

GREAT DESIGNS IN STEEL

2021 ACURA TLX

Jeremy Lucas

Honda Body Design Project Leader

Honda North American Functions

HONDA

Development



Sales



Manufacturing



HDMA Focus

Sales



Development

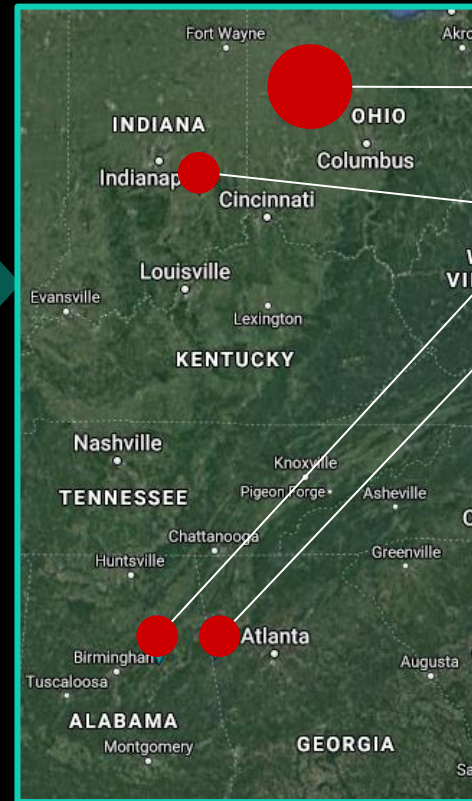


Manufacturing



Honda Development & Manufacturing of America

HONDA



- **North American Auto Development Center**
- Manufacturing Management Center
- Marysville Auto Plant
- Performance Manufacturing Center
- East Liberty Auto Plant
- Anna Engine Plant
- Transmission Plant (located in Ohio)
- Indiana Auto Plant
- Alabama Auto Plant
- Transmission Plant (located in Georgia)

North American Auto Development Center Campus

HONDA



- **Location:** Raymond, Ohio
- **Size of Building:** +1.6 million sq. ft.
- **Number of Associates:** 1,600+
- **Began operations in current building:** 1993
- **Started operations in Ohio:** 1984

The All-New Acura TLX

TLX

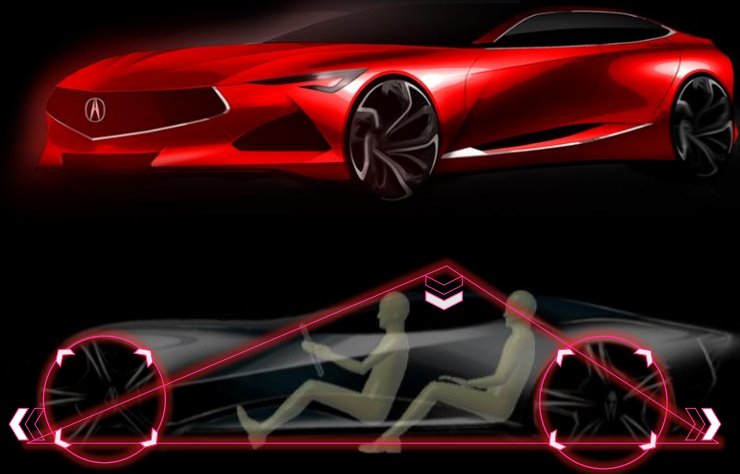


Grand Concept

TLX

DESIGN

NEAR-EXOTIC STANCE AND
PROPORTION



ALLURING MODERN EDGE



EXPRESSION OF ACURA IDENTITY THROUGH DRASTIC CONTRAST

IMMEDIATE
WOW

EXPERIENCE

ADVANCED SPORT COCKPIT



ALLURING SHAPE



GENUINE MATERIAL

INTRIGUING FUNCTION

IMMEDIATE
PLEASURE

PERFORMANCE

EMOTIONAL DYNAMICS AND
TYPE S

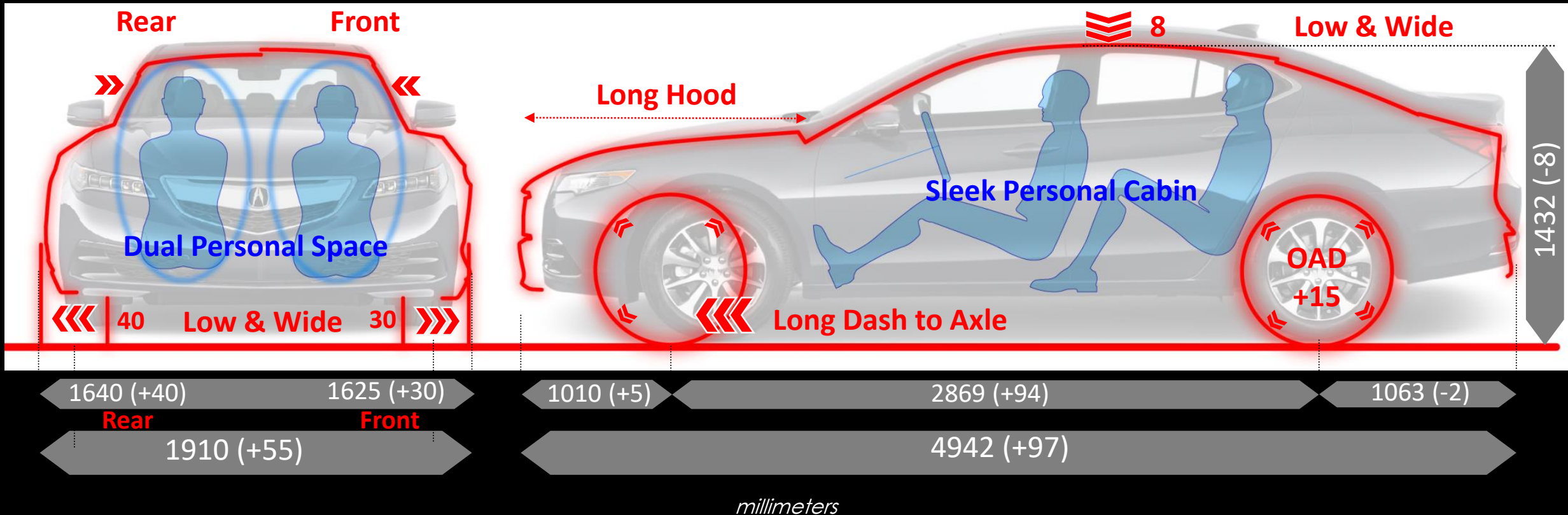


IMMEDIATE
EXCITEMENT

Emotional STANCE

TLX

- Low & Wide
- Large, Powerful Shoulders
- Large Wheels / Tires
- Performance Inspired Long Dash to Axle
- Sleek Personal Cabin



Exclusive Sport Sedan Platform

TLX

Improved Weight Distribution


Ultra-Stiff Body Rigidity

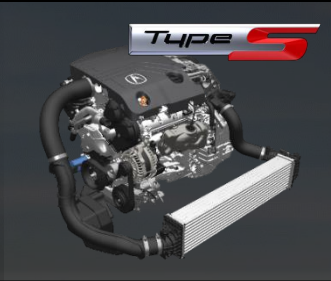
4th-Generation Super Handling All-Wheel Drive

NSX-Derived Electro-Servo Brake

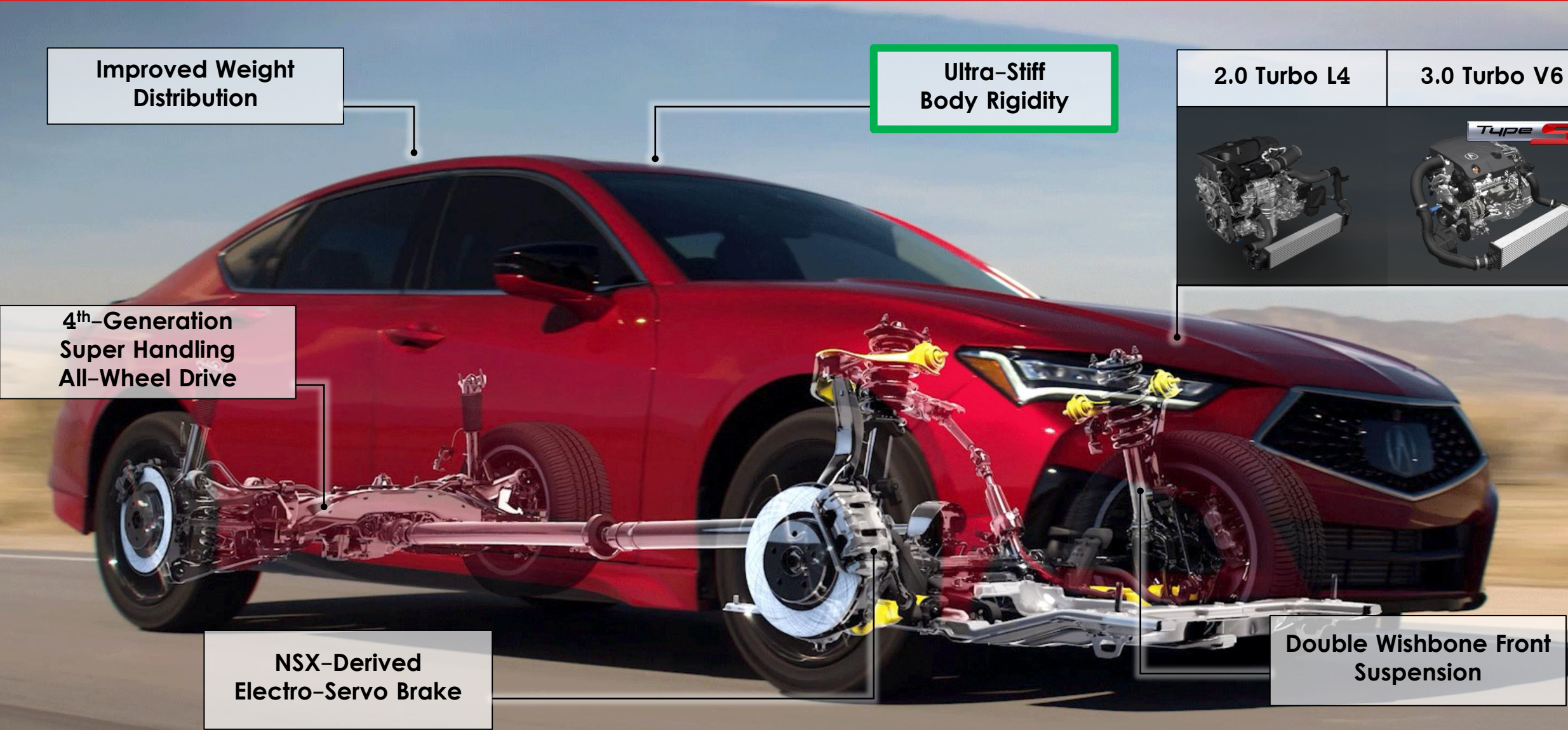
2.0 Turbo L4

3.0 Turbo V6

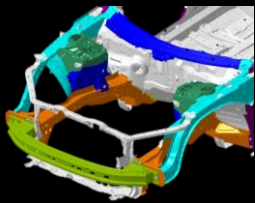
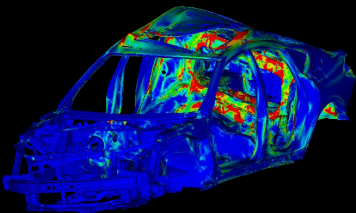




Double Wishbone Front Suspension



Platform Packaging Items



	Electro-Servo Brake	Double Wishbone Front Suspension	AWD System Mounts	Rigidity	ACE™ Body Structure
2.0T FWD	○	○		○	○
2.0T SH-AWD	○	○	○	○+	○
3.0T SH-AWD Type S	○	○	○	○++	○



