

Great Designs in

# STEEL



## **Hot Stamped Steel One-Piece Door Ring in the All-New 2019 Ram 1500**

**David Reed, FCA US LLC**

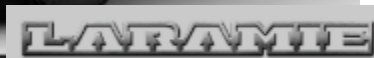
**Paul Belanger, Gestamp**

# Agenda

- All new 2019 RAM 1500 Truck overview
- Steel strategy and content
- Truck performance
  - NVH
  - Safety
- Hot Stamped Door Ring



# 2019 Ram 1500 Exterior Styling



# 2019 Ram Rebel



# 2019 MY Ram 1500 - No Compromise

## STRENGTH SAFETY

- ✓ Durability focus
- ✓ 98% High Strength Steel Frame
- ✓ Splayed Front Frame Rails
- ✓ 54% High Strength Steel Cab and Box Structure
- ✓ Largest brakes (14.9")
- ✓ 100 + Safety Features

## CAPABILITY

- ✓ 2,300 lbs. Max Payload
- ✓ 12,750 lbs. Max Towing
- ✓ Performance – Pentastar® V6 and Hemi® w/ eTorque technology
- ✓ Off-Road – Rebel and Off-Road Group
- ✓ Chassis – Protection Group, Air Suspension
- ✓ Cargo – Rambox®, Bed Divider, Most Interior Storage – 2x competition, Bed Step

## TECHNOLOGY

- ✓ 12" Touchscreen Radio
- ✓ SiriusXM MyControl 360L
- ✓ Blindspot Detection w/ Trailer Coverage
- ✓ 19-Speaker, 900W Harman Kardon Sound System
- ✓ More than 100 Safety Features including:
  - ✓ Forward Collision Mitigation
  - ✓ 360 SurroundView Camera
  - ✓ Adaptive Cruise Control w/ Stop Go
- ✓ Efficiency – eTorque mild hybrid, Active Air Dam, More Aerodynamic, MDS

## LUXURY

- ✓ Superior Ride & Handling
  - ✓ 5-link coil suspension
  - ✓ 4-corner air suspension
- ✓ +4" Cab length for the most spacious interior
- ✓ Reclining Rear Seat
- ✓ Power Running Boards
- ✓ Genuine Materials - Leather/Wood/Metal
- ✓ Quietest Cab
- ✓ Ventilated Rear Seats
- ✓ Dual Pane Sunroof
- ✓ Flat Load Floor

# Improved Capability – Payload & Towing



- ✓ **Max Towing 12,750 lbs**  
20% increase  
256 mm gear set
- ✓ **Max Payload 2,300 lbs**  
22% increase



- ✓ **Front Suspension**  
20% increase roll stiffness  
Frequency Response Damping



- ✓ **Rebel – 33" GY Duratrac**
- ✓ **4x4 Off-Road Package**
  - ✓ eLocker
- ✓ **Exclusive Air Suspension**



- ✓ **Rear Suspension**  
Variable Rate Springs  
Frequency Response Damping



- ✓ **LED Quad Projector**  
w/adaptive cornering -  
15° outer lens pivot



- ✓ **18" Brakes**  
BIC stopping distance

# Efficiency



- ✓ **98% High Strength Steel Frame w/ Double-Shear Welded X-mbrs**
- ✓ **54% High Strength Steel Body**
- ✓ **Aluminum Hood & Tailgate**  
**-225 lbs**



- 0.357 Aero Drag Coefficient**
- ✓ **Active Air Dam**
- ✓ **Active Grille Shutters**
- ✓ **BIW Contour**  
**9% reduction**



