COLLISION WARNING

Forward collision warning is available primarily on luxury vehicles, although recently it also has been offered by Ford, Chrysler, and other non-luxury brands. It first appeared on a U.S. car in model year 2000 and was standard on just 1 percent of 2005 models and optional on 2 percent. In 2010, it was standard on 1 percent and optional on 11 percent of models. If it continues to follow this pattern, it will be available on 95 percent of registered vehicles in 2049. However, if further research confirms the benefits of the technology, it could be expected to move faster.

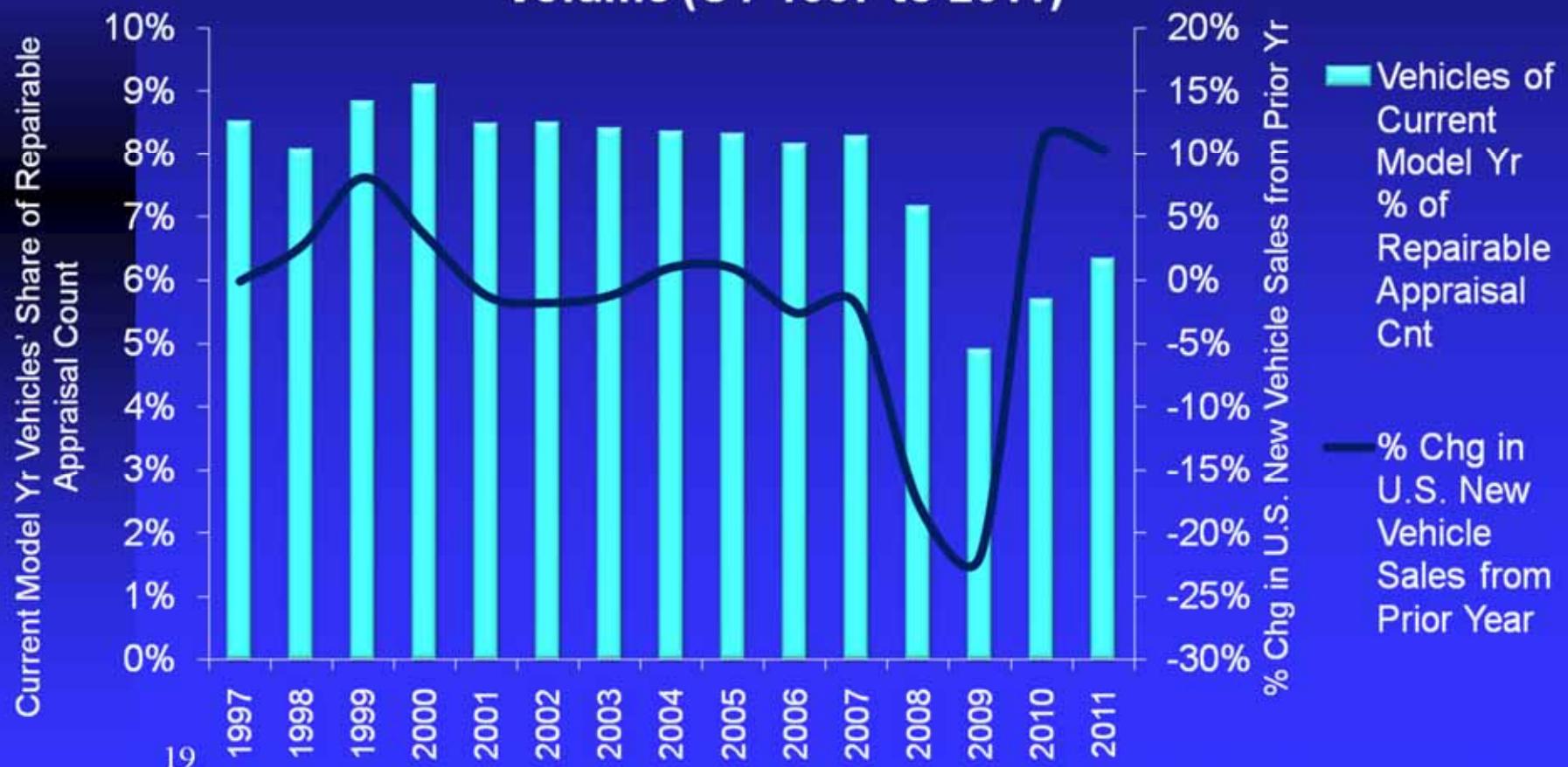


Source: Insurance Institute for Highway Safety. "Estimated Time of Arrival." *Status Report*, Vol. 47, No. 1, Jan 24, 2012,



Market conditions lead to fewer but more complex repairs

Comparison of YoY Change in U.S. New Vehicle Sales to Current Model Year Share of CCC Annual Appraisal Volume (CY 1997 to 2011)

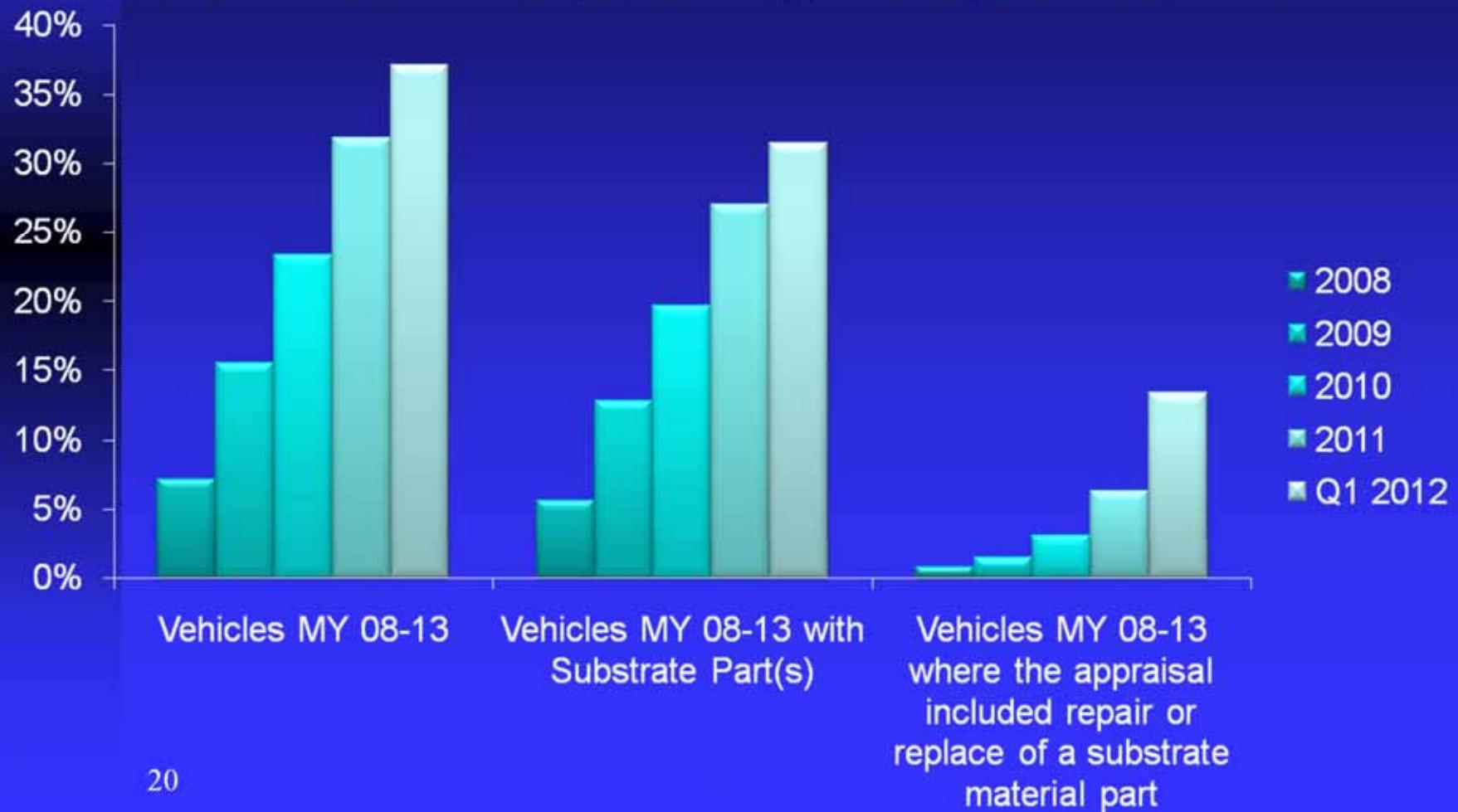


Source: CCC Information Services Inc. and CNW Marketing Research Inc.