Acura Precision Concept

TLX



Exterior Challenges

TLX



- Side Panel Manufacturability
- Aluminum Hood Sharp Radius
- Laser Braze Roof

Exterior Challenges

TLX

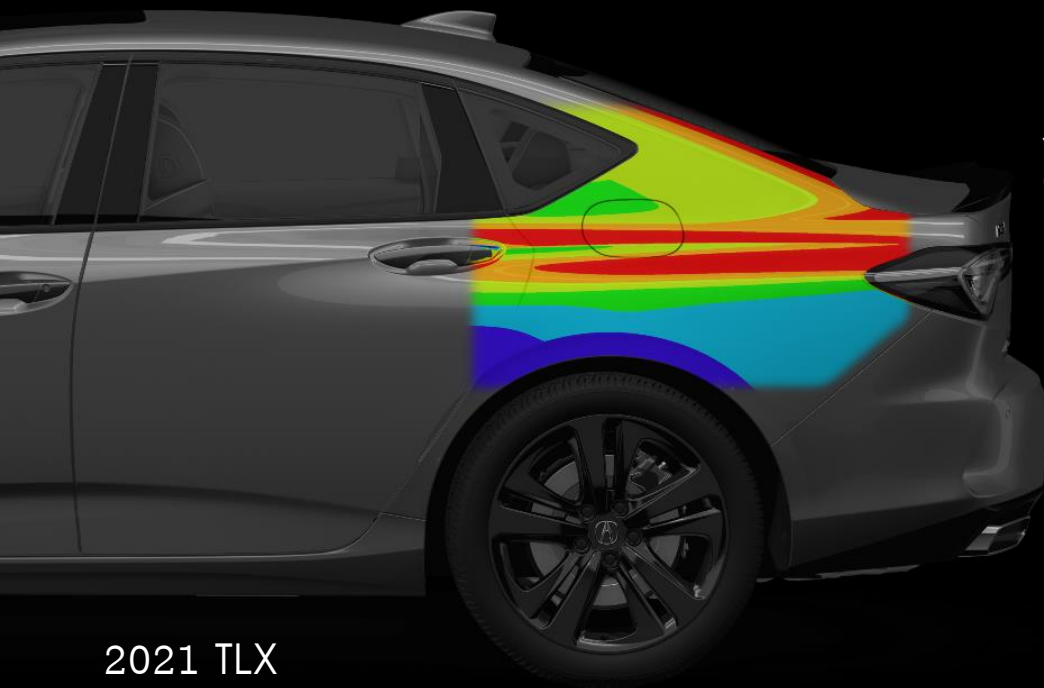


- Side Panel Manufacturability
- Aluminum Hood Sharp Radius
- Laser Braze Roof

Styling Impact on Design

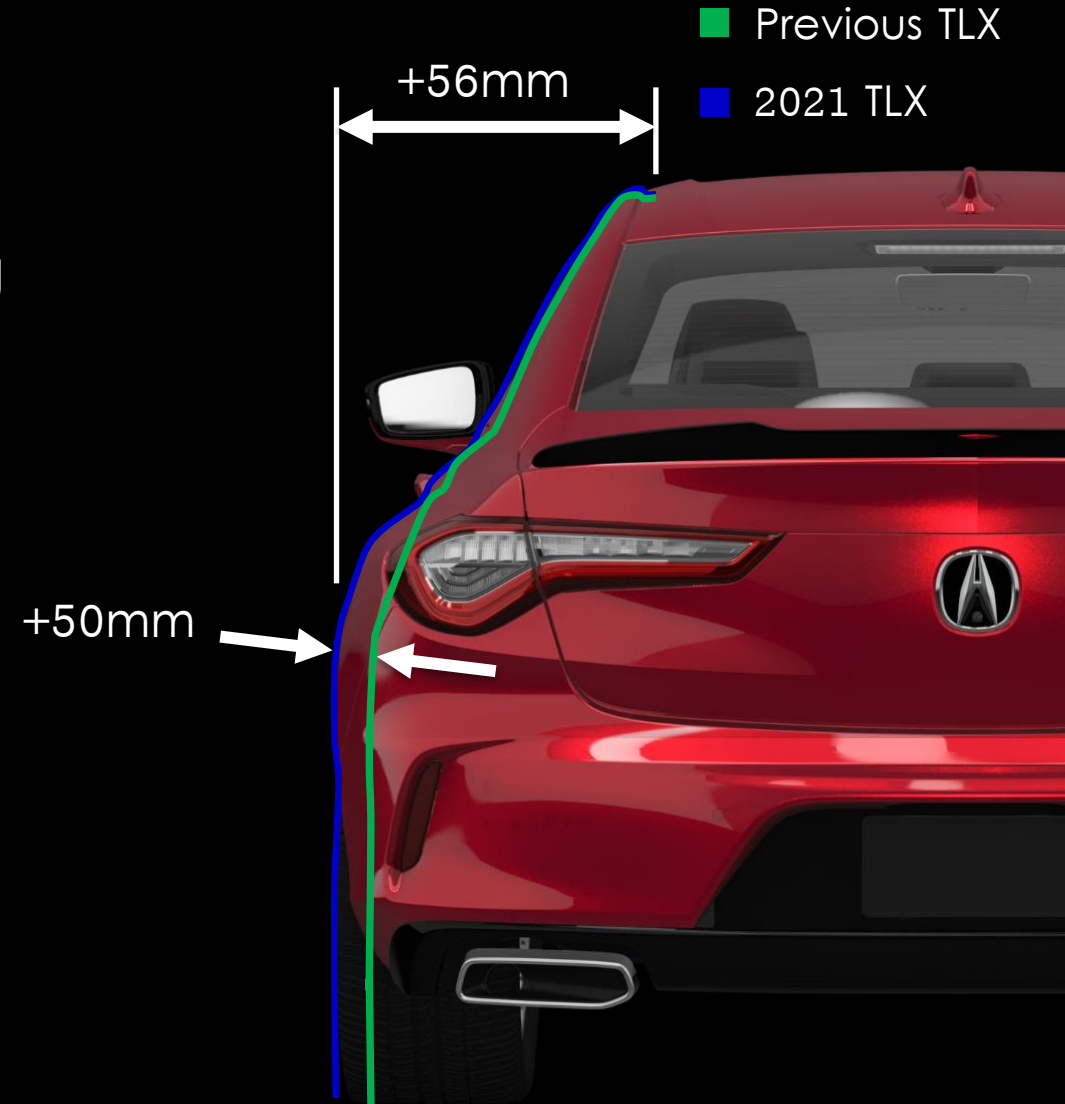
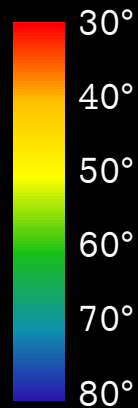
TLX

- Overall body width increased
- Depth and hip increased
- Rear fender angle is 30.3° from horizontal
- With only 4 stages in the SPO die, the styling created challenging fuel fid forming



2021 TLX

Styling Angle
(From Horizontal)

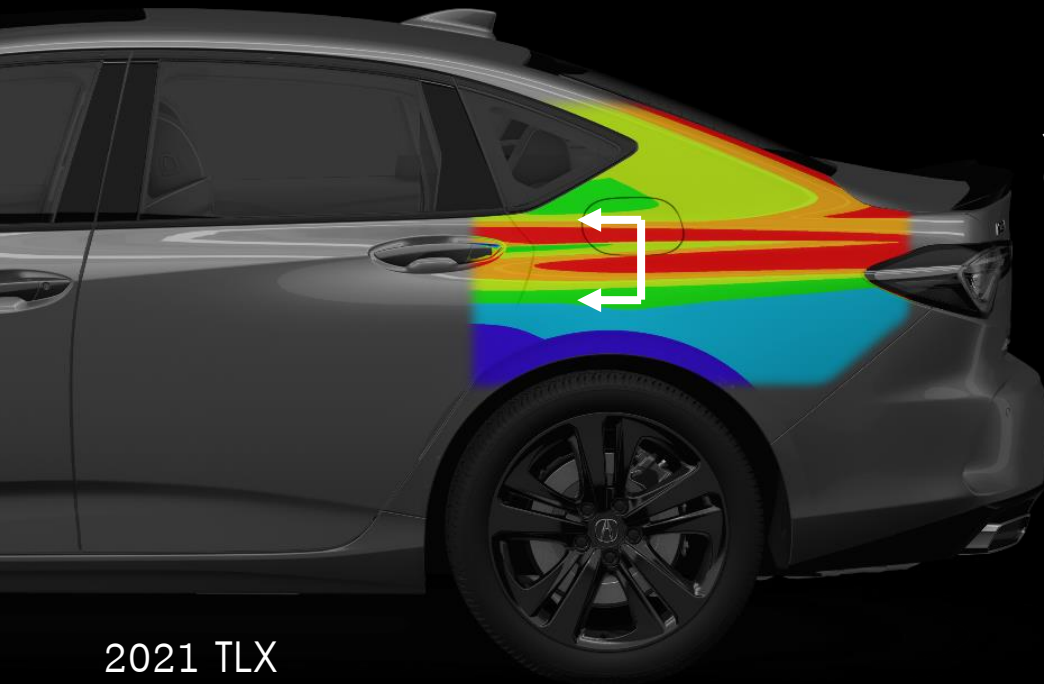


Styling Impact on Fuel Lid

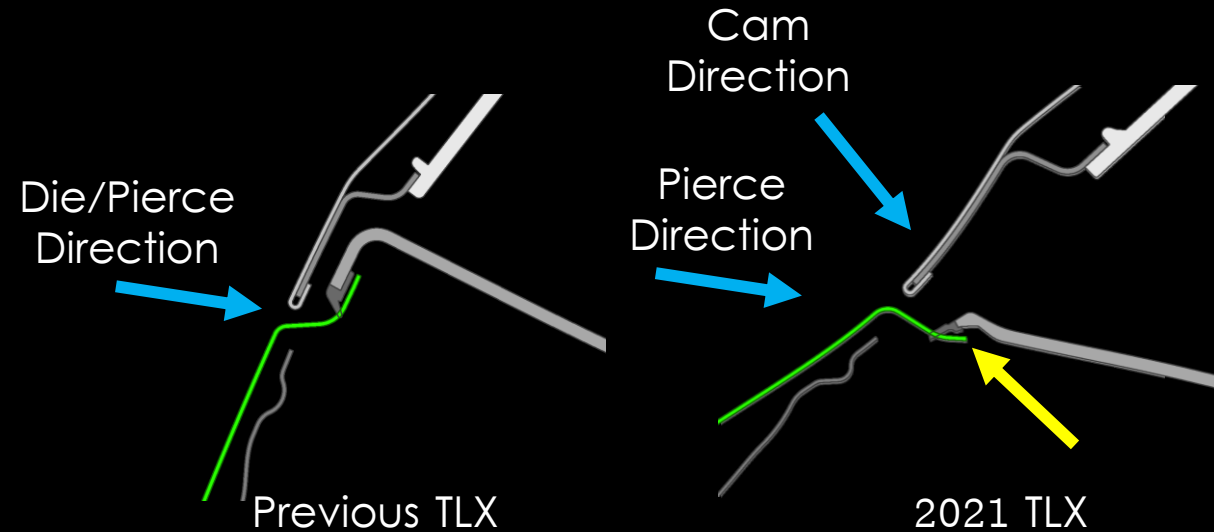
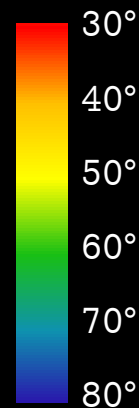
TLX

- Styling Angle caused fuel lid clearance issues during stroke
- Required pull cam / drop cam on a move unit
- Part of rough trim became final trim to allow for water drainage

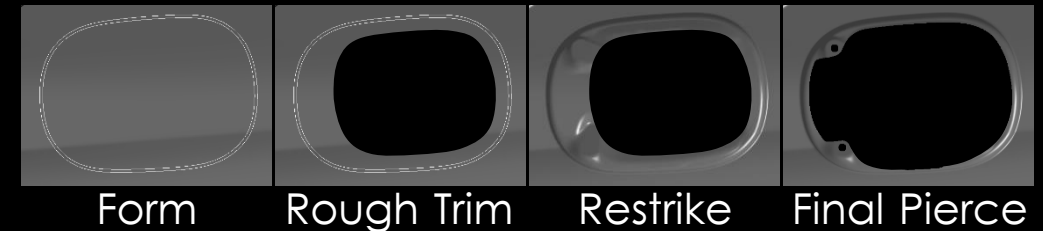
HONDA MOTOR FIRST



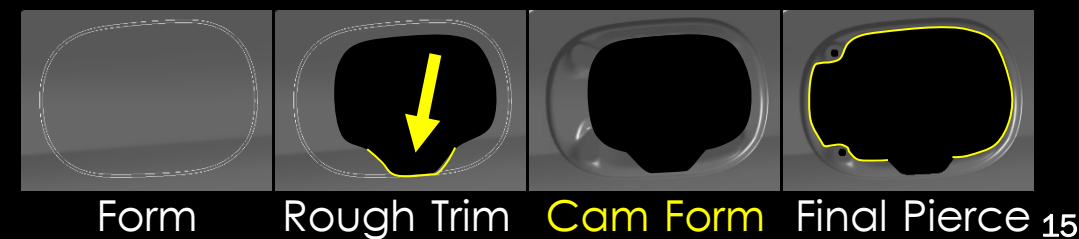
Styling Angle
(From Horizontal)



Typical Acura Manufacturing Process



2021 Acura Manufacturing Process



Laser Braze Roof

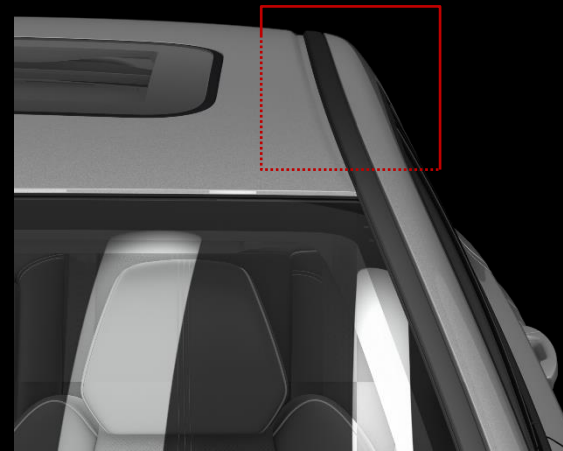
TLX

ACURA FIRST

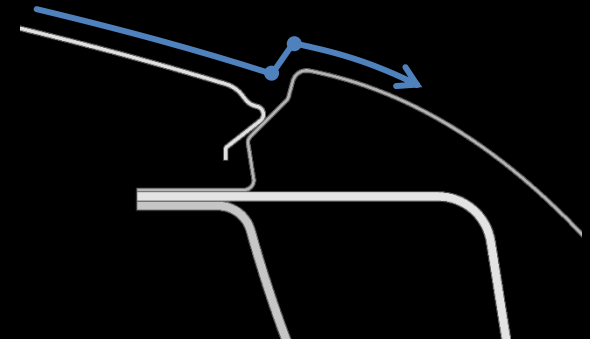
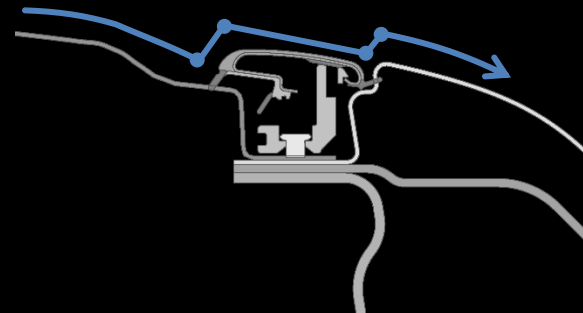