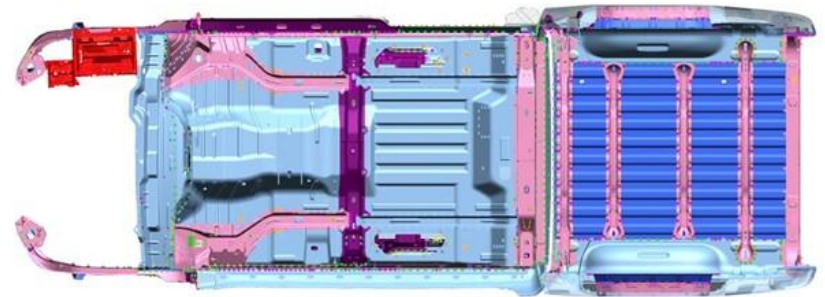
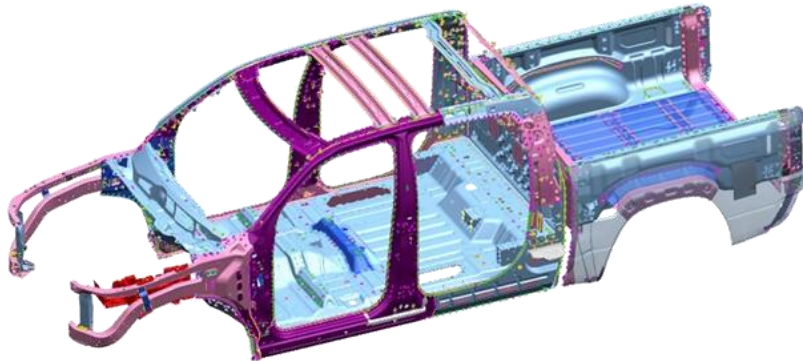
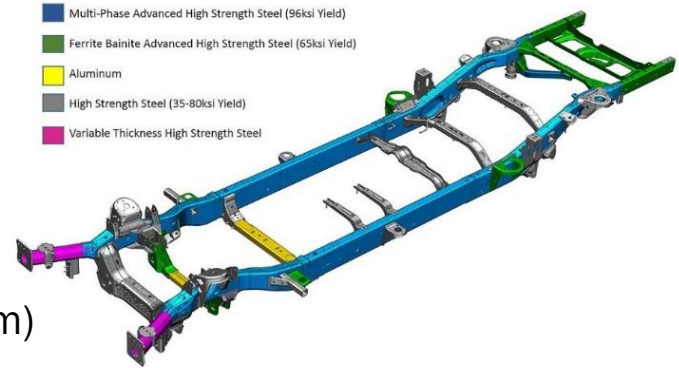
- ✓ **eTorque Mild-Hybrid**
- ✓ **Gen 2 8-speed trans**
- 5.7L**
- ✓ **Incr'd Cyl Deactivation**
  - ✓ **850W eFan**
  - ✓ **Thermal Axle**
- 3.6L Pentastar® Upgrade**
  - ✓ **Cooled EGR**
  - ✓ **2-step valve lift**
- ✓ **Incr'd Compression Ratio**  
**10% improvement**



- ✓ **Tire Rolling Resistance**  
**10% reduction**  
**w/o compromise to ride,**  
**steering & handling**