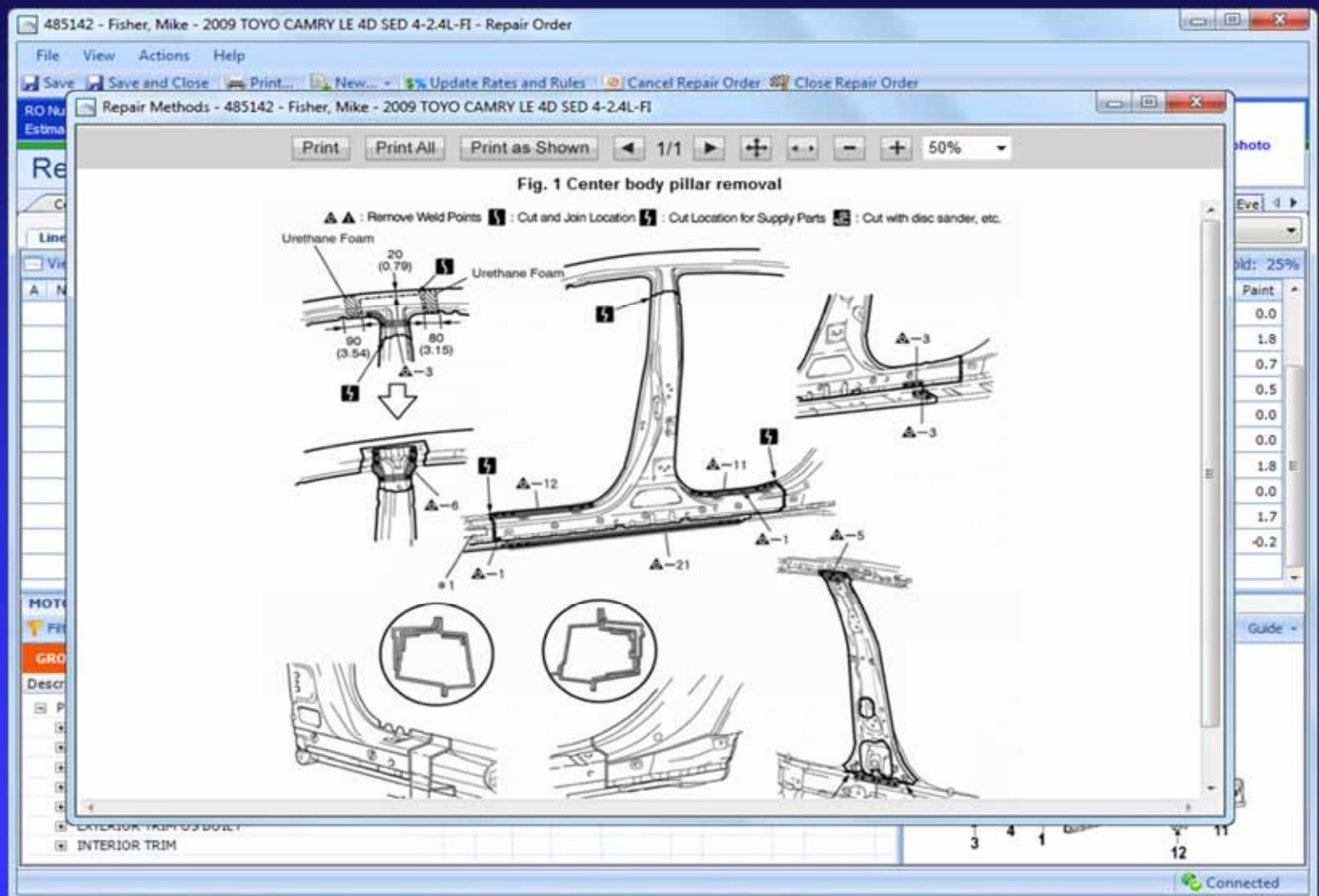
Substrate Impact on Automotive Claims

Percent of Overall Repairable Appraisal by Calendar Year





CCC ONE™ Repair Methods





Thank you



New Vehicle Design

Rick Tuuri

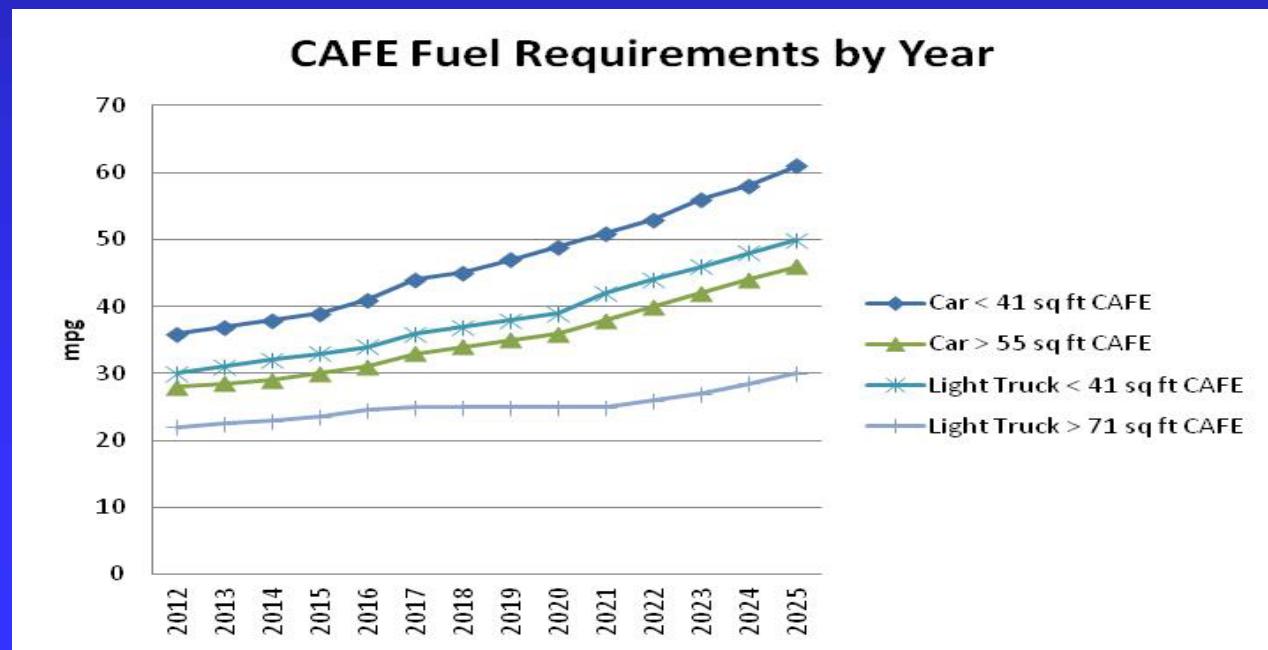
VP Industry Relations

Audatex, a Solera Company



New Vehicle Design

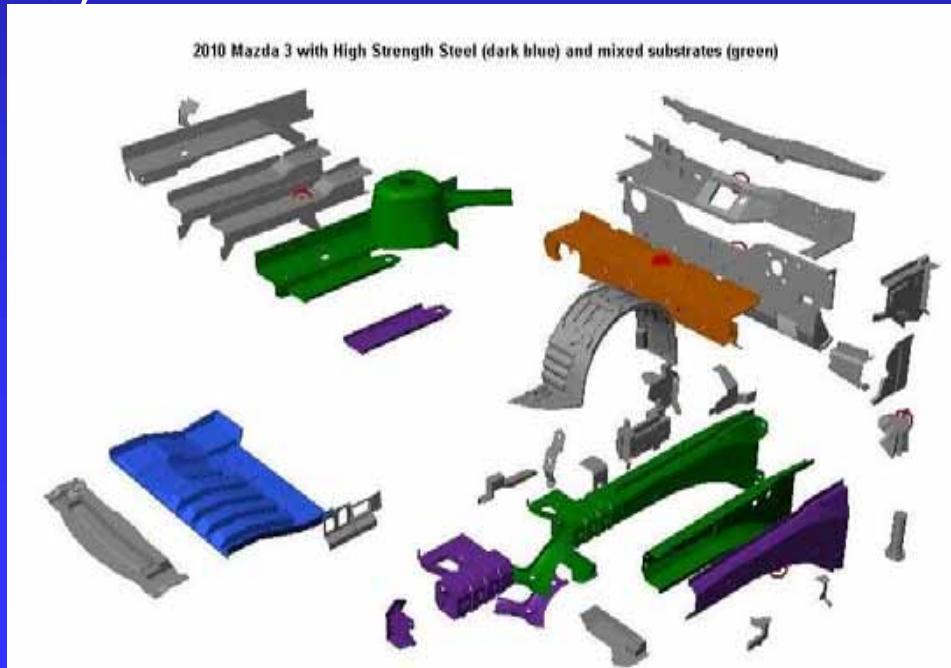
- US & Canada have the lowest fuel efficiency among first world nations
- CAFÉ 2011 standards defined based upon vehicle footprint
- By model year 2025, fuel efficiency will increase to 54.6 mpg for cars and light duty trucks





New Vehicle Design

- Plastic & Plastic Composites
- Weight reduction through design and technology
- Nanotechnology in developing paints, plastics and light metals
- High Strength Steel (HSS)
- Aluminum
- Carbon Fiber
- Kenaf
- Self-healing metals?





New Vehicle Design

Aluminum

- Averages 343 pounds of finished aluminum per vehicle in 2012, up from 327 pounds in 2009
- Expected to double its share of the average light vehicle material mix to 16% by 2025
- Is the dominant material for powertrain, heat exchangers and road wheels and is **rapidly gaining market share for hoods, trunk lids, bumpers, steering knuckles and suspension arms**
- Aluminum is gaining share at the expense of both traditional and high strength steels which are declining as a percent of substrate mix



New Vehicle Design

Aluminum

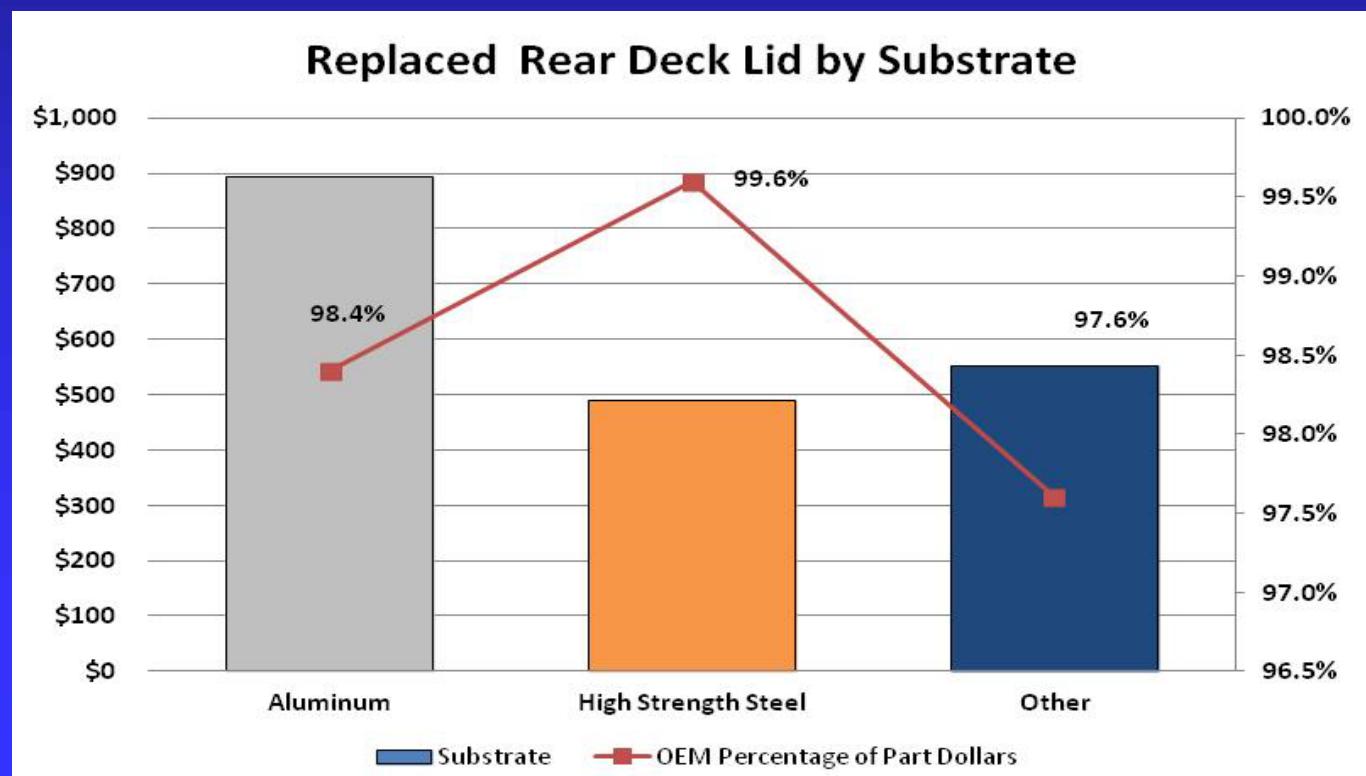
- 31 percent of all hood panels on 2012 model year vehicles will be aluminum; saving 100 million pounds of vehicle weight
- Aluminum growth will be driven primarily by the conversion of steel to aluminum panels, body structures and bumpers
- Common 2011 loss vehicles with aluminum parts
 - Mercedes E350, C300
 - Toyota Prius
 - Ford F-150
 - Jeep Grand Cherokee
 - Ford Mustang
 - Nissan Maxima



New Vehicle Design

Aluminum

- The trend for insurers and repairers to monitor is adaption rate of aluminum parts and the related impact to repair costs