- + Appearance
- + Manufacturing Efficiency
- + Quality
- + Durability

Previous TLX
Molding

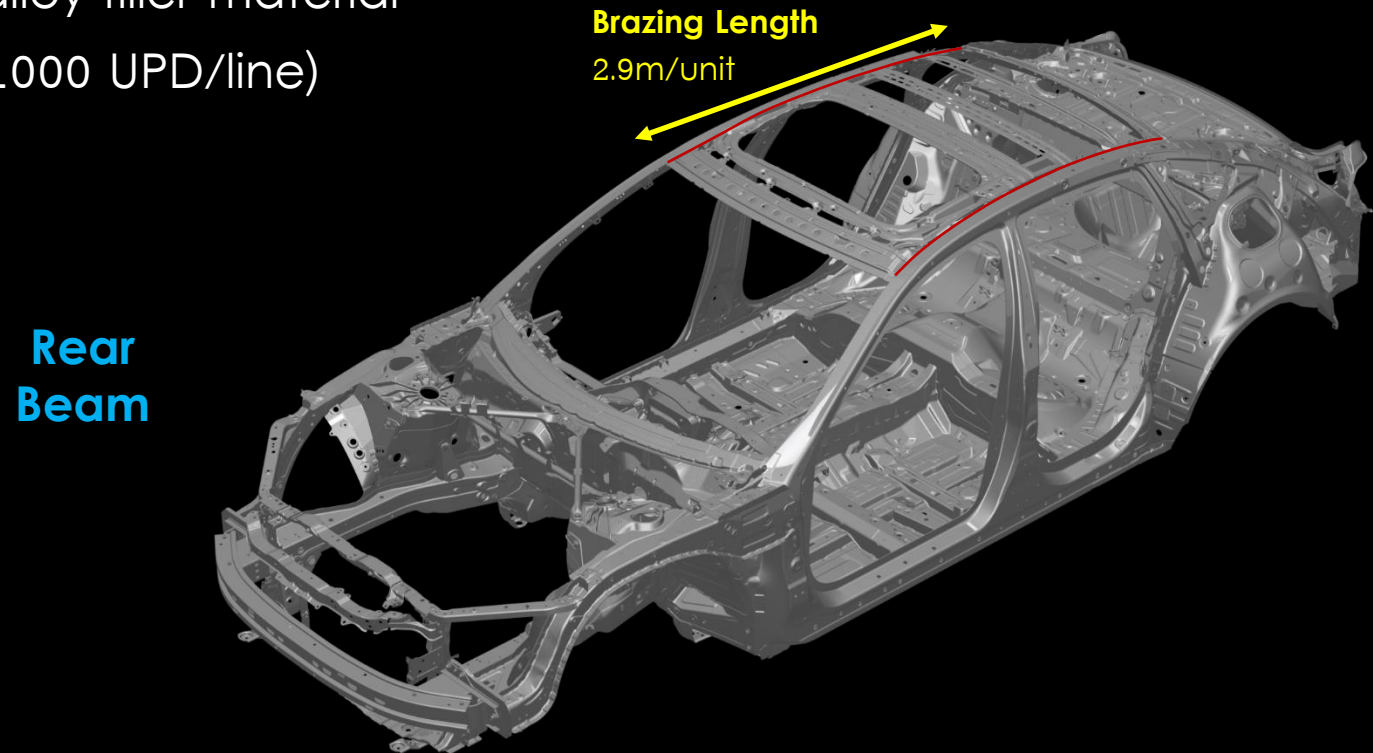
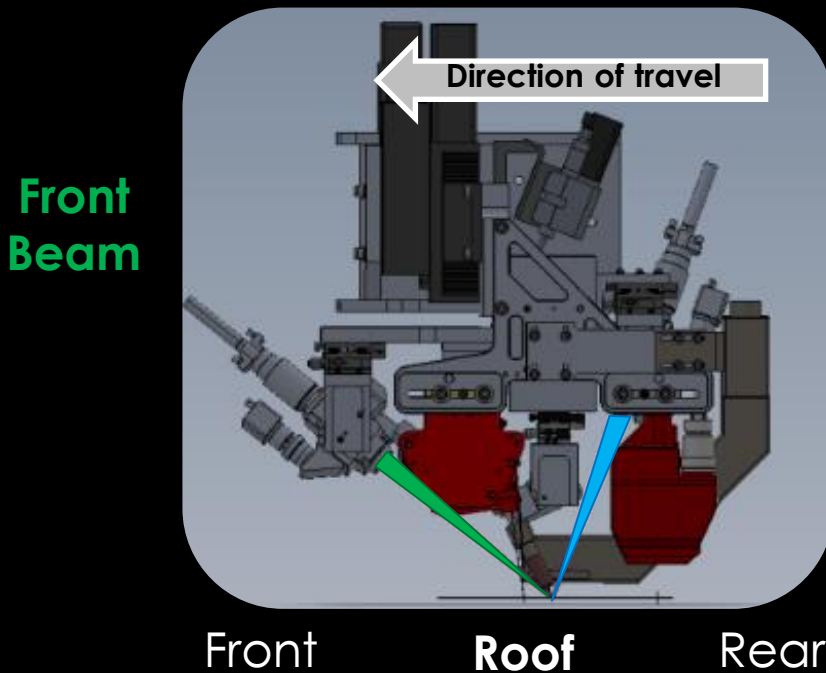


2021 TLX
Laser Brazing



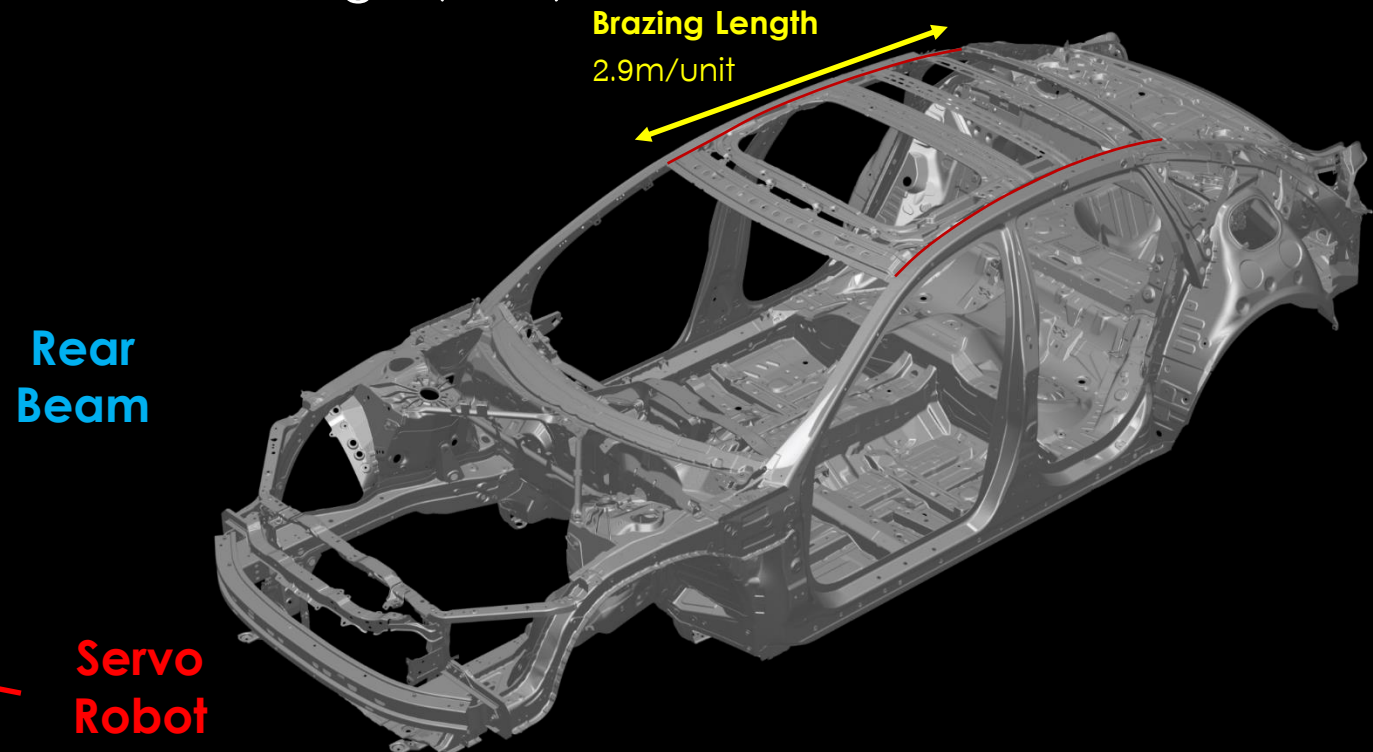
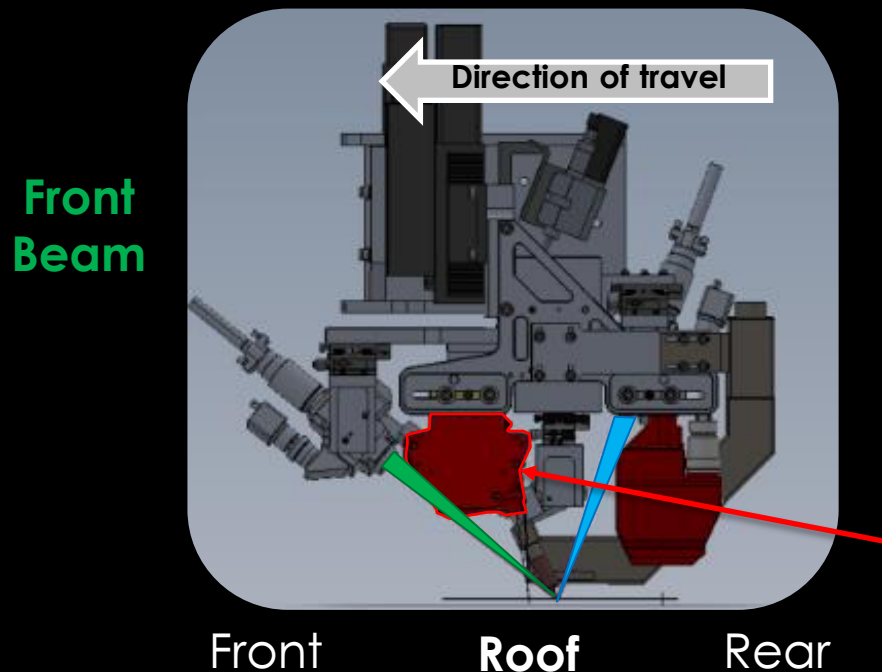
Manufacturing Efficiency

- Honda-original 2-beam laser tool
 - **Front Beam:** Preheating to remove GA layer (cleans)
 - **Rear Beam:** Braze with Cu alloy filler material
- **Process time:** 44 seconds/unit (1000 UPD/line)



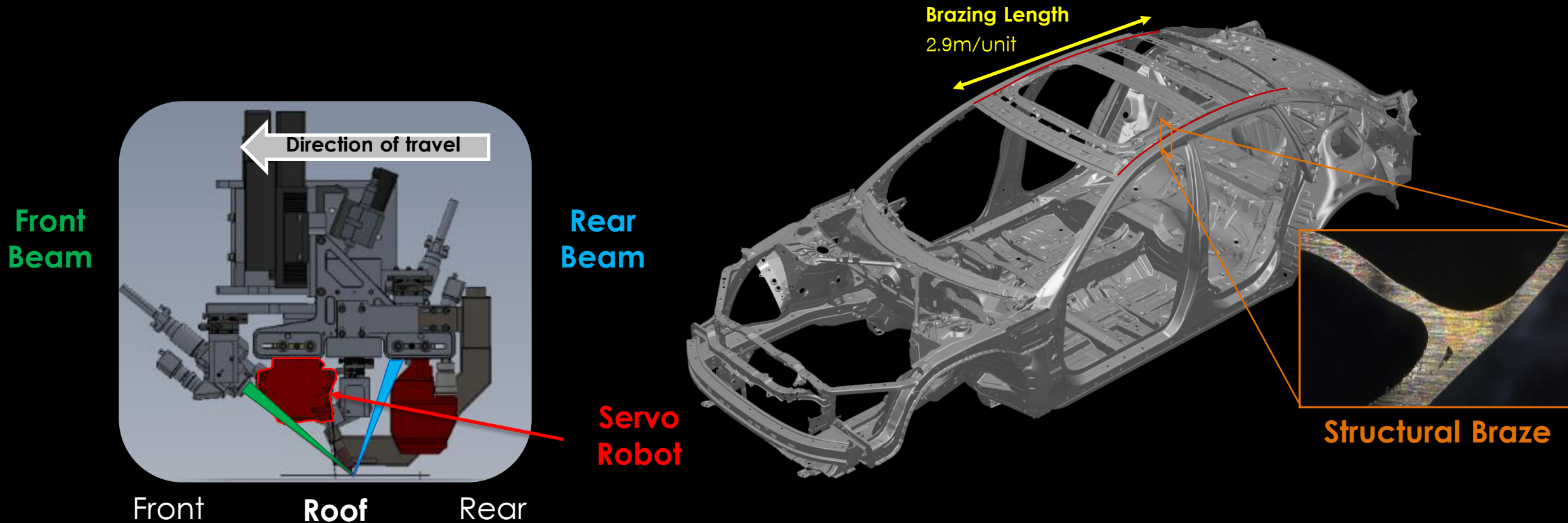
Quality

- Seam tracking system with **Servo Robot**
- Welding heat control
- 2 pass polishing with Active Contact Flange (ACF) to apply constant pressure
- No pre-cleaning of flanges