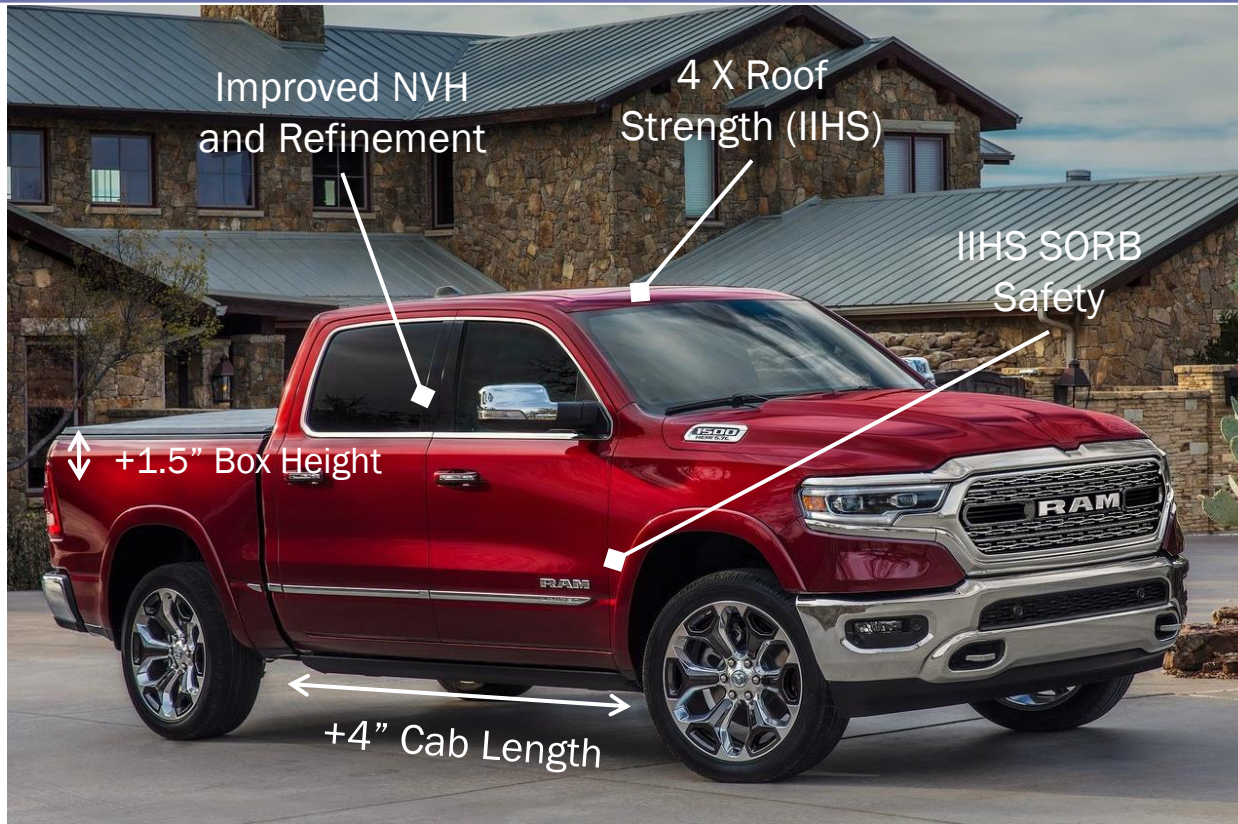
# Weight Savings

- Total vehicle weight savings: 225 lbs
- Chassis weight savings: 125 lbs
  - 98% high strength steel frame
- Body weight savings: 101 lbs
  - Aluminum tailgate savings: 19 lbs
  - Increase high strength steel usage (12% to 54% new Ram)