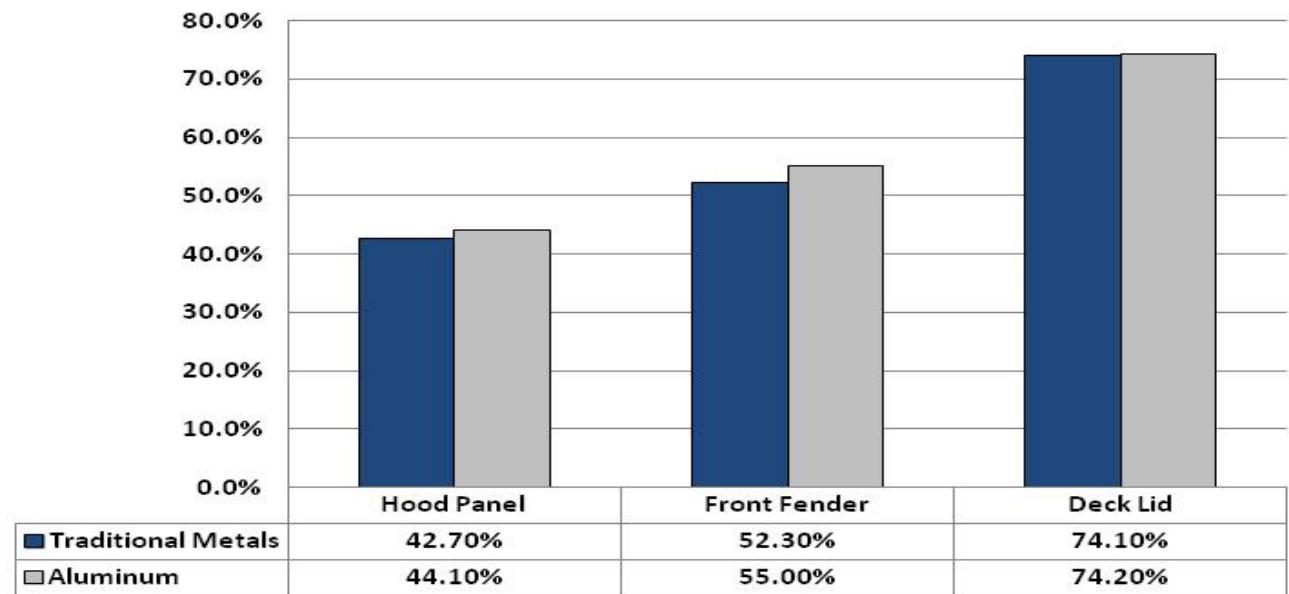


New Vehicle Design

Aluminum

- Aluminum parts reflect equal to, if not improved repair percentages which suggests “memory” of aluminum panels during repair is not an issue

Top Aluminum Panels Repair vs. Replace

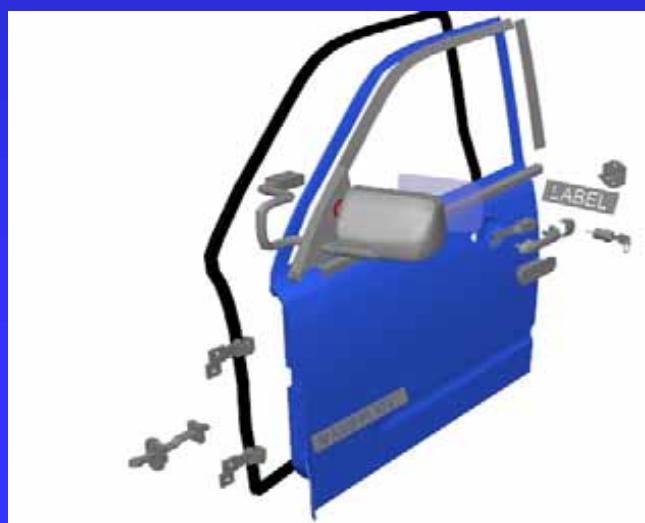




New Vehicle Design

High Strength Steel

- Higher quality and stronger alloys, but typically a thinner gauge
- Damage to outer door panel often involves stretching, requiring heat techniques to repair
- Very limited amounts of heat can be applied to HSS in the repair process

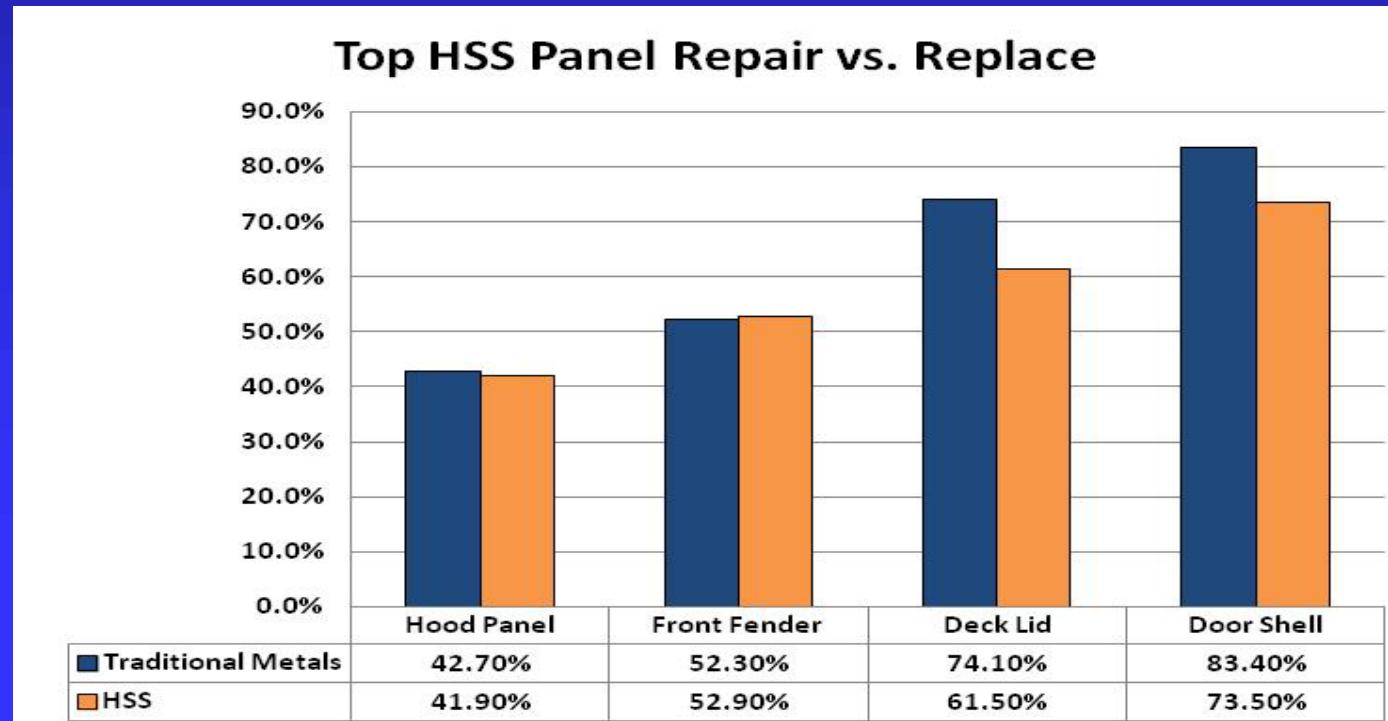




New Vehicle Design

High Strength Steel

- While part price variances are not as significant with HSS, data suggests some significant repair versus replace differences





New Vehicle Design

Carbon Fiber

- Composites are 30 percent lighter than aluminum and 50 percent lighter than steel
- Typically costs 10 times as much as aluminum and 30 times that of steel
- Mass production remains a challenge for manufacturers
- BMW plans by the end of 2013 to roll out electric cars with entire passenger cabins made from a composite known as carbon fiber reinforced plastic (CFRP)
- BMW's i3's body will be 550—770 pounds lighter than comparably sized vehicles



New Vehicle Design

Carbon Fiber

- Repair percentages are near zero for exposed weave carbon fiber and replacement costs high

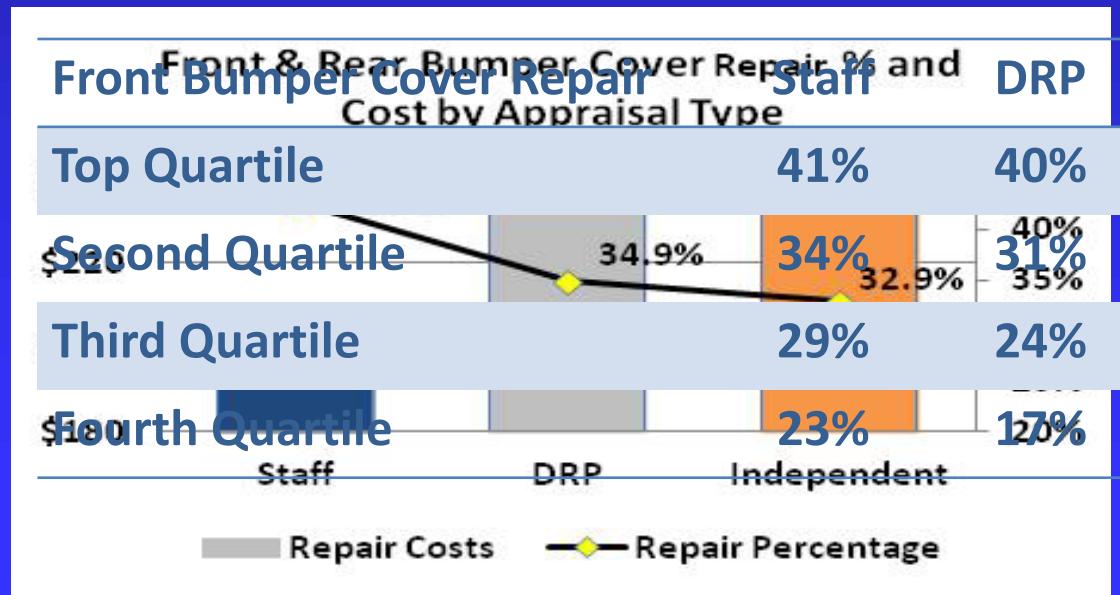
Vehicle	Part	Carbon Fiber	Traditional Metal
2010 Corvette ZR01	Hood	\$5,897	\$1,023
2009 Mercedes CL63AMG	Outer Mirror Housing Cvr	\$3,620	\$238
2010 Audi A6	Deck Lid Moulding	\$740	\$128
2009 Mini Cooper S	Outer Mirror Housing Cvr	\$279	\$41
2009 Audi TT	Lower Front Spoiler	\$542	N/A



New Vehicle Design

Plastic & Plastic Composites

- Thermoplastic olefins (TPOs), polycarbonates, polyesters, polypropylene, polyurethanes, polyamides, or blends of these with, for instance, glass fibers, for strength and structural rigidity





New Vehicle Design

Electronics

- January 2012 report found that “NHTSA did not have the technical expertise to properly monitor safety in electronics that are rapidly taking control of nearly every automotive system.”
 1. Connect OBD plug to vehicle
 2. Connect USB plug to tablet or PC
 3. Turn ignition on
 4. Run diagnostics scan (lasts up to 3 minutes)
 5. Review scan report
 6. Import scan results into case: VIN, mileage, repair proposals, etc.