Durability

- **Structural braze** improves body rigidity





TLX

Platform Architecture

Unique Acura Sedan Platform

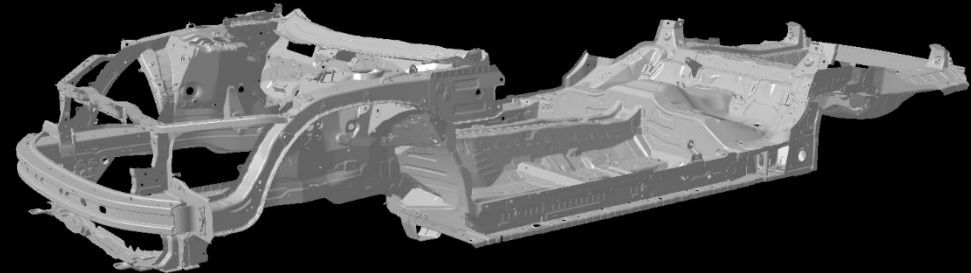
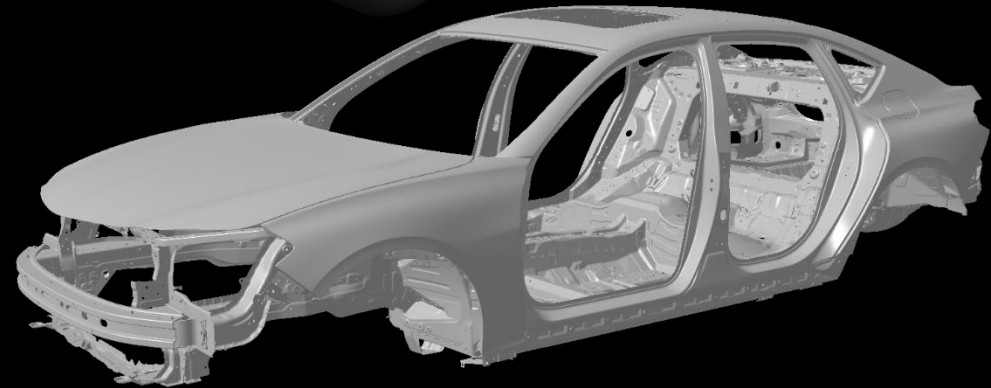
Support dynamic concept

High-Rigidity Body

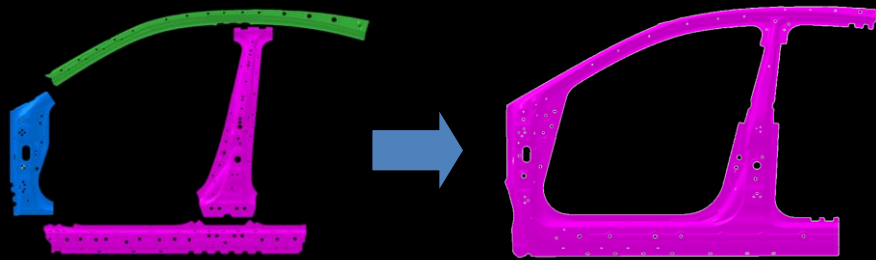
Make best use of double wishbone front and multi-link rear suspension setups

Powertrain Flexibility

Support 2.0T & 3.0T engines
Support FWD & SH-AWD drivetrains



One-Piece Hot Stamp Door Ring



Magnesium Steering Hanger Beam



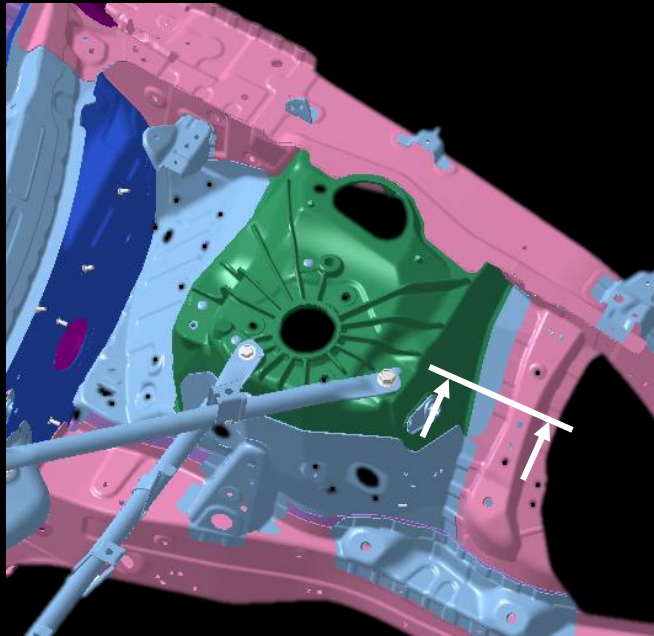
Factory Spray Foam of Body Cavities



Multi-Layer Galvanic Corrosion Protection

E-Coat Applied Prior to SPR

Primary isolation between dissimilar materials

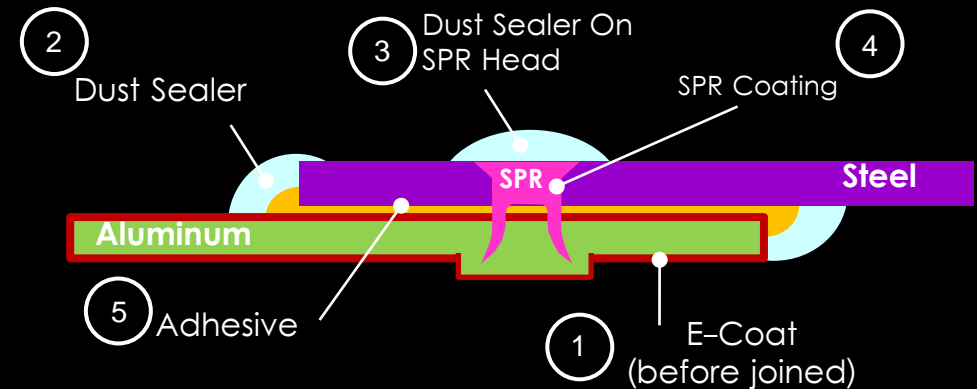


- Cast Aluminum
- 590MPa or Above
- 270MPa

Dust sealer at both sides of the joint and SPR heads

Barrier to water entry

Multi Material Joint Construction for Direct Water Splash Area



Mechanical Fastening

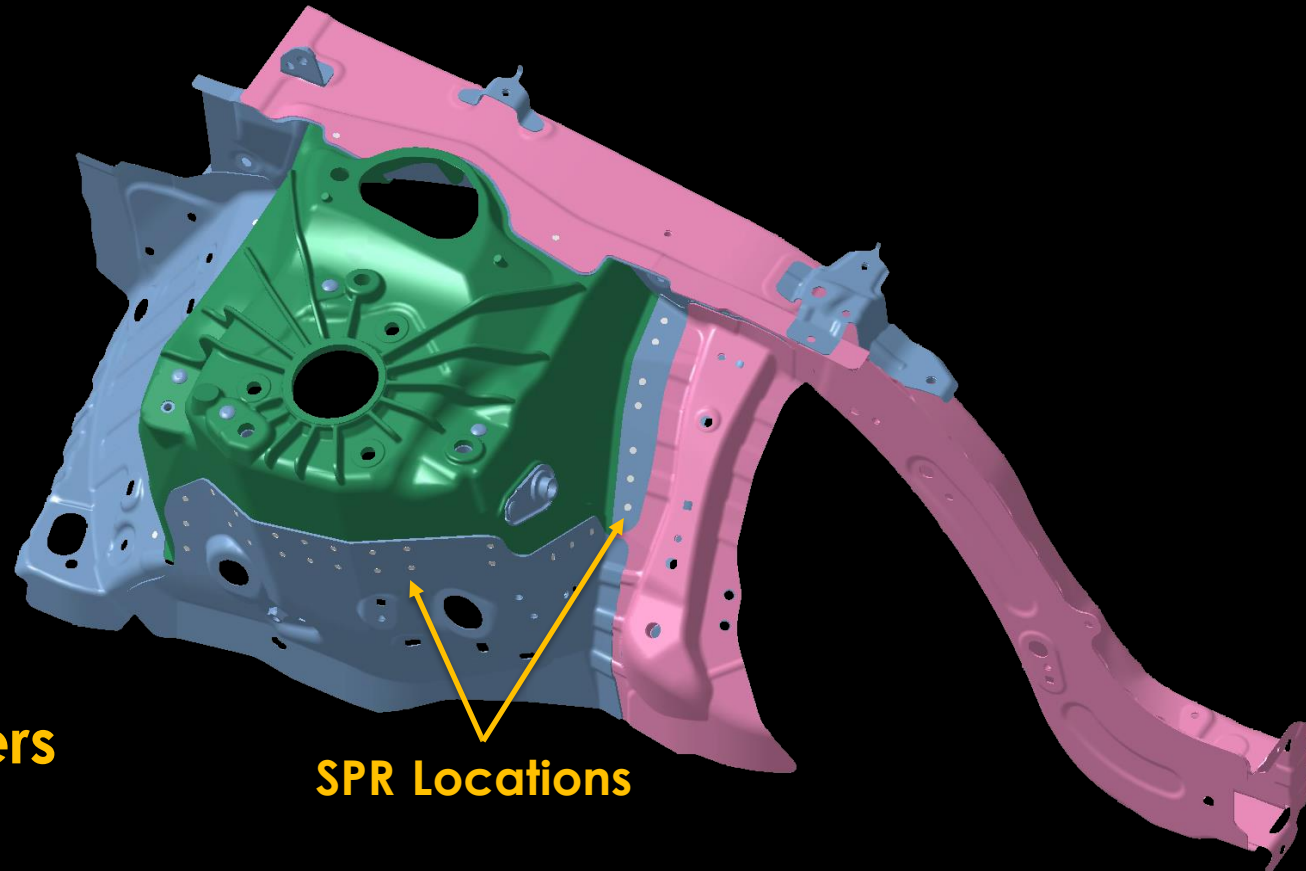
54 Self-Piercing Rivets (SPR)

per damper housing

- 3 SPR lengths
- 2 and 3 sheet stacks

Nut plates hold mechanical fasteners

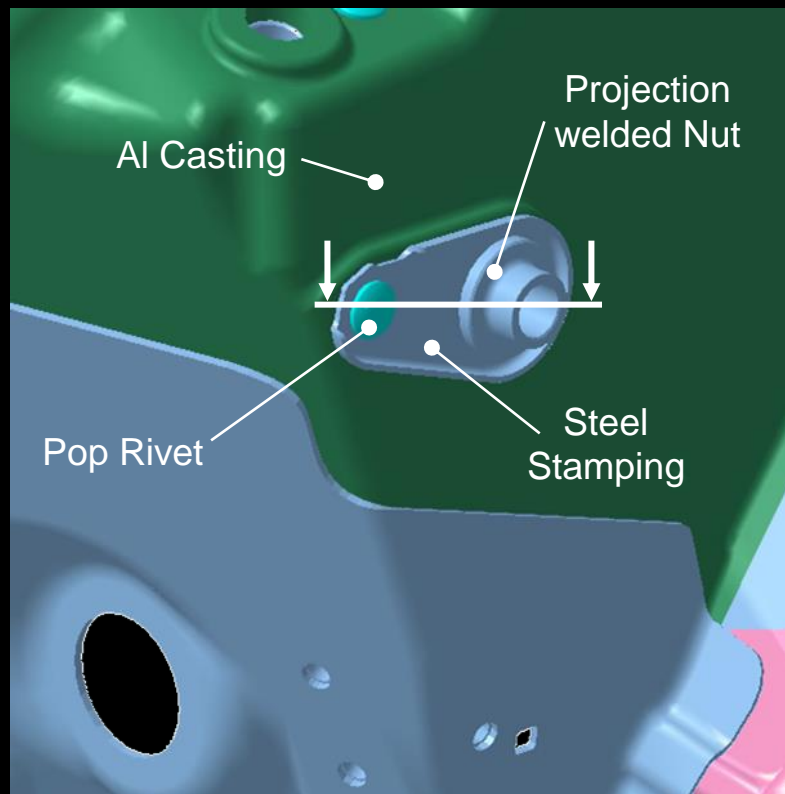
- Steel nut plates applied with blind rivets
- Nut plates are e-coated before assembly



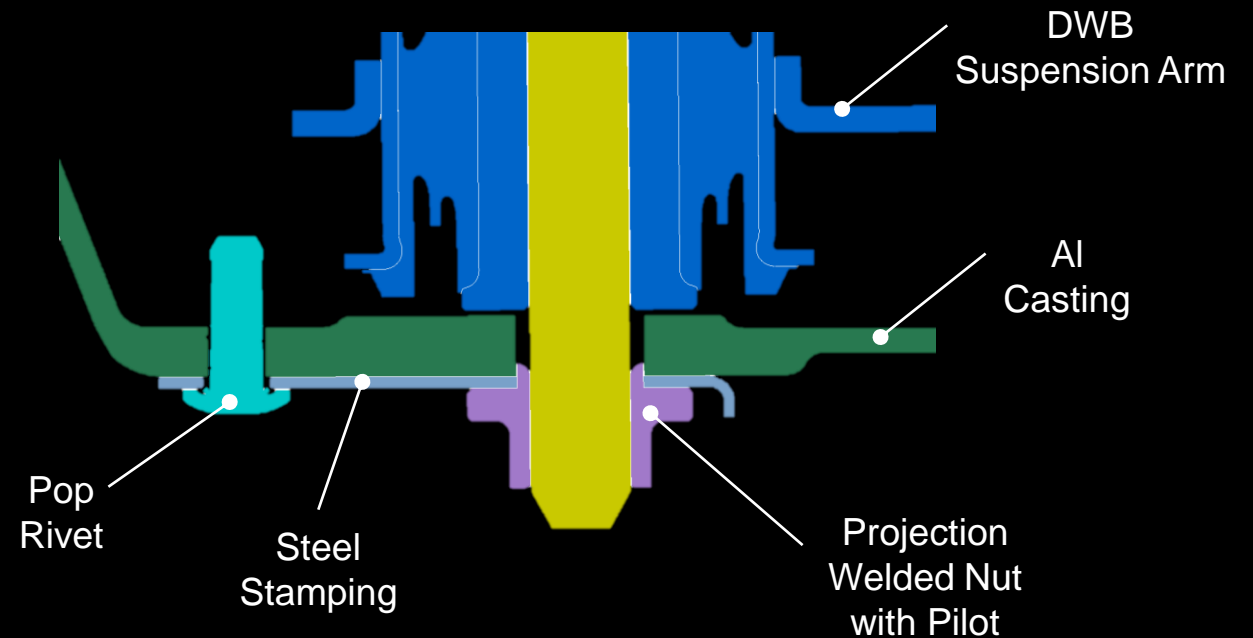
- Cast Aluminum
- 590MPa or Above
- 270MPa