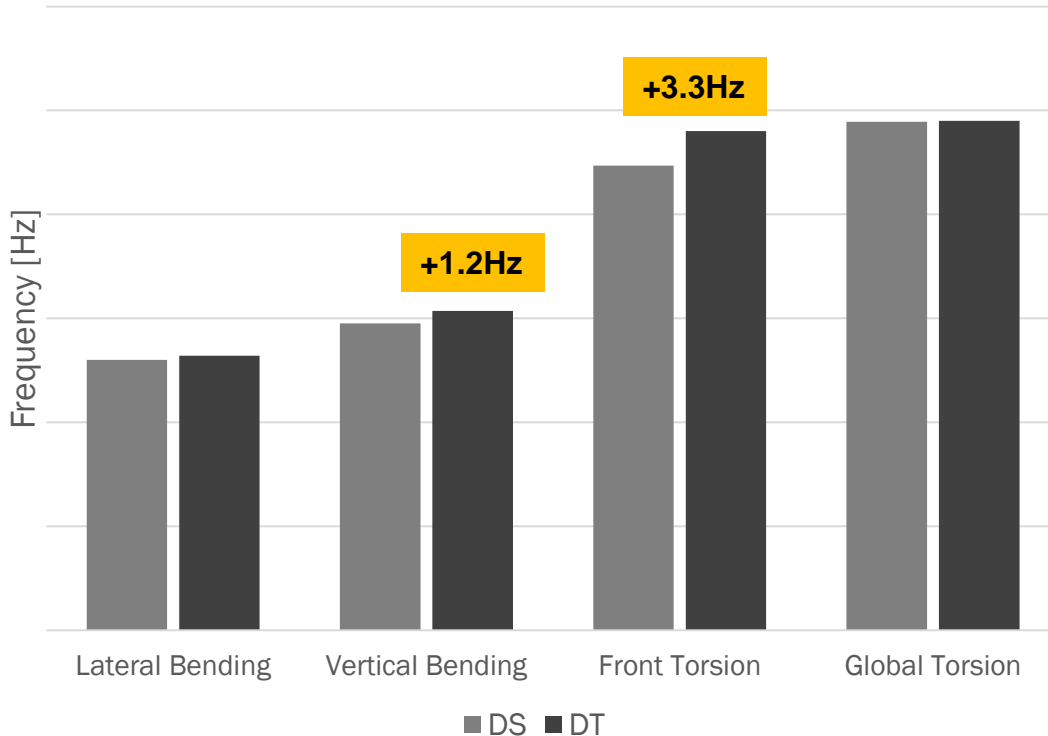




# 2019 Ram 1500 Body Structure Improvements



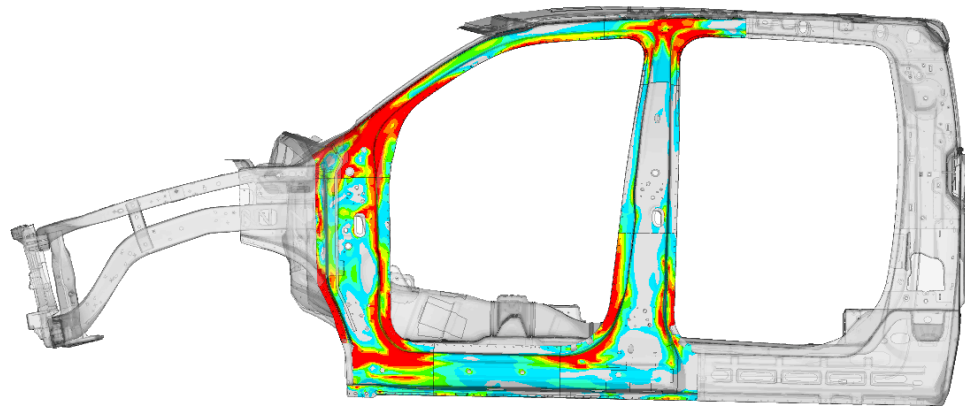
# Body Stiffness – Cab Normal Modes



- The higher bending mode of the new Ram 1500 help to provide improved ride comfort
- The hydroformed engine box structure improves front end torsion stiffness

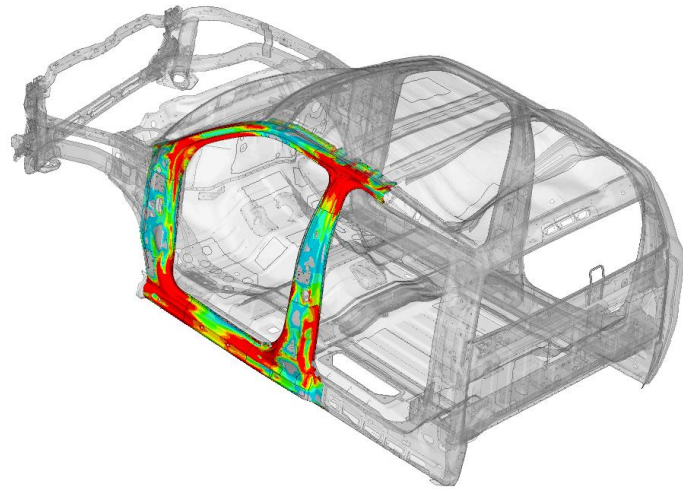
# Body Stiffness – Normal Modes

- Minimal deformation of Door Ring structure in Bending mode
- Nodal point at B-Plr
- Continuous distribution of strain energy through joints and working sections