New Vehicle Design

Electronics

- Awareness for non-visible damages
- Increased information on safety related parts
- More precise damage estimate
- Options & Packages

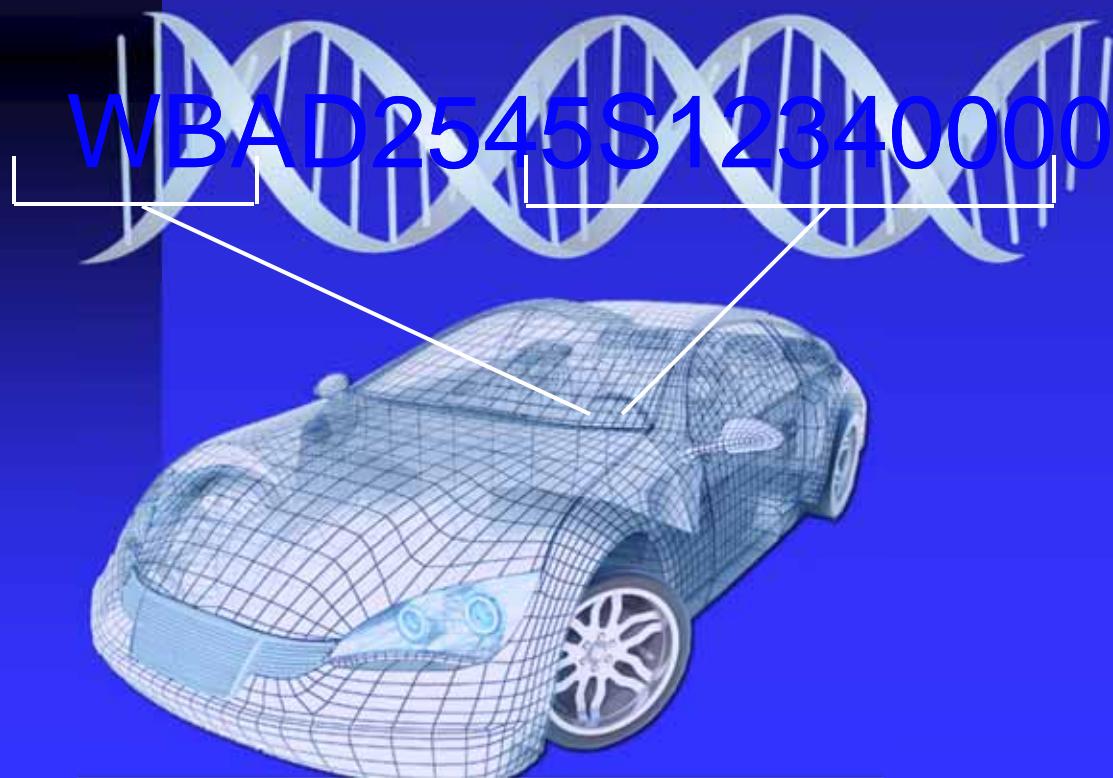
WBAD2545S12340000



New Vehicle Design

AudaVIN = Intelligent Vehicle Identification

Web-based vehicle identification service providing standard equipment, and factory fitted options.



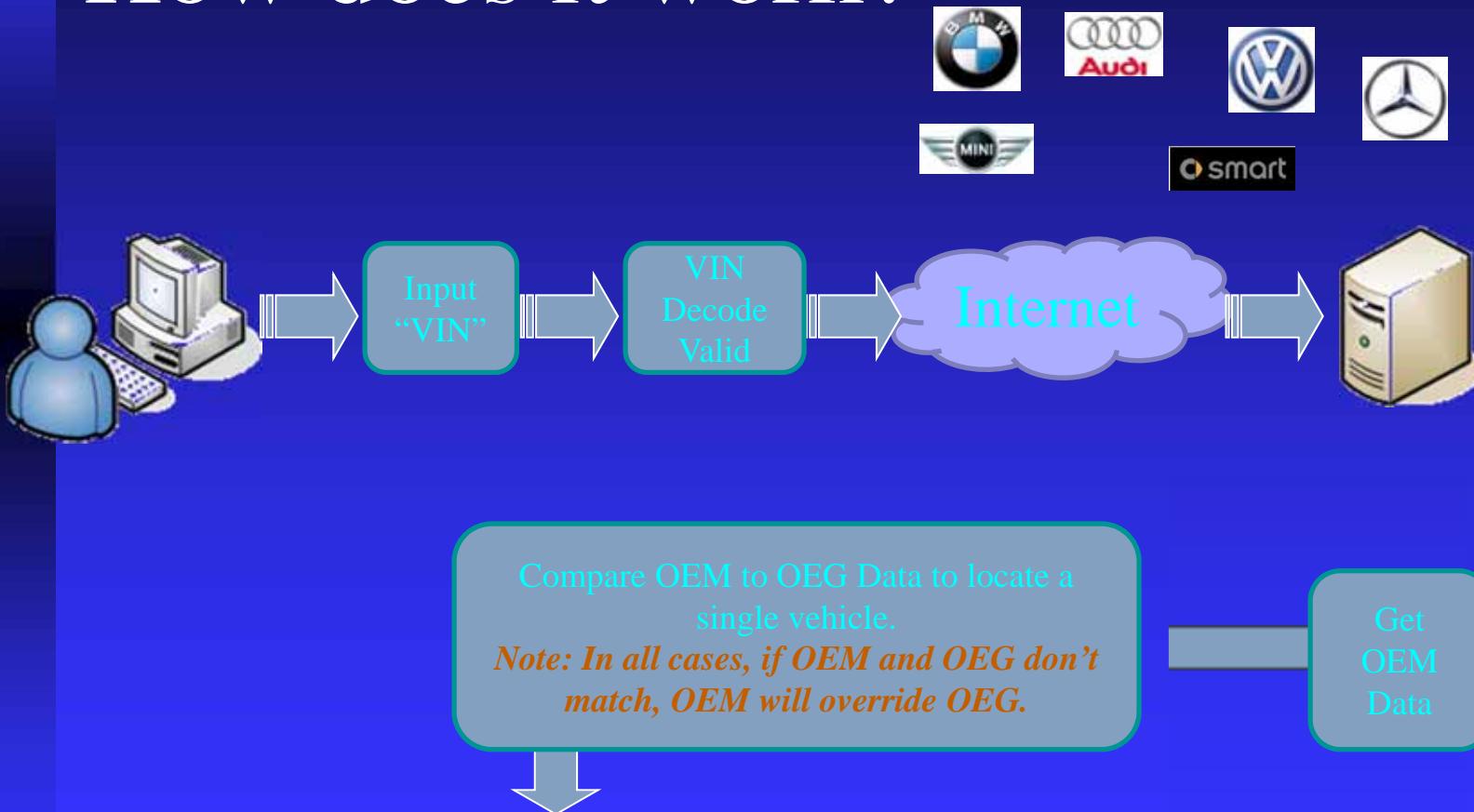
- Improve accuracy
- Faster estimate
- Prevent fraud
- Control expenses





AudaVIN Complete Decode/DNA

How does it work?





New Vehicle Design

Challenges in Estimating & Repair

- Proper part identification
 - ✓ Platform companies embedding substrate into estimating platforms
 - ✓ Vehicle Build Data to ensure estimating accuracy
- Qualified repair
 - ✓ I-CAR training
 - ✓ Reassessing DRP partners to ensure avoidance of cross contamination on aluminum repair
 - ✓ Proper tools to detect UHSS, boron steel analyzer



New Vehicle Design

Challenges in Estimating & Repair

- Substrate Data & Analytics
 - ✓ Leverage vehicle build and claims data to forecast loss costs
 - ✓ Analyze part level data to understand adoption rate & cost implications
 - ✓ Integrated repair calculators by substrate
 - ✓ Vehicle Electronic & Build Data
 - ✓ Next generation of accuracy by OEM's and platform providers



Audatex Color Coded 3D Substrate

Substrate	Color	Rationale
Aluminum	Yellow	Aluminum-based parts are orange to note warning.
Boron	Red	Boron-based parts are a separate color
Carbon Fiber	Green	Carbon fiber is a separate color
Dual Phase Steel	Dark Blue	Steel-based parts are blue
Extra High Strength Steel	Dark Blue	Steel-based parts are blue
Aluminum/Dual Phase Steel	Yellow	Aluminum-based parts are orange to note warning.
Aluminum/High Strength Steel	Yellow	Aluminum-based parts are orange to note warning.
High Strength Steel	Dark Blue	Steel-based parts are blue
Aluminum/Magnesium	Red	Magnesium-based parts are red to note high warning
Sheet Molding Compound	Yellow	Sheet Molding Compound is a separate color
Boron/High Strength Steel	Red	Boron-based parts are a separate color
Laminated Steel	Red	Laminated steel-based parts are red to note high warning
Magnesium	Red	Magnesium-based parts are red to note high warning
Ultra High Strength Steel	Dark Blue	Steel-based parts are blue
Mixed Substrates	Dark Green	Mixed substrate parts are their own color

3D Color Legend

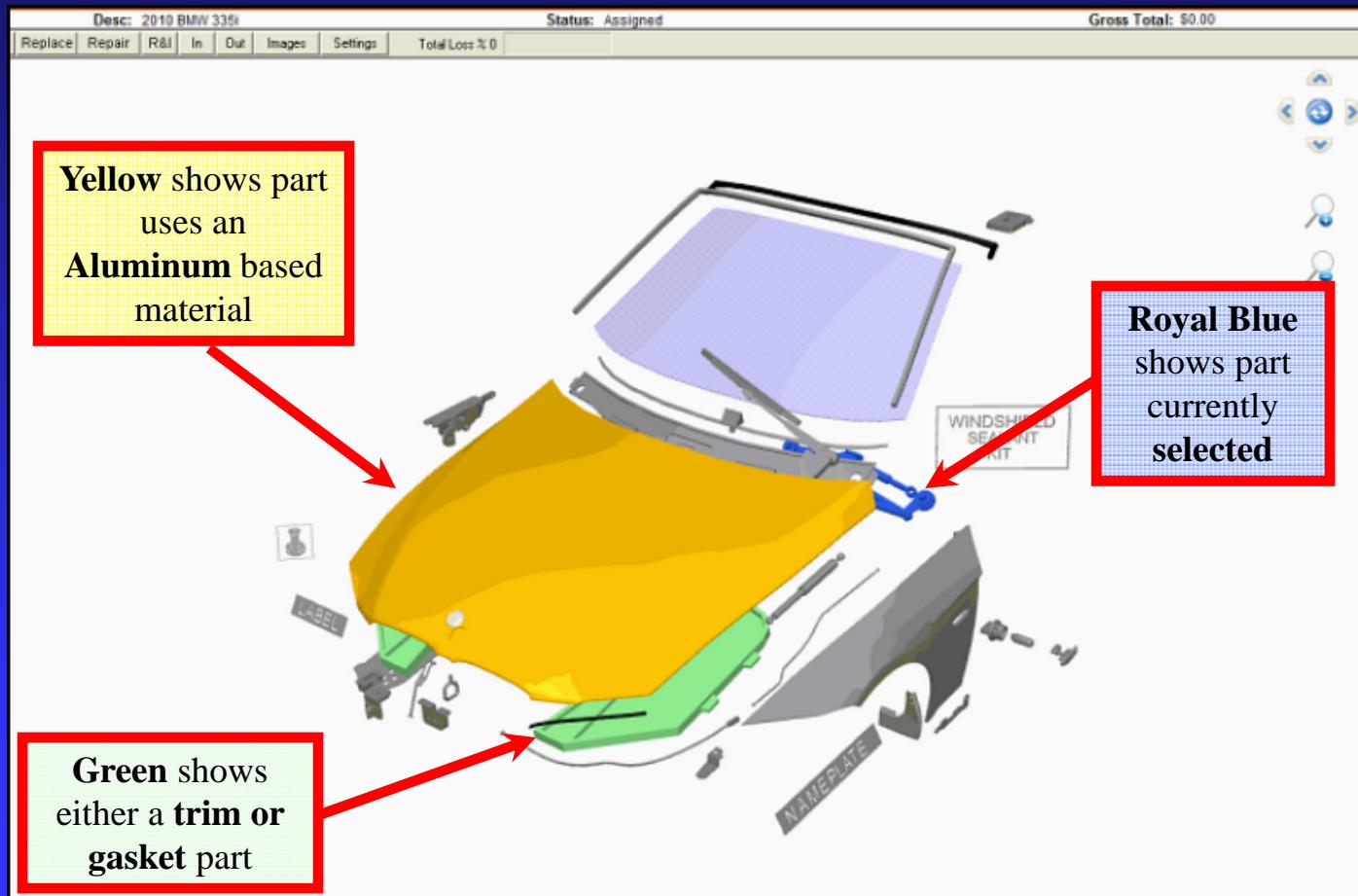
Different colors
in the graphics
denote different
types of
substrates