Improved Mechanical Fastener Accuracy

Mechanical fasteners attached to castings by nut plates attached with blind rivets



Pilot weld nuts ensure high accuracy positioning directly off machined casting hole



Tolerance absorbed on blind rivet hole

Next-Generation ACE™ Body Structure

Cast-Aluminum Front Damper Mount

Bonded to a steel
structure

Front Side Frame

Lower load path
to floor and door ring

Upper Frontal Structure

Upper load path
to door ring

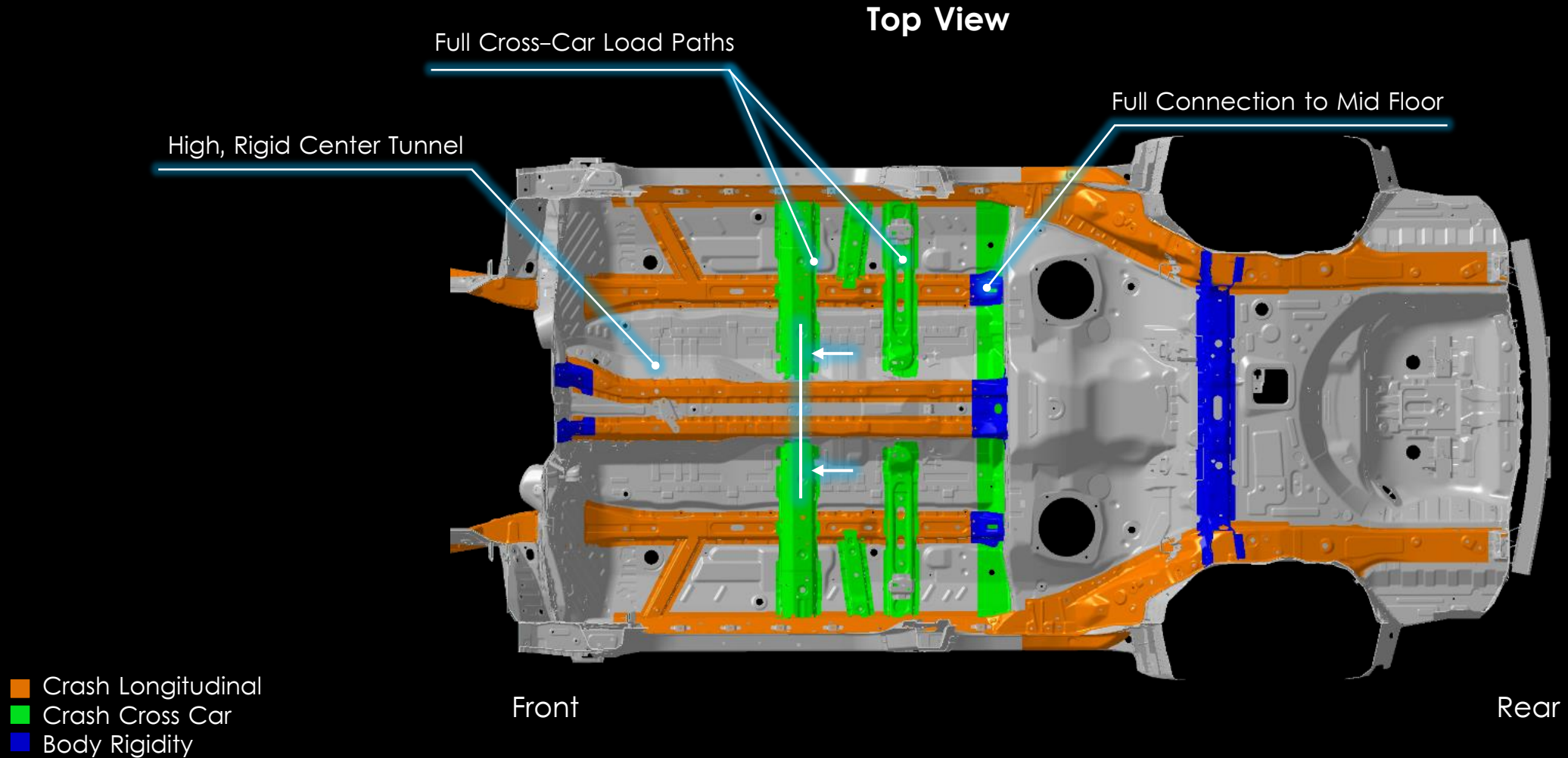
Cross-Car Load Path for oblique frontal impact

- 980MPa center
- 1500MPa hot stamp integrated into outer shear plate

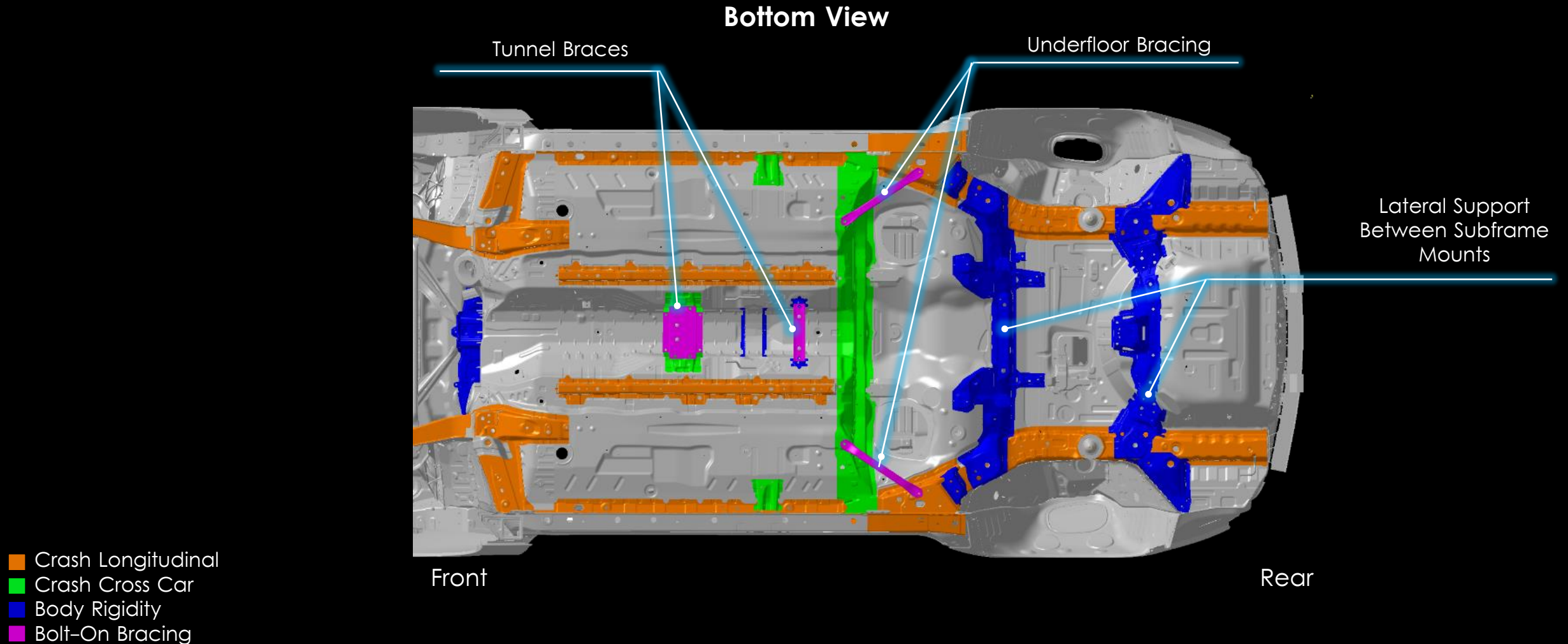
Deep Center Tunnel with upper reinforcements

- + Impact Performance
- + Body Rigidity

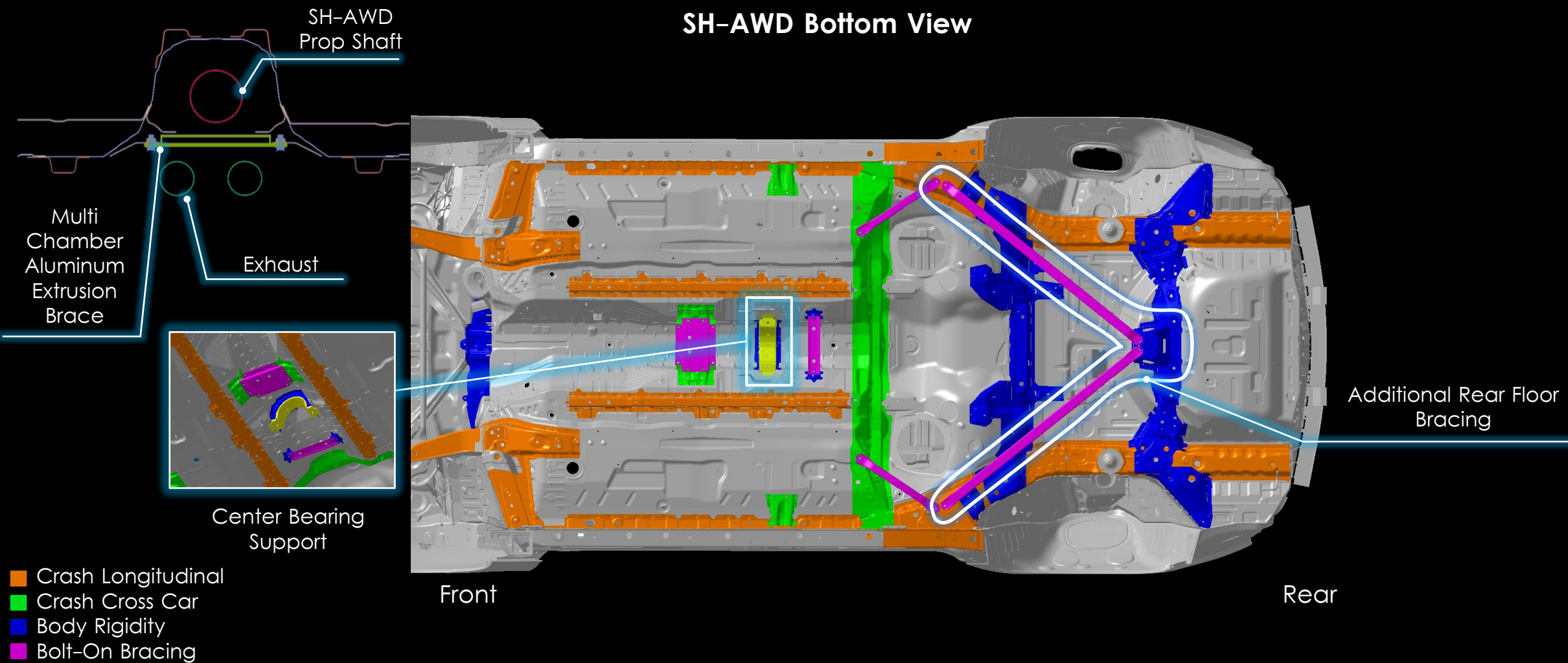
Floor Architecture combines high rigidity with crash load control & dispersion