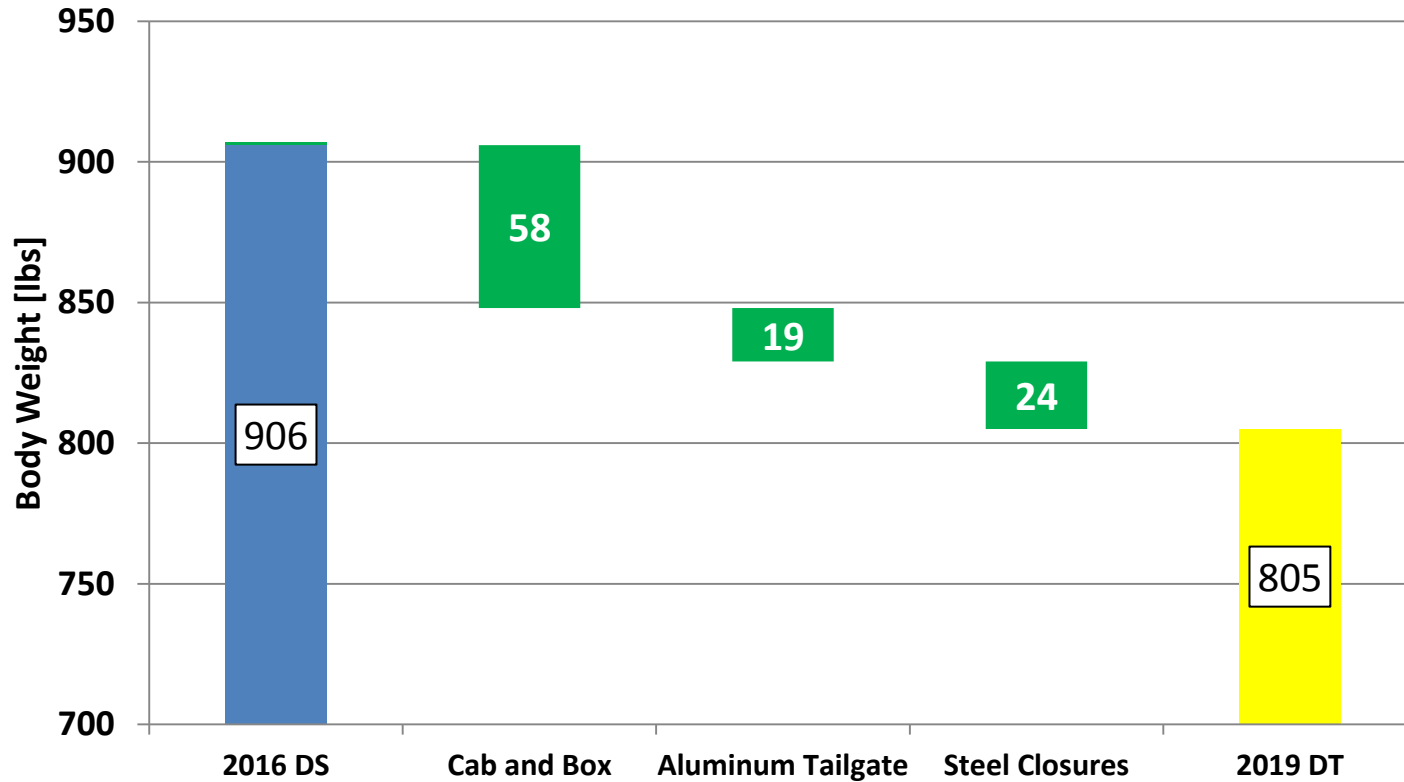


# Body Stiffness – Normal Modes

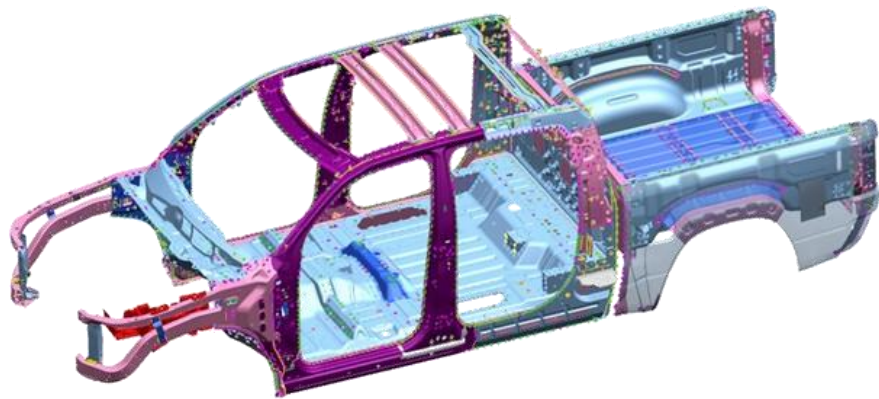
- Clean, global torsion mode
- Deformation modes limited to y-plane in torsion mode
- Continuous distribution of strain energy through joints and working sections