Audatex Color Coded 3D Substrate

BMW 335 3D graphic

A “Rollover” and text in the part edit box will identify the steel type.

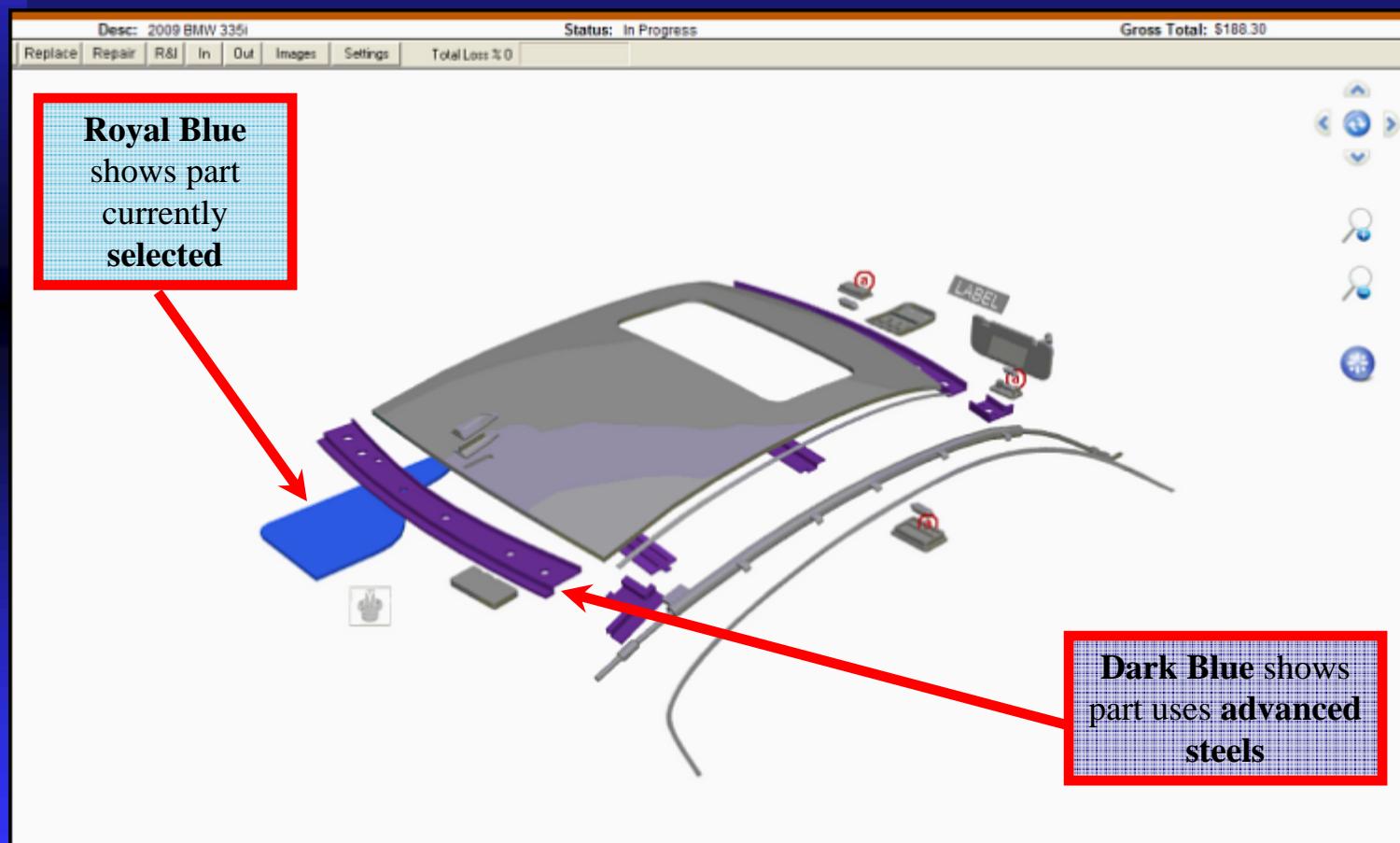




Audatex Color Coded 3D Substrate

BMW 335 3D graphic

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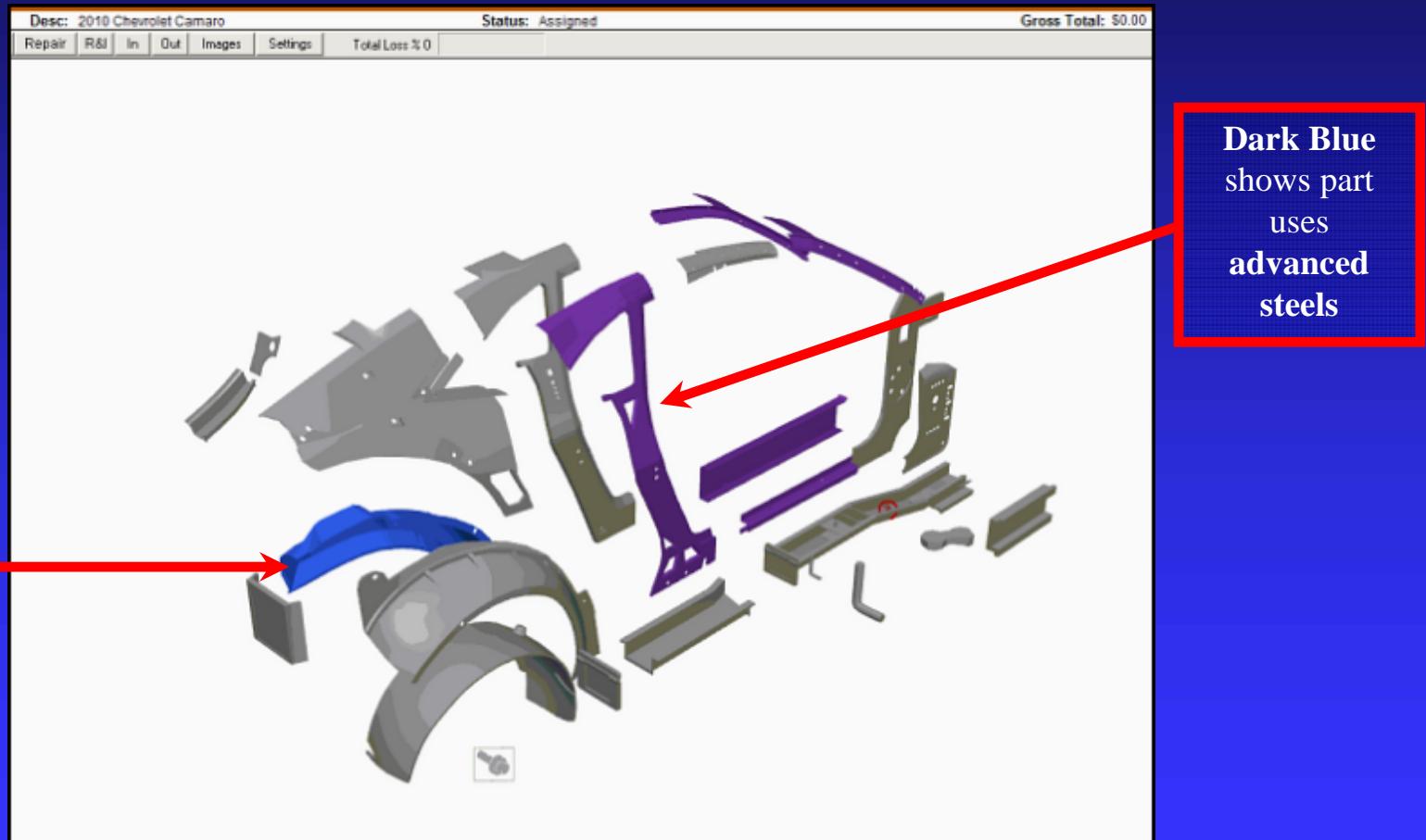




Audatex Color Coded 3D Substrate

BMW 335 3D graphic

A “Rollover” and text in the part edit box will identify the substrate material





Thank you



Trends in vehicle construction materials and vehicle technology

Greg Horn

*Vice President, Industry Relations
Mitchell International*



New CAFÉ standards mean new vehicle directions

- In late 2009 the President announced that new cars and trucks will have to achieve 35.5 miles per gallon by 2016; four years earlier than the previous regulation
- The new goal is 35.5 mpg for the US light vehicle fleet; an average of 39 mpg for cars and 30 mpg for trucks



The current Mercedes E Class

ultra-high-strength, hot-formed steel



Aluminum& fiberglass
reinforced plastic

Bolt on for easy
replacement

- 72 percent of all structural body components in the car contain ultra high strength steels
- Aluminum is used for the hood, front fenders, rear deck lid, package shelf and various load-bearing sections.
- Door shells are HSS and UHSS
- The front end is a hybrid construction made from sheet aluminum and fiberglass-reinforced plastic.