Floor Architecture combines high rigidity with crash load control & dispersion



Floor Architecture combines high rigidity with crash load control & dispersion

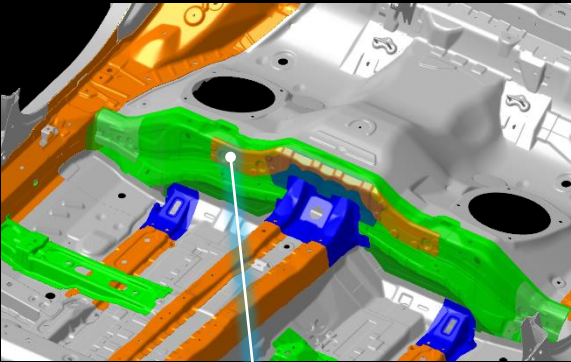


Floor Architecture combines high rigidity with crash load control & dispersion



Top View

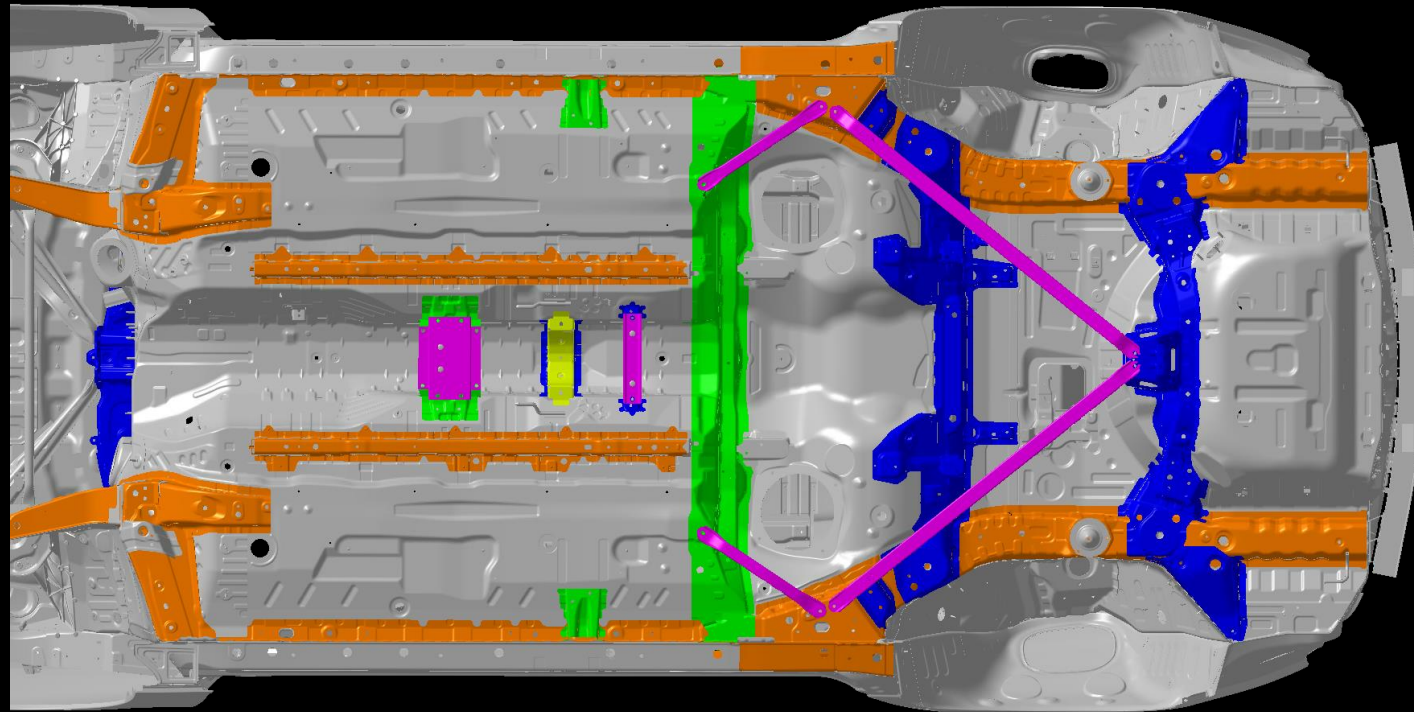
Rear



Front

Mid Floor Cross
Member Internal
Reinforcement

SH-AWD Bottom View



Front

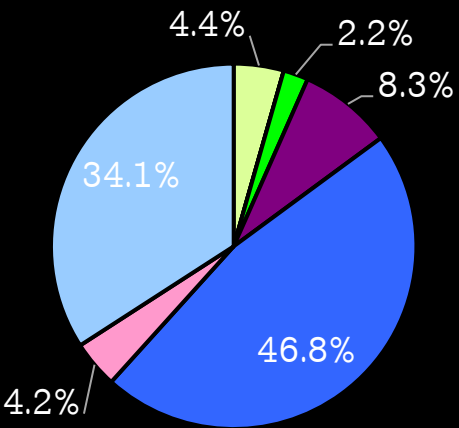
Rear

- Crash Longitudinal
- Crash Cross Car
- Body Rigidity
- Bolt-On Bracing

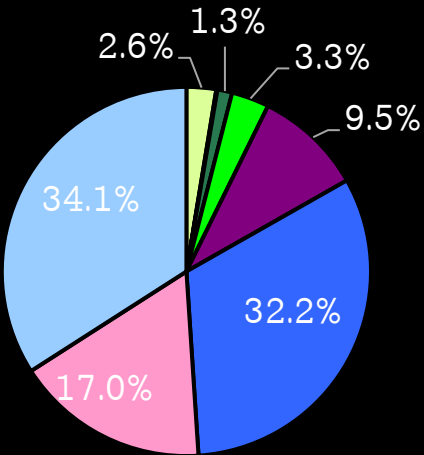
Body Material Usage



Composition %
Previous TLX

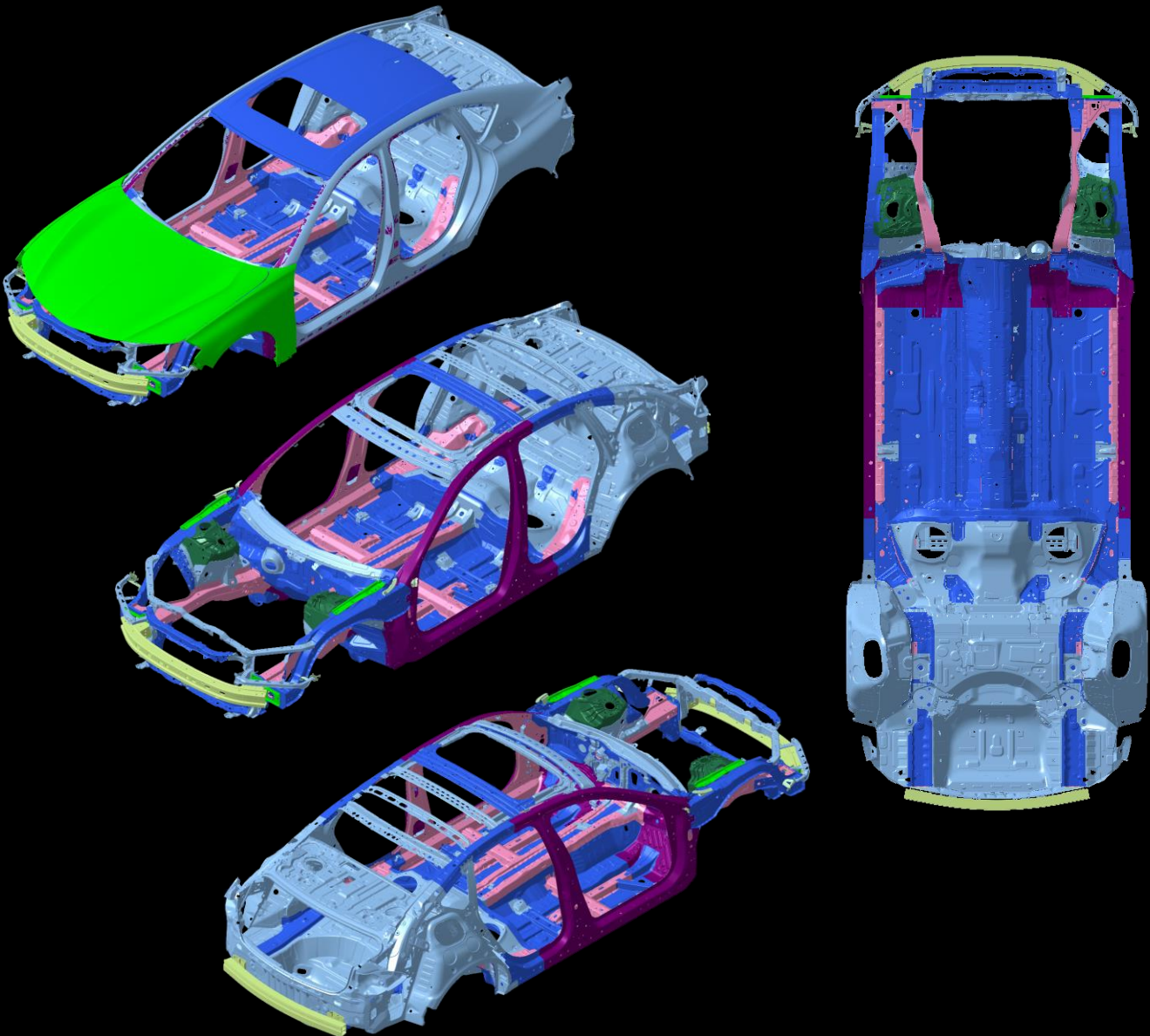


Composition %
2021 TLX



- | | |
|---------------------|------------------------|
| Al Extrusion – 6XXX | Press Hardened Steel |
| Al Sheet – 5XXX | High Strength Steel |
| Al Casting | Advanced High Strength |
| Al Sheet – 6XXX | Mild Steel |

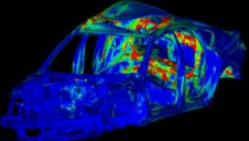
mild steel -> 270; high strength -> 340,440,590;
advanced -> 780,980; press hardened -> 1500