# Body Weight Reduction Milestones



# Steel-Intensive Design Strategy



**Cab:** weight reduction (-10%)

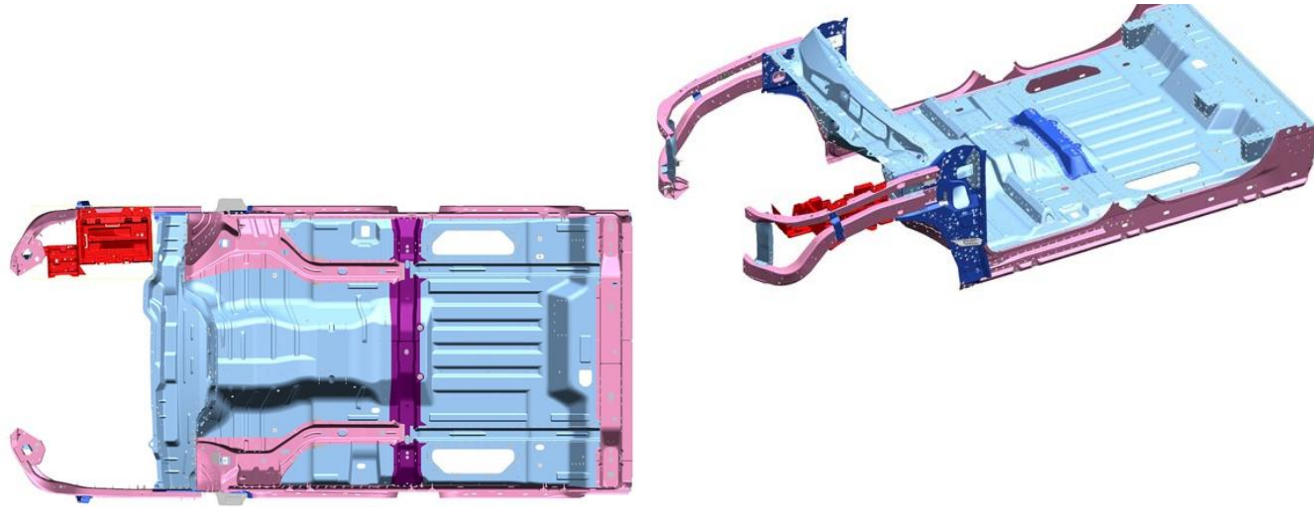
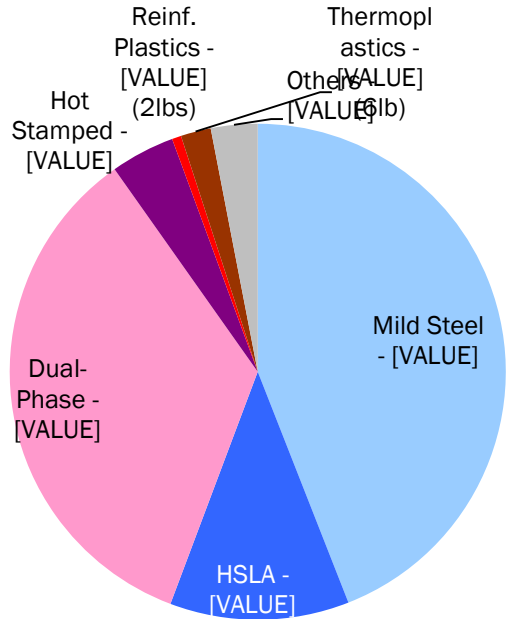
**Box:** weight reduction (-15%)

**Body Structure:** 101lbs weight reduction (-11%)

- Steel-intensive, lightweight design with high strength structural adhesive
- Strategic mix of hot stamped, UHSS, dual phase and HSLA steels
- Efficient, lightweight body structure, with improved stiffness and strength

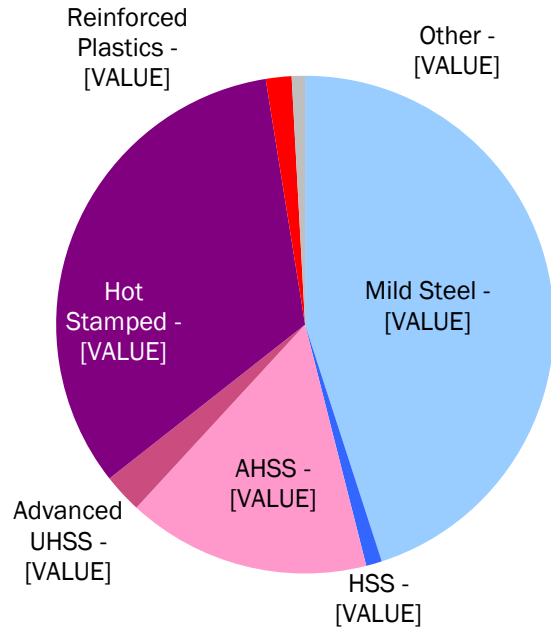


# DT Crew Material Summary - Underbody



- Dual phase steel, hydroformed tubes for strong and efficient engine box structure
- Dual phase steel sill structure
- Hot stamped underbody crossmember to efficiently control side impact intrusion