The Volvo S60

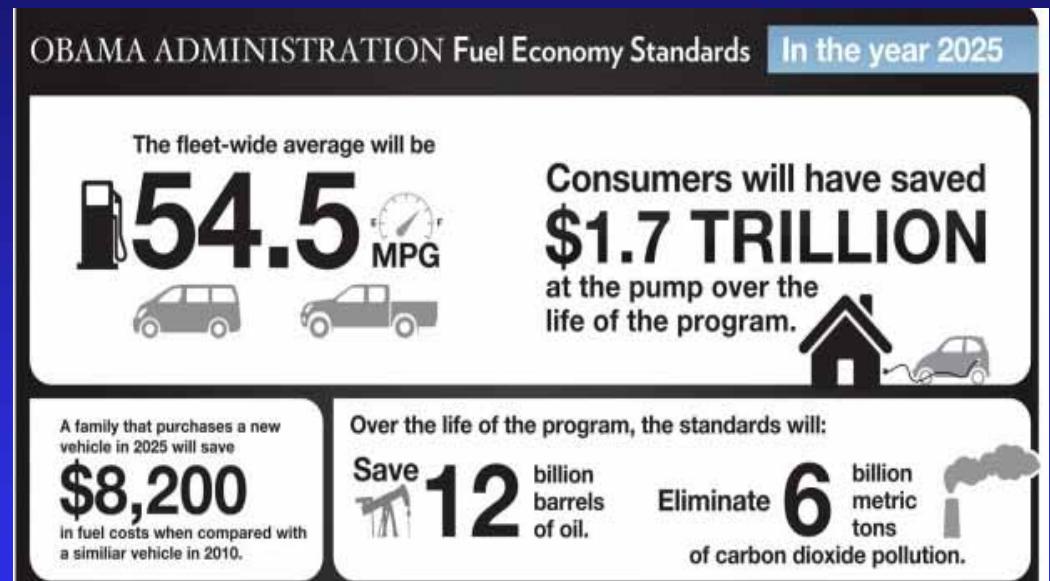


- Grey and silver are standard steel and aluminum, respectively
- Blue is high-strength steel
- Yellow is extra-high-strength steel
- Red is ultra-high-strength steel



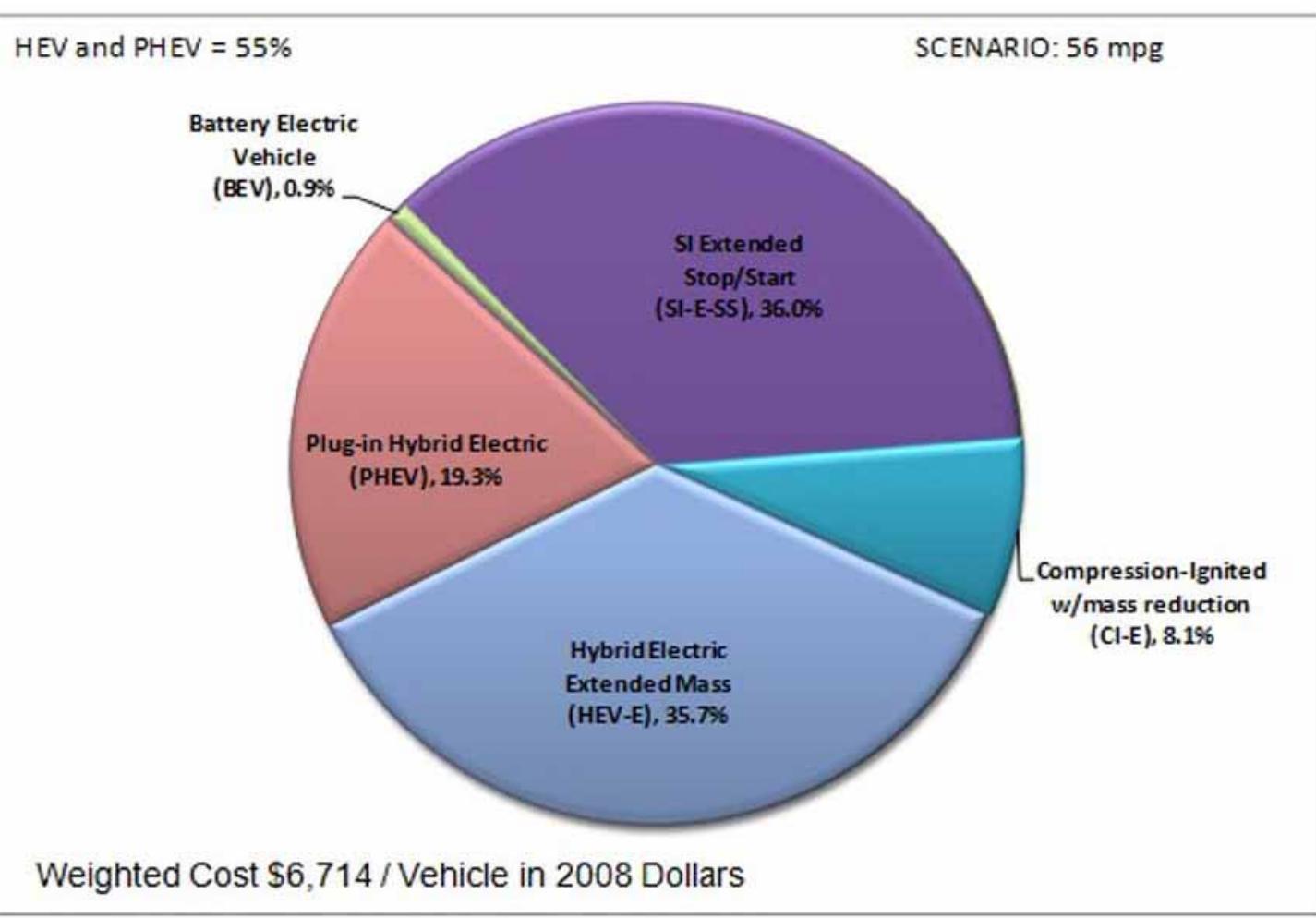
New CAFE standards for 2025 being considered

- The Obama administration is pushing for a fleet wide average of 54.5 miles per gallon for all new cars and trucks sold in the U.S. by 2025





How will we get there?



Source: CAR Estimates



Aluminum structures





Changes in Metallurgy in the production of vehicles



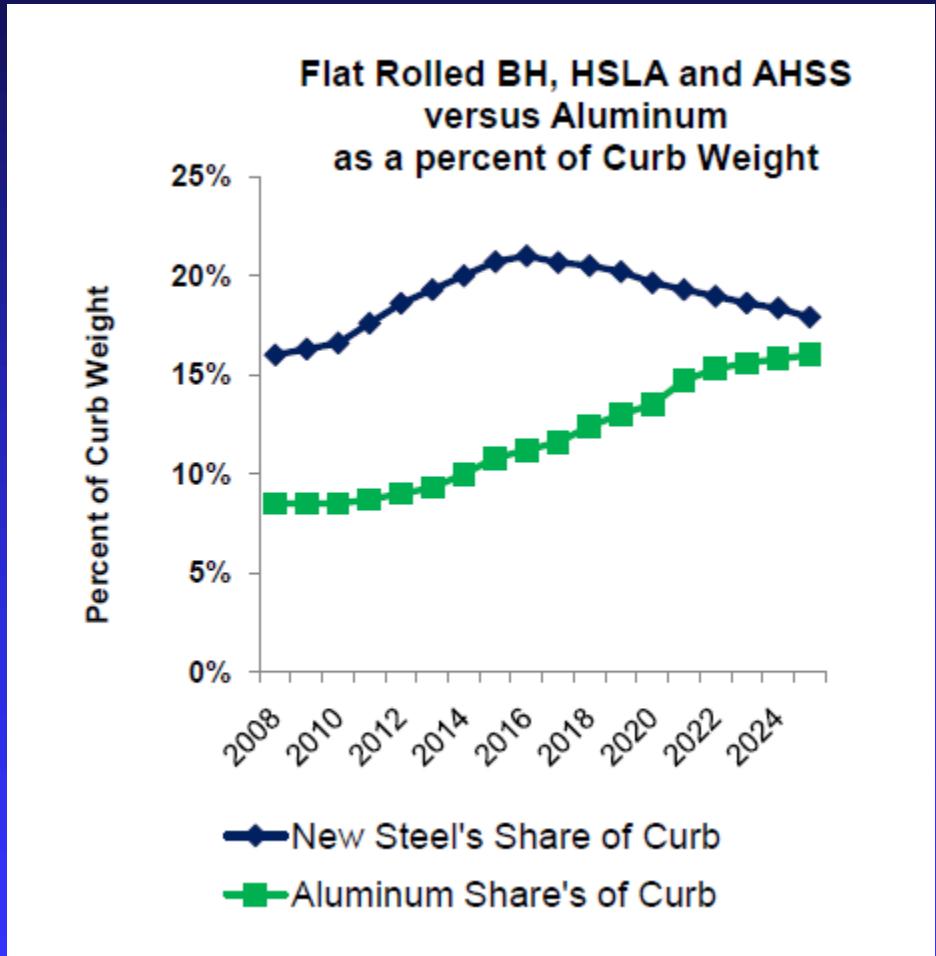
What is the most common all aluminum body vehicle in the US?





Why the focus on aluminum?

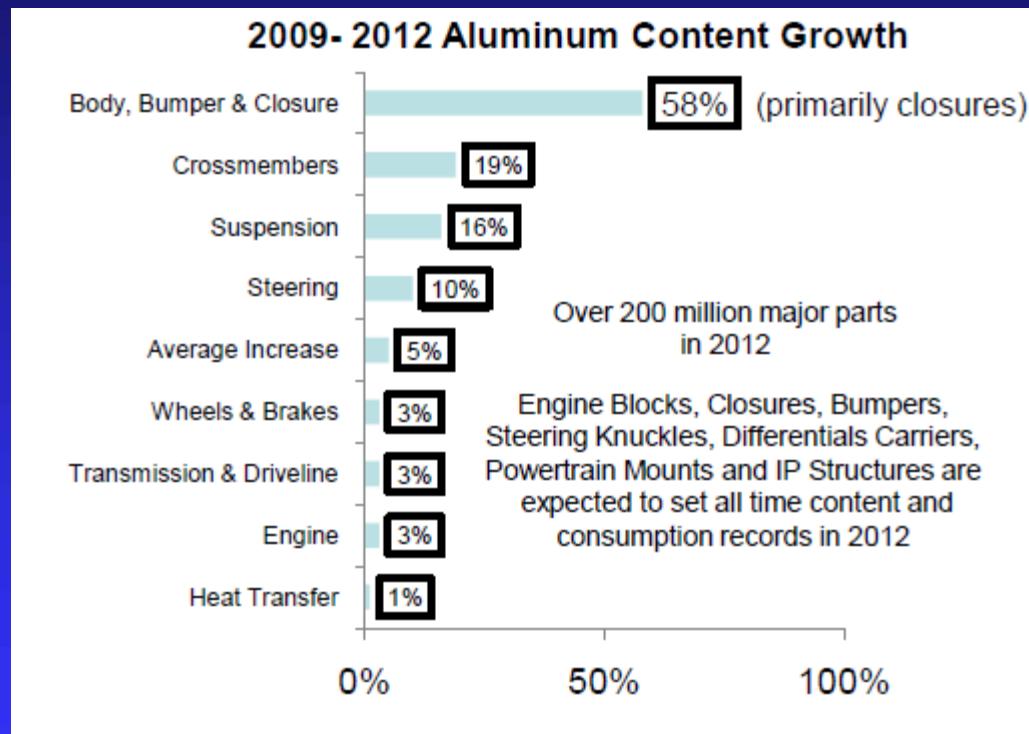
- AHSS will replace HSLA to save weight, but the peak penetration should be between 20-25% of curb weight
- Aluminum has started to replace HSLA and Bake Hardened steels