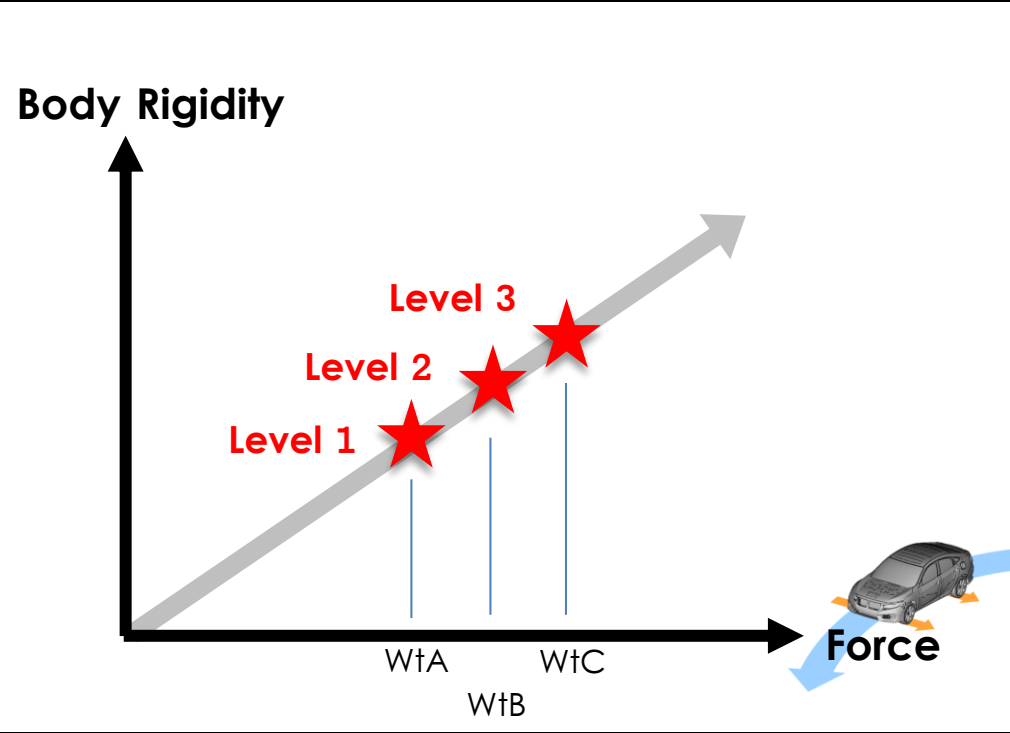




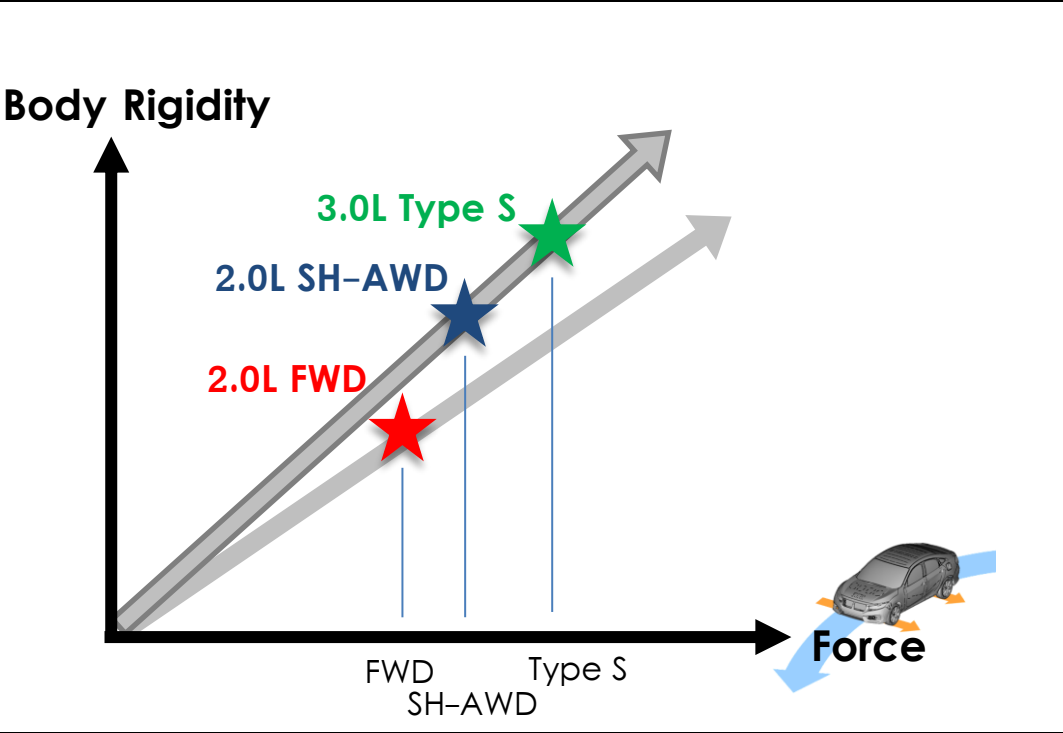
TLX

Body Rigidity

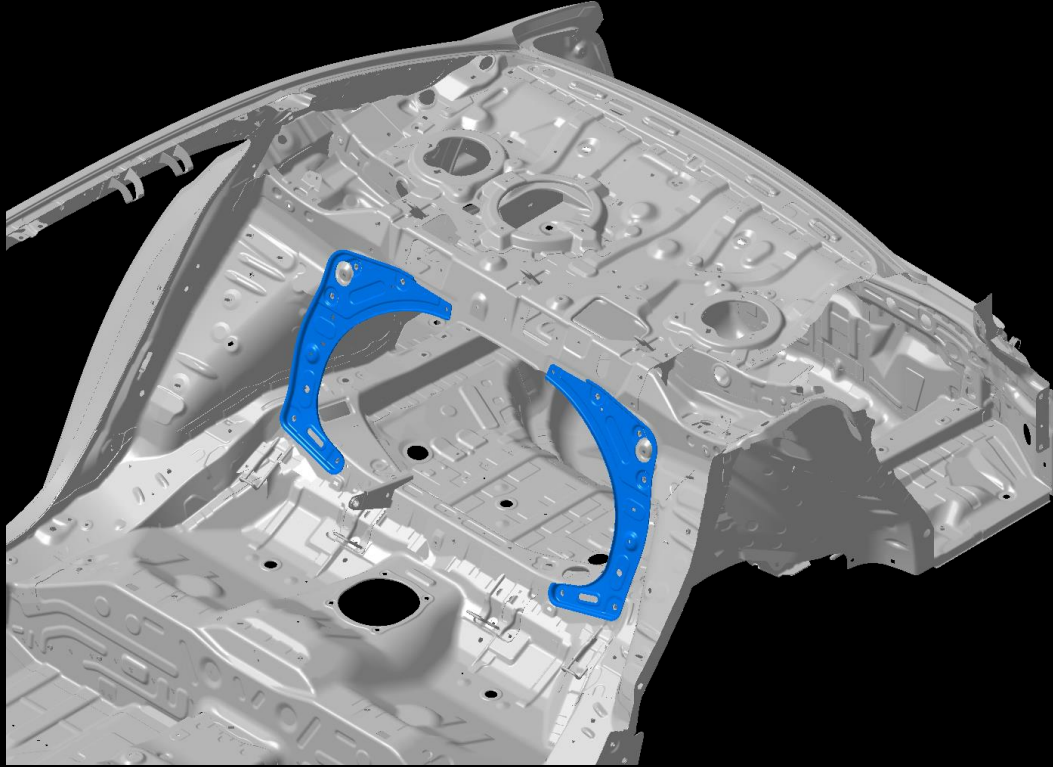

Rigidity
○
○+
○++



Equivalent Dynamic Performance
Trend With Changing Weight



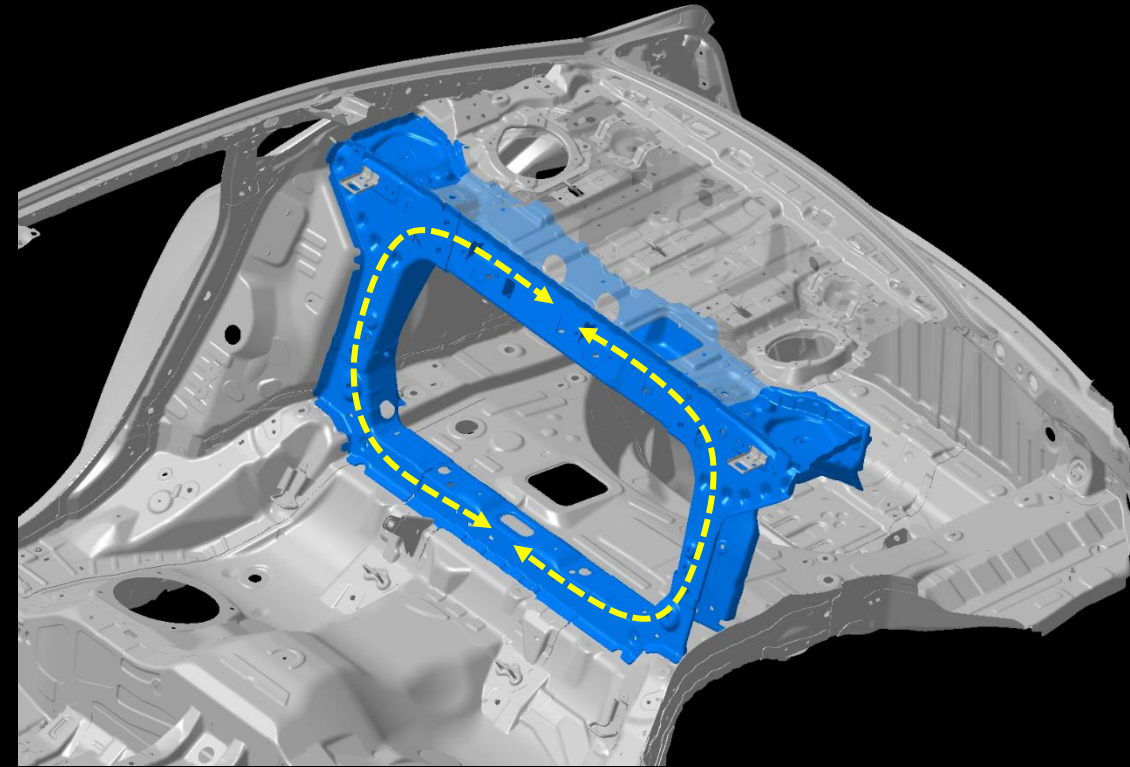
Increasing Dynamic Performance
Trends and Changing Weight



Previous TLX

Bolt-On Gussets

- Higher weight and investment at an equivalent performance level
- Lower rigidity
- Restricted cargo pass-through area



2021 TLX

Welded Ring Structure

- + Saves 8kg (over Type S targets)
- + Higher rigidity
- + Increased cargo pass-through area

Super Handling Body Rigidity

TLX

Super-Handling Capability Realized with Dynamic-Focused Rigid Body Structure

Rear Damper
Torsion
+90%

Rear Tire
Patch Lateral
+100%

Body Rigidity Metrics

		% Improvement
		Previous TLX vs. 2021 TLX
Front	Tire Patch Lateral	+129%
	Damper Torsion	+15%
	Floor Bending	+30%
Rear	Tire Patch Lateral	+100%
	Damper Torsion	+90%
	Damper Bending	+133%

Front $\frac{3}{4}$ view

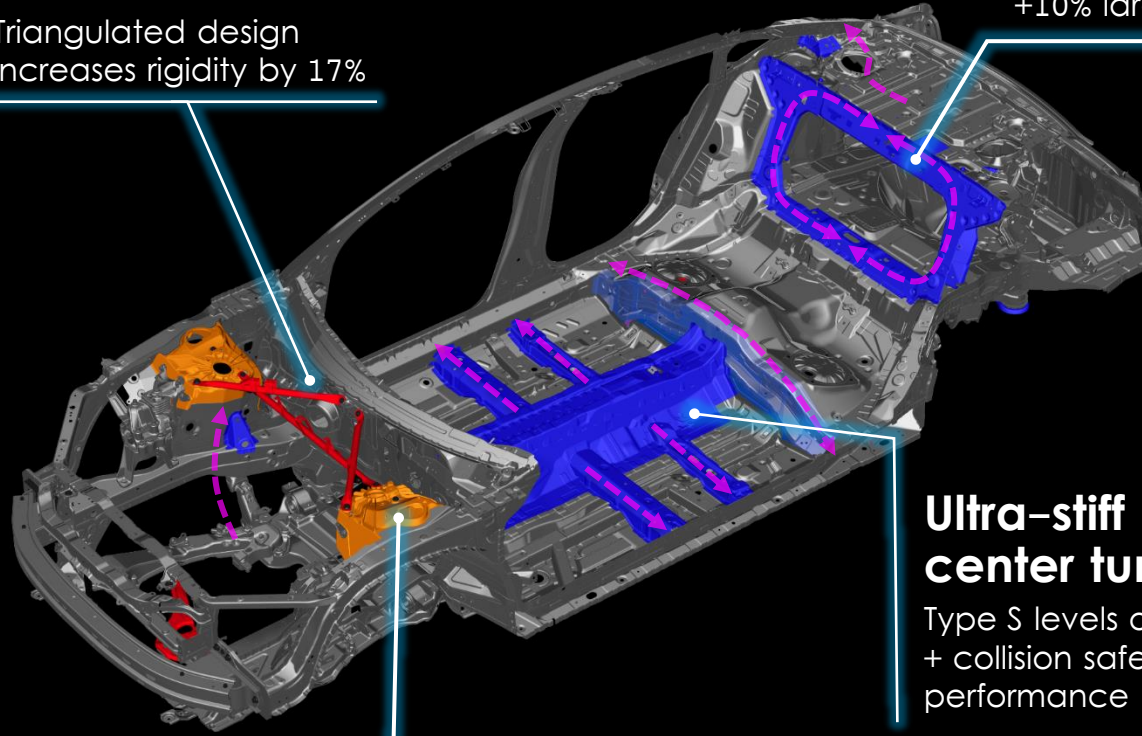
Rear $\frac{3}{4}$ underside view

Performance Body Structure

TLX

Shock tower bars

Triangulated design
increases rigidity by 17%



Cast aluminum damper mounts

Rigid foundation for DW suspension

Welded stiffener ring

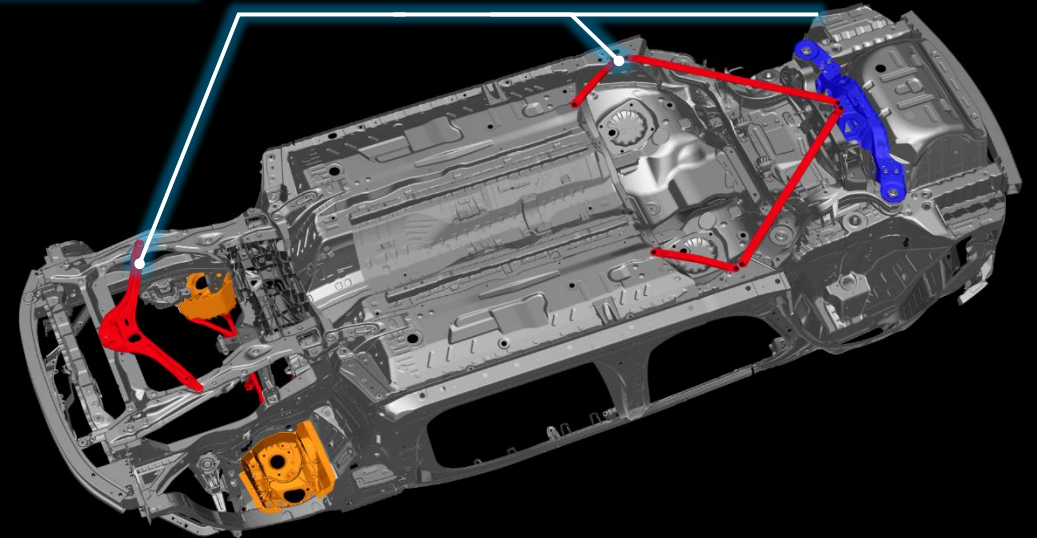
Enhanced rear torsional stiffness
+10% larger trunk pass through

Ultra-stiff center tunnel

Type S levels of rigidity
+ collision safety
performance

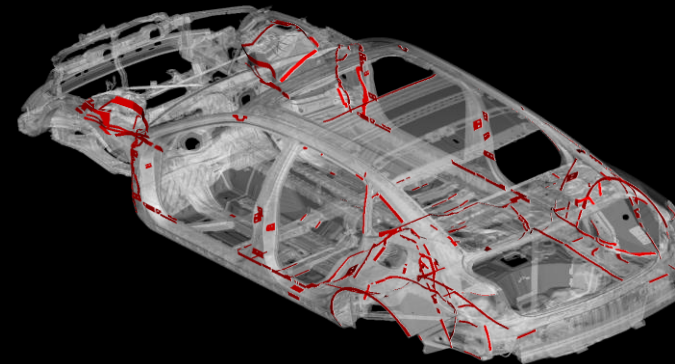
Underbody Braces

+7.9% rear torsional stiffness
+4.6% rear bending stiffness



High-performance structural adhesive

Most extensive application
ever for Acura (29 meters)



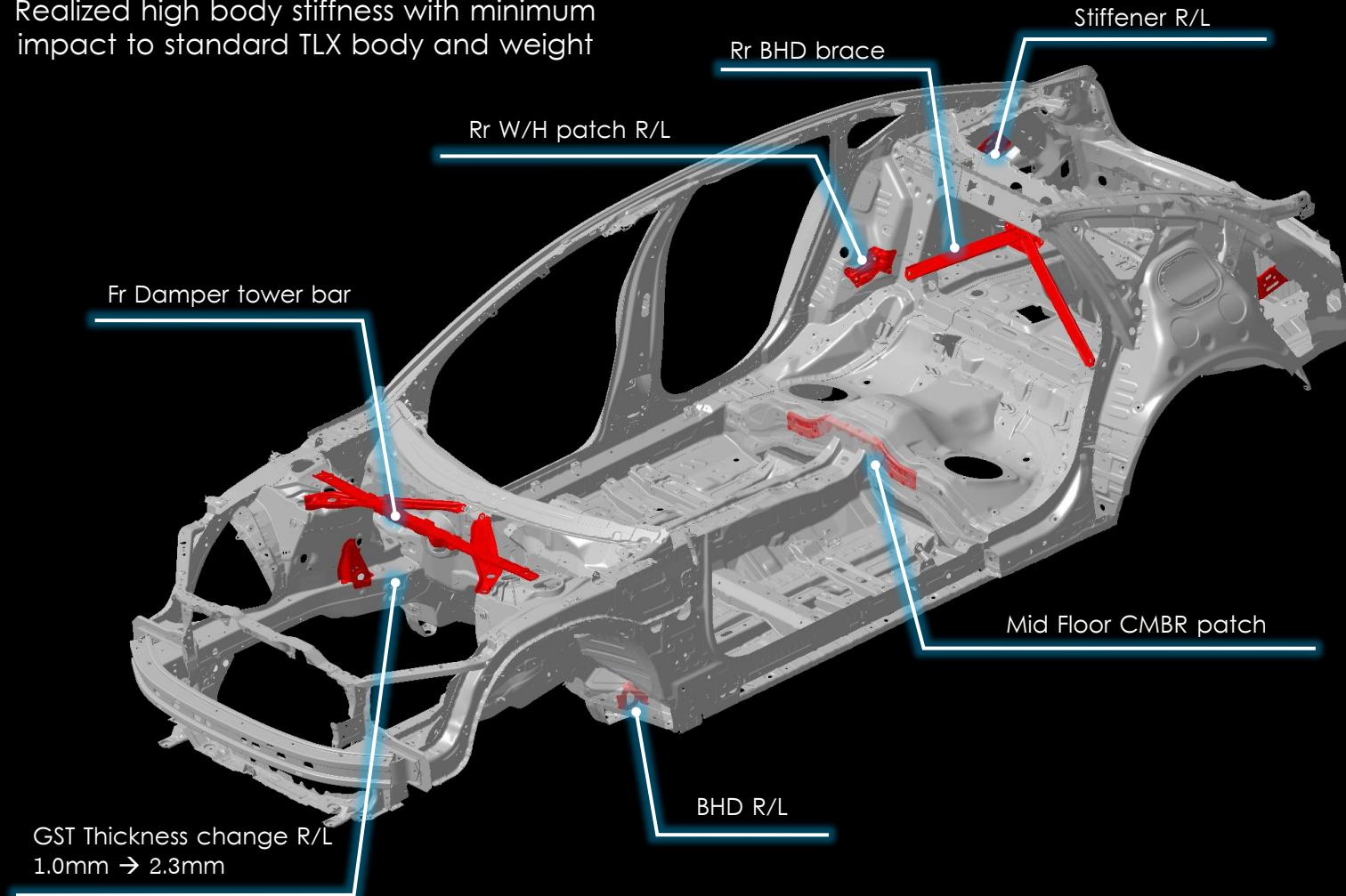
Type S Body Rigidity

TLX



Exclusive Parts

Realized high body stiffness with minimum impact to standard TLX body and weight



Body Rigidity Metrics

		% Improvement		
		21M vs 20M	Type S vs AWD	Type S vs 20M
Front	Tire Patch Lateral	+129%	+10%	+152%
	Damper Torsion	+15%	+7%	+24%
	Floor Bending	+30%	+5%	+37%
Rear	Tire Patch Lateral	+100%	+2%	+104%
	Damper Torsion	+90%	+24%	+136%
	Damper Bending	+133%	+4%	+141%