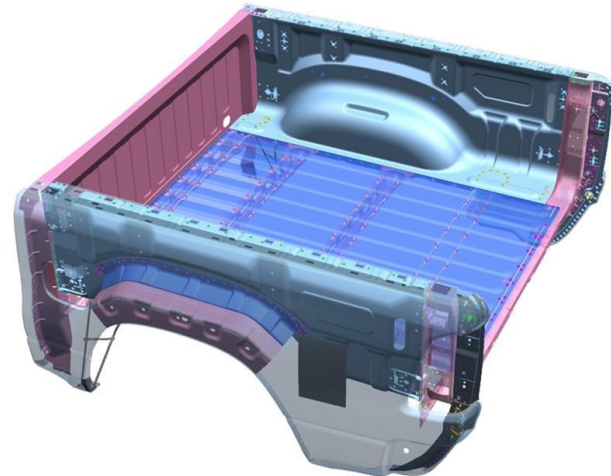
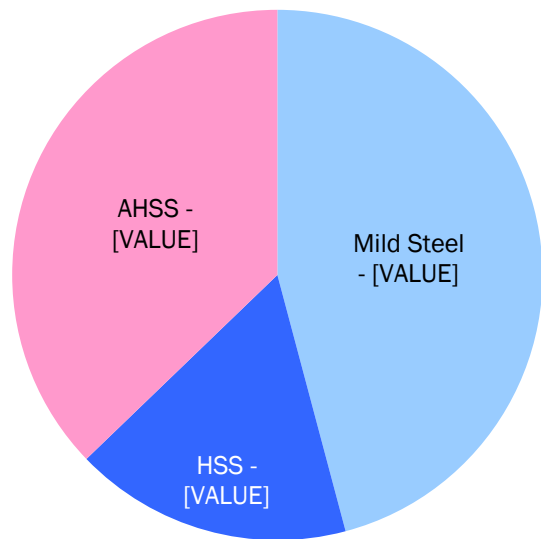
# DT Crew Material Summary - Upperbody



- Mild steel used for exterior surface parts requiring high formability and appearance
- Dual phase steel structural reinforcements
- Hot stamped steel door ring structure and front header provide strong, lightweight designs for impact

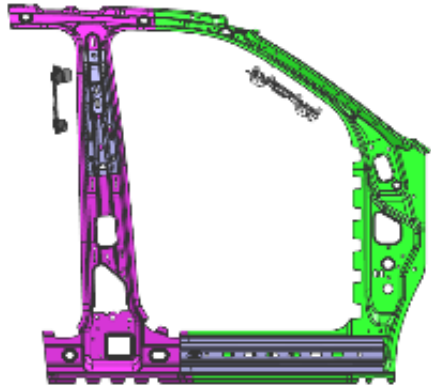


# DT Material Summary - 5'7" Box



- Mild steel panels for parts with high formability requirements
- HSS floor panel
- AHSS hydroformed rear
- Dual phase steel crossmembers and front panel to maximize durability and lower weight

# Bodyside Structure Weight Comparison



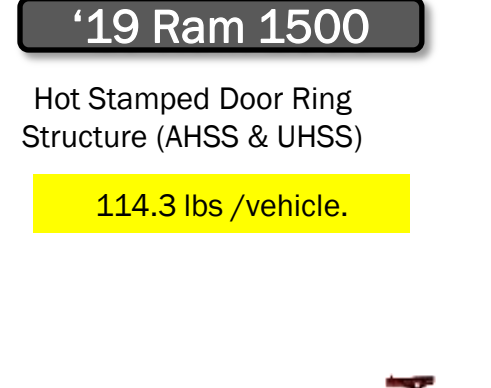
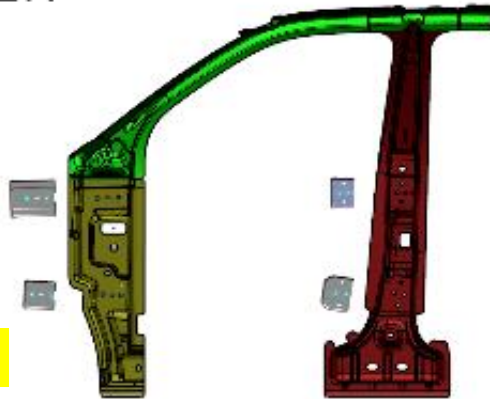
**'18 Ram 1500**