Source: Ducker Worldwide



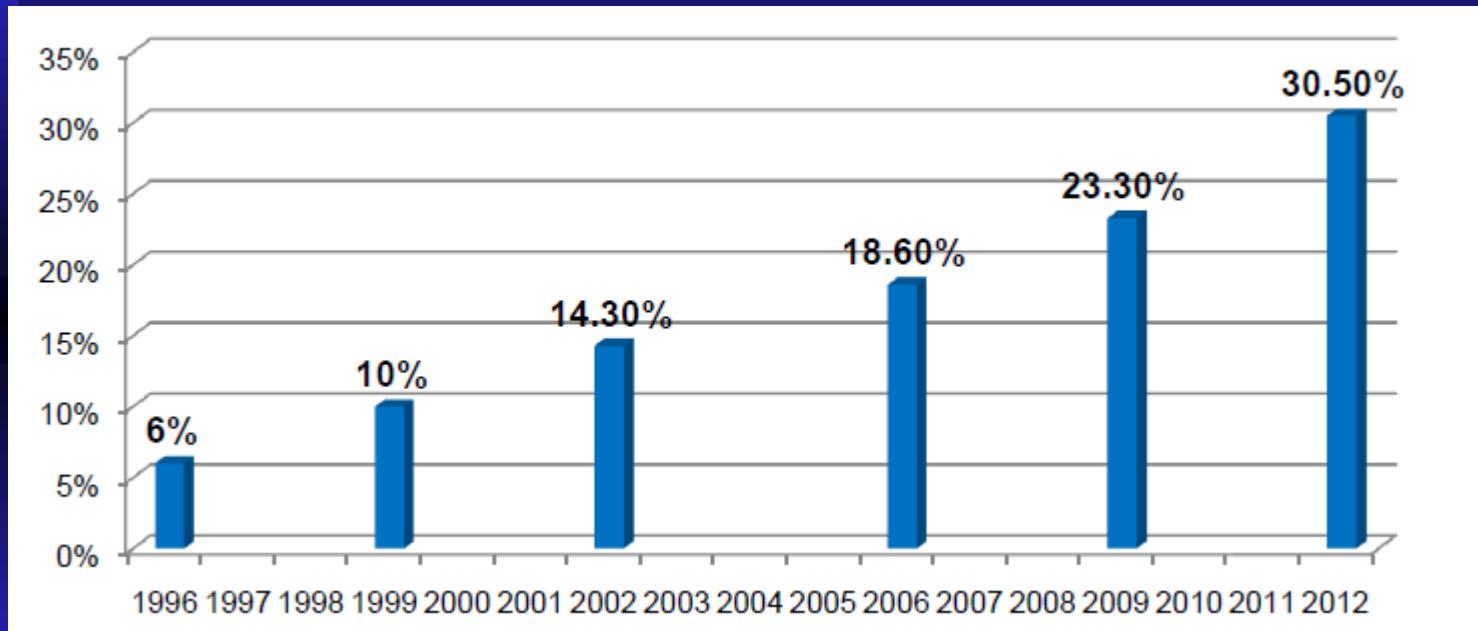
The growth in the use of aluminum



Source: Ducker Worldwide



The trend in the use of aluminum hoods



Currently at 30.5%; the trend predicts that 41% of vehicle hoods will be 41% in 2017 and 53% by 2025 (even without further CAFÉ standard restrictions)

Source: Ducker Worldwide



What do Callaway Golf Clubs and Lamborghini have in common?





Woven Carbon Fiber vs. Forged Carbon



Driving Technology

The photo above shows part of a Callaway club using traditional weave (left) versus one using Forged Composite. In the latter case, **fiber chips** are mashed together like composite hash browns and formed in a mold so accurate that even part numbers can be stamped into the piece.



- standard woven carbon fiber is typically made layer by layer and infused with epoxy or in premade sheets, which are baked to a form in a vacuum oven known as an autoclave.
- Forged composite takes a different route by taking a toothpaste-like mixture of carbon fibers and epoxy and forming parts in a mold with over six tons of pressure.
- The result is cheaper carbon-fiber-reinforced materials that can be made in less time.



Forged Carbon advantages



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Accident Avoidance Technology

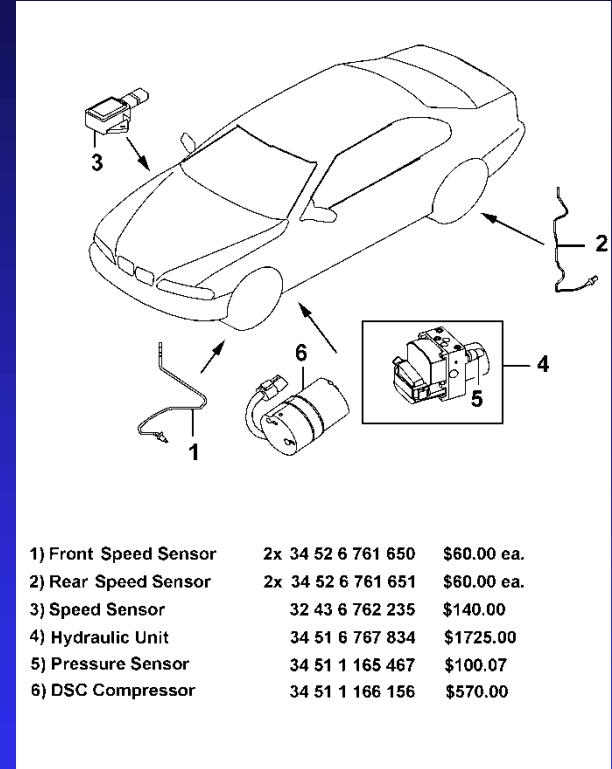
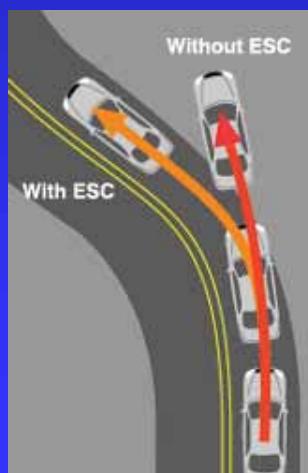


Required for the 2012 model year: ESC

- **ESC – Electronic Stability Control**
- Compares driver's actual course with intended course and compensates for any differences
- Relies on a variety of sensors: wheel speed, steering wheel angle, lateral accelerations
- Applies brakes to individual wheels and controls engine power to correct oversteering and understeering

■ ESC Safety Statistics

- NHTSA study found 35% reduction in single vehicle crashes
- 67% reduction for SUVs
- 15% drop in total accidents involving Mercedes Benz vehicles since 1999, when ESC became standard
- Estimated potential impact of widespread US adoption
 - ◆ 5,000 to 8,500 lives saved
 - ◆ Save \$35 Billion in economic losses



1) Front Speed Sensor	2x 34 52 6 761 650	\$60.00 ea.
2) Rear Speed Sensor	2x 34 52 6 761 651	\$60.00 ea.
3) Speed Sensor	32 43 6 762 235	\$140.00
4) Hydraulic Unit	34 51 6 767 834	\$1725.00
5) Pressure Sensor	34 51 1 165 467	\$100.07
6) DSC Compressor	34 51 1 166 156	\$570.00

Source: ESC Coalition, Mitchell's CEG Guide



BMW ‘Left hand turn assist’

- A combination of three laser scanners are used to scan on coming traffic when the GPS and road signs indicate the driver wishes to make a left hand turn





BMW Side View Camera

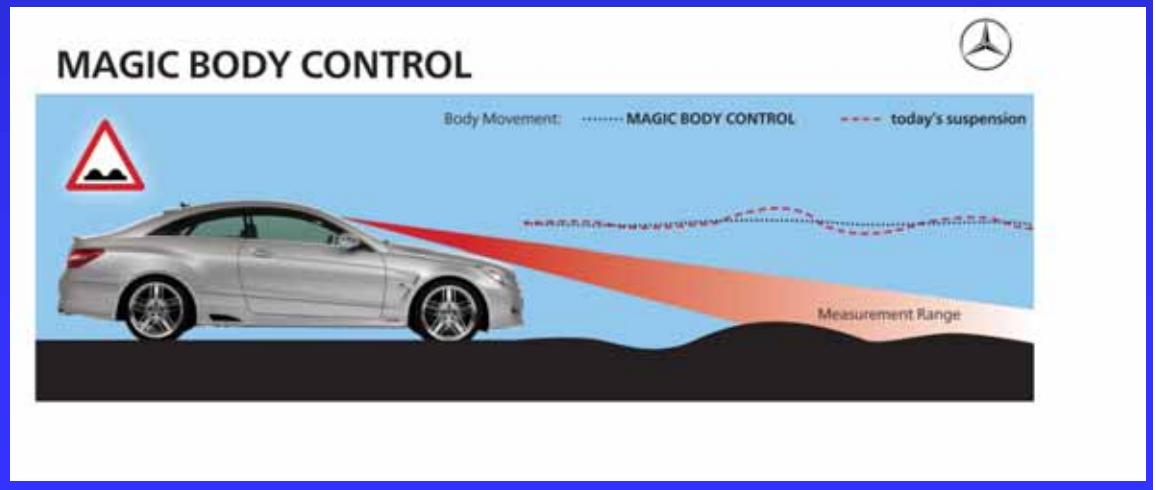
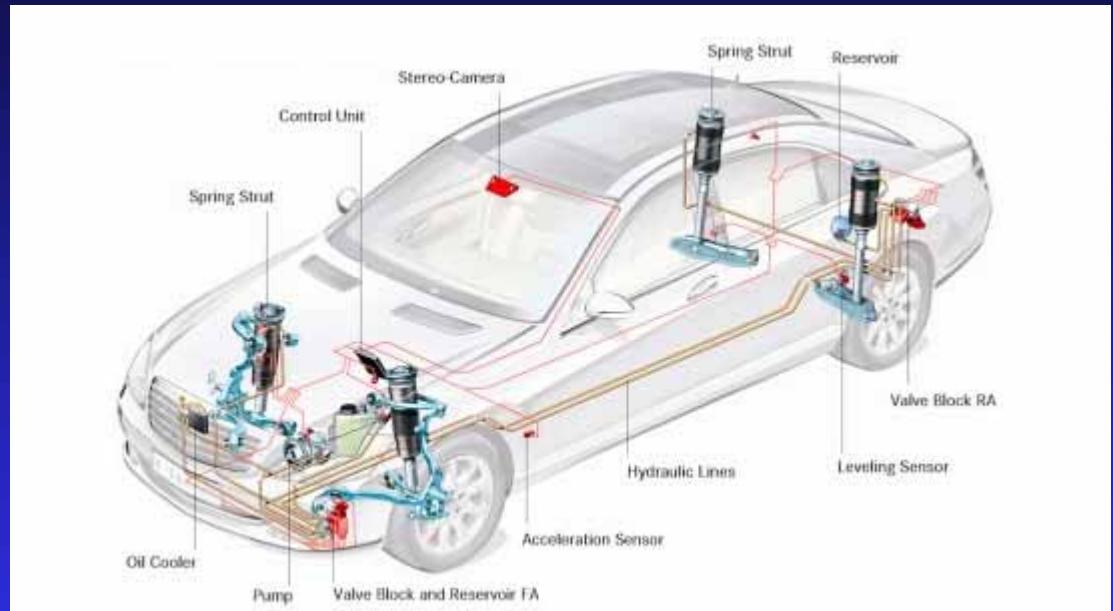
Images courtesy: Thatcham





Mercedes “Magic Body Control”

- Available on the 2013 S class
- A camera situated at the top of the windshield scans the 15 to 45' of road ahead, for bumps and potholes as small as 0.4 to 0.8 inch.
- It feeds that data directly to the system's control unit.
- It pre-emptively adjusts the shock absorbers oil flow to neutralize the imperfection





Volvo V40 Pedestrian Airbag





New automotive technology
which may *increase* accidents or
repair costs



The 2013 Ford Mustang “Track App”





2013 Mustang Track App

Countdown Start **Track Use Only**

Press OK to Start

012345.6 km 6 🔐 ⚡

Both an automatic start and a countdown start, with a drag racing start light, are available.