TLX

Safety

Advanced Safety Structure

TLX

ACE™ Body Structure

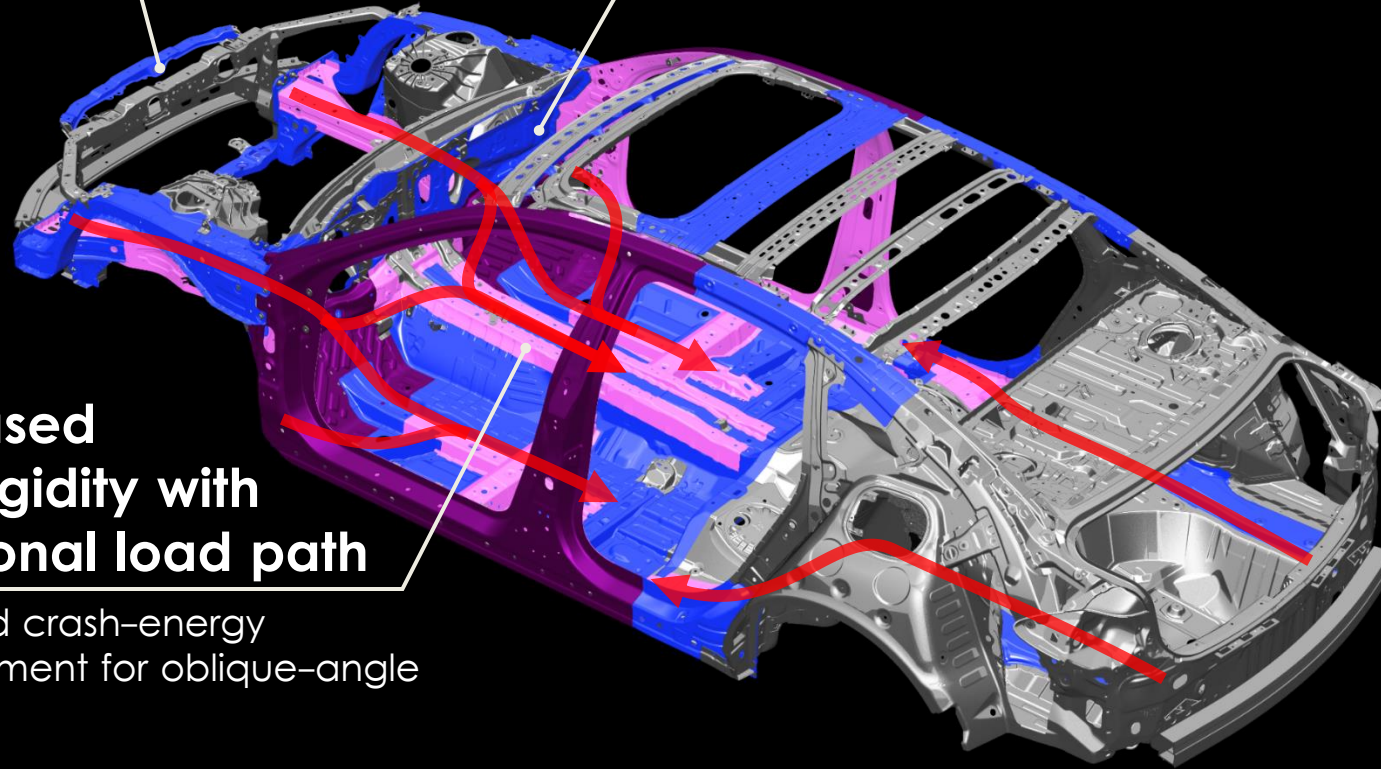
Frontal collision compatibility with vehicles of different sizes and ride heights

Ultra-high-strength dash lower & Dash crossmember

Improved crash-energy management for oblique-angle collisions

Increased floor rigidity with additional load path

Improved crash-energy management for oblique-angle collisions



- High Strength Steel 340, 440, 590 MPa
- Advanced High Strength Steel 780, 980 MPa
- Press Hardened Steel 1500 MPa

MY 2021 TARGETS



GOOD all collision safety ratings
GOOD standard headlight rating
SUPERIOR front crash prevention
Vehicle-vehicle, vehicle-pedestrian



5-STAR
overall vehicle score

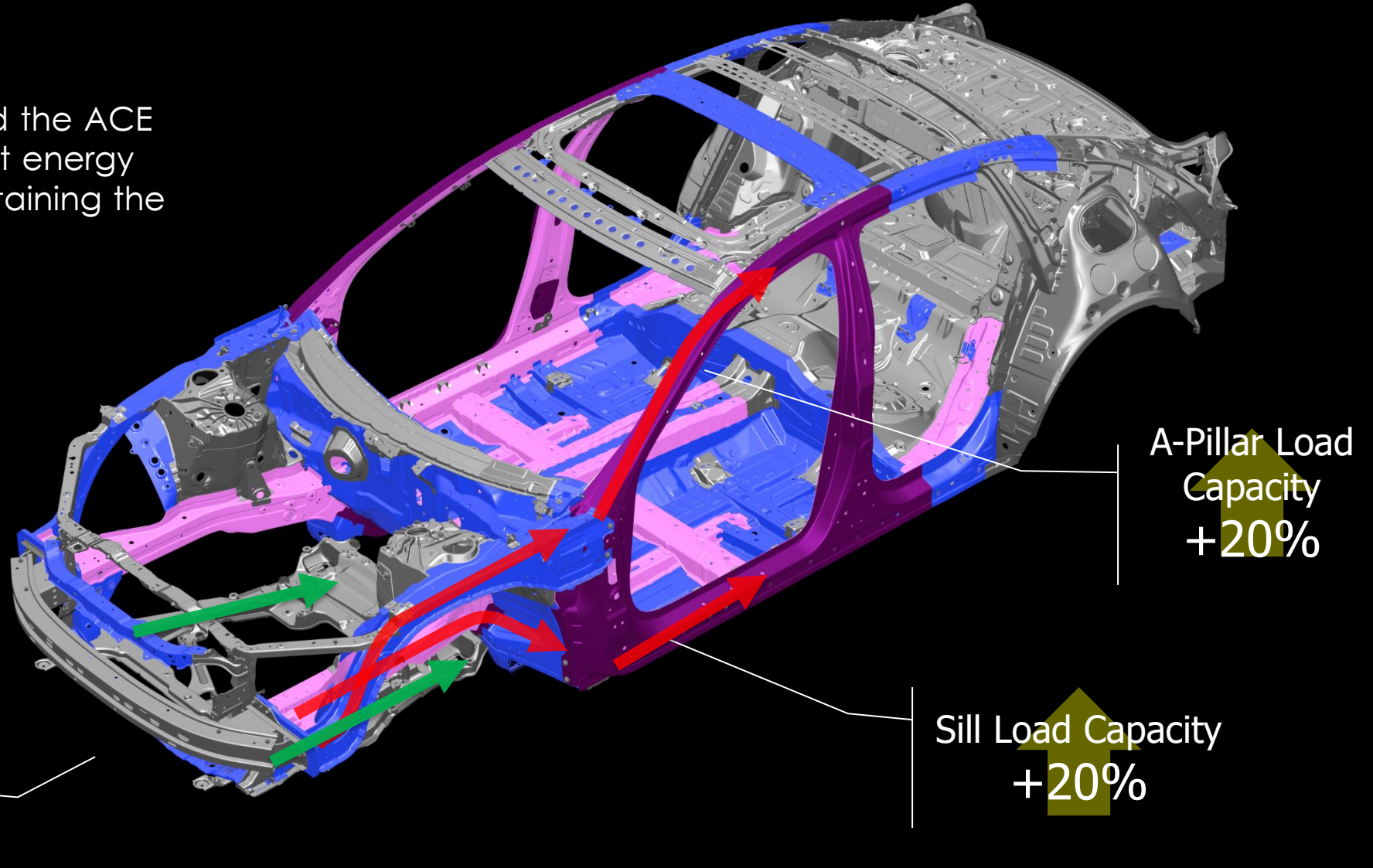
Safety Structure – Engine Room



ACE™ Body Structure

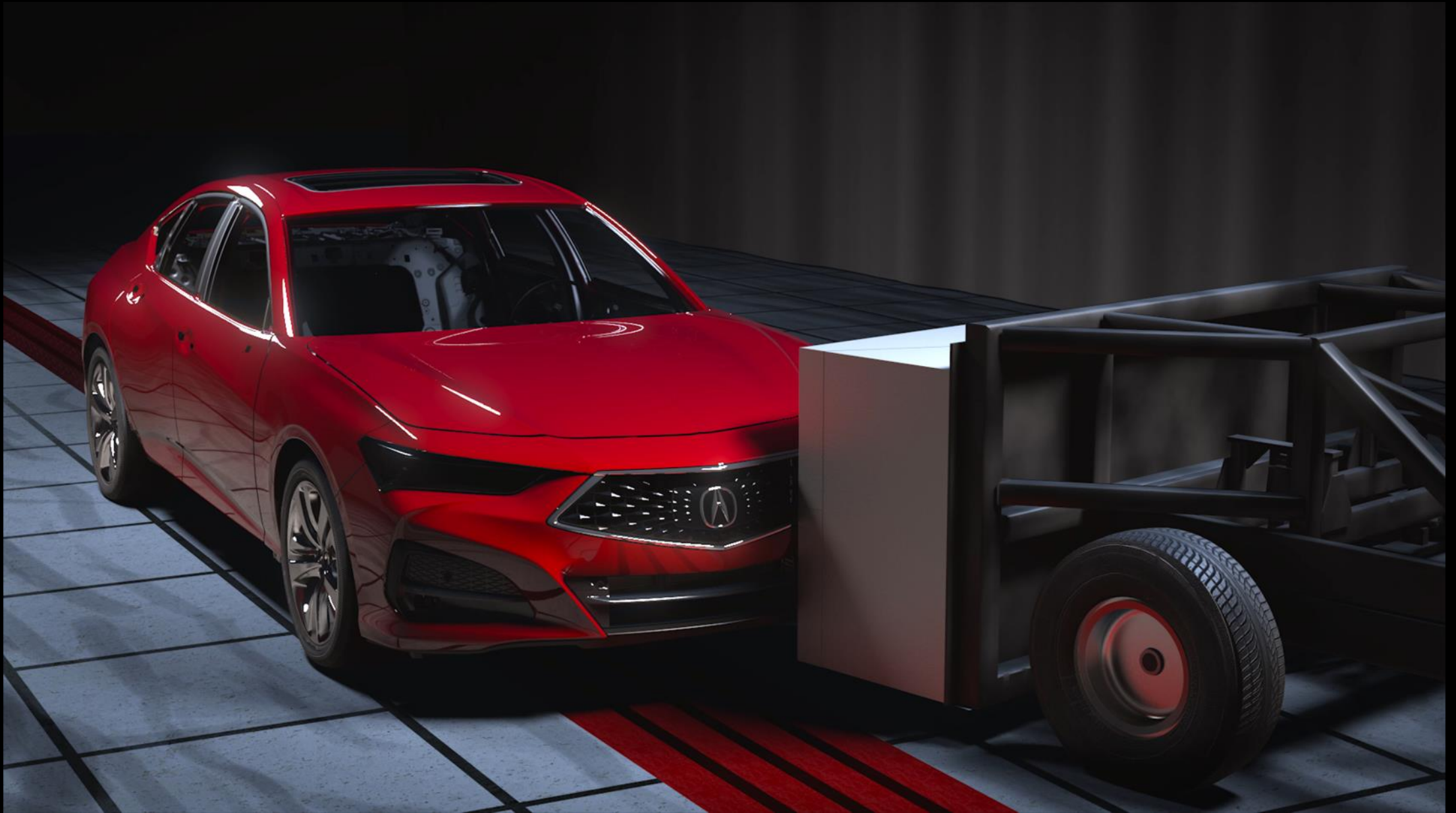
The new platform evolved the ACE body structure by efficient energy management while maintaining the core concepts:

- Self Protection
- Partner Protection



Front Oblique

TLX



Conclusion

2021 Acura TLX

TLX



THANK YOU

Jeremy Lucas

Honda

Body Design Project Leader – 2021 Acura TLX