Acceleration **Track Use Only**

0 - 60 MPH
0 - 100 MPH
0 - 1/8 Mile
0 - 1/4 Mile

012345.6 mi 6 🔐 ⚡

Drivers track their fastest time and choose from 0-30 mph, 0-60 mph, 0-100 mph, the eighth-mile and quarter-mile.

All Time Best Results

0 - 30 MPH	2.8 s
0 - 60 MPH	4.7 s
0 - 100 MPH	11.8 s
60 Ft	1.97 s

012345.6 mi 6 🔐 ⚡

View/Clear Results

Drivers can view their top times, including their all-time best. They can also review their last results and saved results from the acceleration timer and brake performance screen.



Active Sound exhaust system



Eberspächer “Aktiv Sound”



Although Pontiac created a muffler bypass for the GTO back in 1970;

German company Eberspächer has created an adjustable exhaust sound system.

Using a steering wheel mounted volume control, you can adjust the exhaust system sound



The Rolls Royce Starlight Headliner



- For around \$12,000, you get 1,600 tiny fiber-optic lights embedded in the fabric above your head
- Doing the math it's \$7.50 per bulb; this sounds much more reasonable.

Images courtesy: MSN

The screenshot shows the Mitchell RepairCenter software interface. The top navigation bar includes the logo, 'Mitchell RepairCenter', and tabs for History, Jobs, Tasks, Labor, Accounting, Analytics, Reports, How To, and Help. Below the navigation bar is a toolbar with icons for Overview, Admin & Vehicle, Repair Lines, Parts, Sublet, Services, Labor, Attachments, Notes, Amount Due, Job Cost, Web Status, and TechAdvisor. The main content area displays a repair job for 'Fleming' on a '2010 Porsche Panamer...' with 'RO: 10006'. A sidebar on the left shows a 'Repair Standards / Panel Identification' section with a 'TOPIC SELECTION' dropdown, a 'TABLE OF CONTENTS' section listing 'Body Material Identification', 'Ultra-High-Strength Steel', 'High-Strength Steel', and 'Straightening Body Parts', and a technical drawing of a car frame with labels A through U. The central content area features a 'Body Material Identification' section with a sub-section for 'Ultra-High-Strength Steel'. It includes a note about the handling of these materials, a list of prohibited actions, and a 'List of materials' table. A callout box labeled 'View Graphic' points to a detailed 3D cutaway diagram of a car's body structure, color-coded by material type (A-F). The bottom of the screen shows a blue footer bar.

Mechanical

New Vehicle ★ 2006 Chevrolet... X ★ 2010 Honda... X ★ 2010 Toyota... X ★ 2010 Toyota... X ★ 2010 Honda... X Part Search Demo Thatcham Demo

2010 Honda Civic

All Topics

Powertrain Diagnostics & Repair

- Vehicle Dimensions
- Restraint Systems
- Repair Standards
- Wiring Diagrams
- Brakes, Steering & Suspension
- Driveline/Axles
- Electrical Systems & Components
- OEM Bulletins
- I-CAR Advantage
- General & Reference Information
- Online Parts and Labor (CEO)
- Assemblies Guide (ATG)
- Common Specs & Procedures

Engine

Exhaust

SPECIFICATIONS (EXCEPT GX & HYBRID)

Auxiliary Emission Control Systems
Cooling Fan
Cooling System (Mechanical)
Engine Control Systems
Exhaust
Fuel System
Ignition Sys
Lubrication
Mechanica
Starter

Component Location Index

- DTC Troubleshooting
- APP Sensor Signal Inspection
- Accelerator Pedal Module Removal/Installation

SPECIFICATIONS (EXCEPT GX & HYBRID)

SPECIFICATIONS (HYBRID)

Article Sections

«

SPECIFICATIONS (EXCEPT GX &

Standards and Service I

Engine Electrical System (R1)

STANDARDS AND SERVICE LIMITS

Standards and Service Limits

- Engine Electrical System (R18A1 engine)
- Engine Electrical System (K20Z3 engine)
- Engine Assembly (R18A1 engine)
- Engine Assembly (K20Z3 engine)
- Cylinder Head (R18A1 engine)
- Cylinder Head (K20Z3 engine)
- Engine Block (R18A1 engine)

Component Location Index

Fig. 1: Identifying Electronic Throttle Control System Replacement Components

ELECTRONIC THROTTLE CONTROL SYSTEM (ETCS) CONTROL RELAY

POWERTRAIN CONTROL MODULE (PCM)

THROTTLE ACTUATOR and THROTTLE POSITION (TP) SENSOR

ACCELERATOR PEDAL MODULE

ACCELERATOR PEDAL POSITION (APP) SENSOR

mitchell



PORSCHE CAYENNE ROCKER PANEL SECTIONING CHANGE

Porsche has revised a sectioning procedure on the Cayenne SUV. For those who have the occasion to work on these vehicles, the change is worthy of note. Up until earlier this month, there was only one procedure to replace the Cayenne outer rocker panel, regardless of the extent of the damage. That procedure involved replacing the entire outer rocker panel (see Figure 1). Damage that was confined to the dogleg area of the C-pillar became a major operation that extended into the A- and B-pillars.



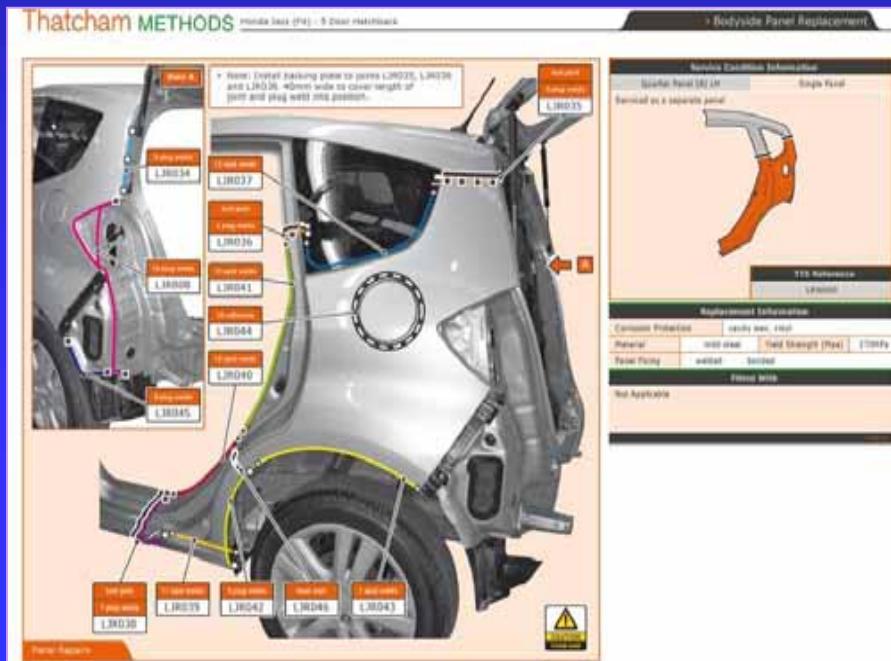
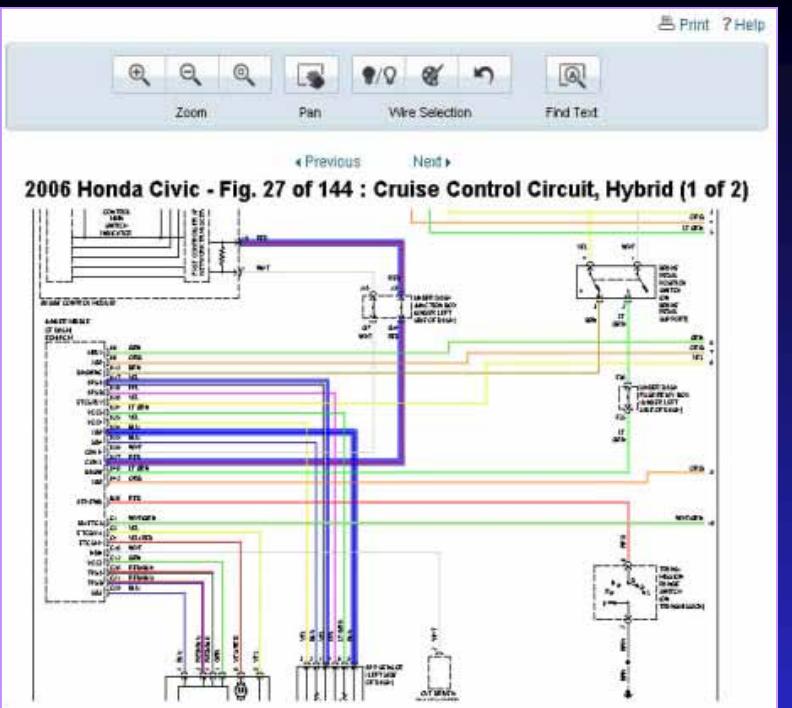
Figure 1 - Before earlier in March, the only procedure in the service information for replacing the outer rocker panel was the entire outer rocker panel.

The new procedure adds two possible sectioning locations in the outer rocker panel, at either of the two shaded areas shown in Figure 2. This allows replacement of only small portions of the outer rocker panel. What does not change, is that no matter how much of the outer rocker panel is replaced, the replacement portion must be cut out of the front outer aperture shown in Figure 3. In addition to the complete outer rocker panel, the front aperture service part includes the entire outer A-pillar, B-pillar, and the front portion of the roof rail. The outer quarter panel, which makes up the rest of the side aperture, is also available as a service part.



Figure 2 - The outer rocker panel may be sectioned in either of these two shaded areas.

The inner panels and reinforcements are available as separate parts (see Figure 4). This includes an ultra-high-strength steel (UHSS) tubular rocker





Education/Training Committee Oklahoma City, OK

Thank you...

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Rick Tuuri

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