Multi-piece Door Ring Construction (HSS)

136 lbs/vehicle

32 lbs

36 lbs



**'19 Ram 1500**

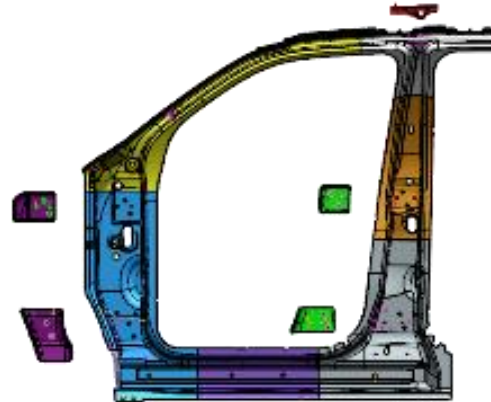
Hot Stamped Door Ring Structure (AHSS & UHSS)

114.3 lbs /vehicle.

22 lbs

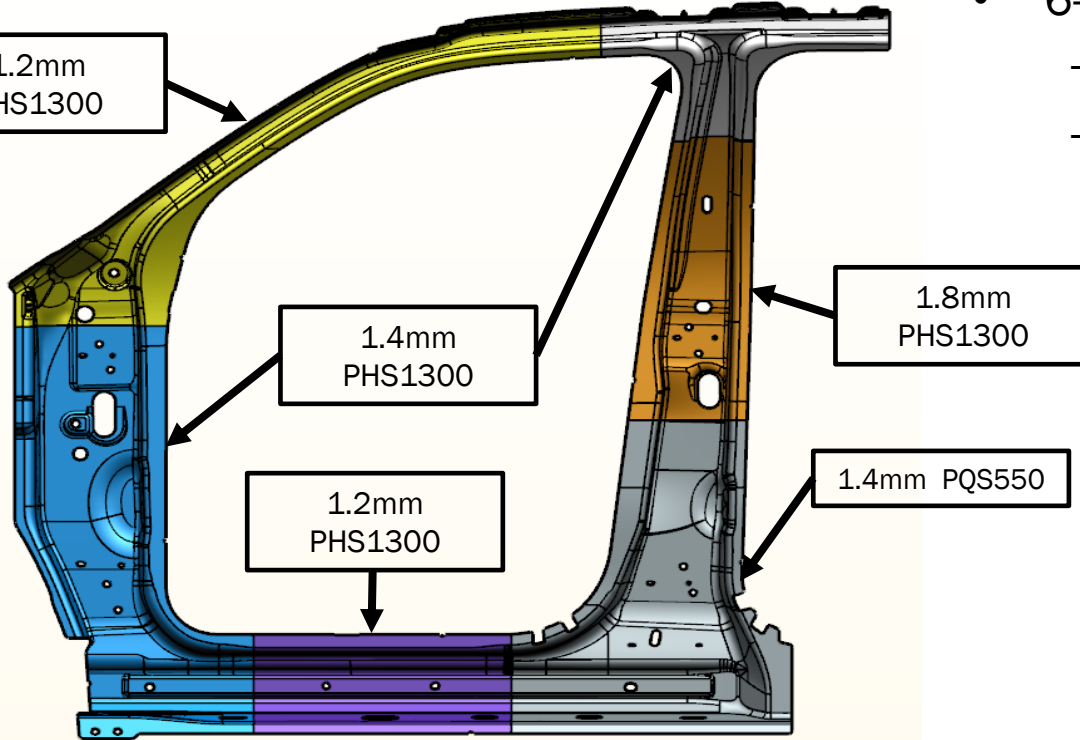
**21.7 lbs saved per vehicle**

35.2 lbs

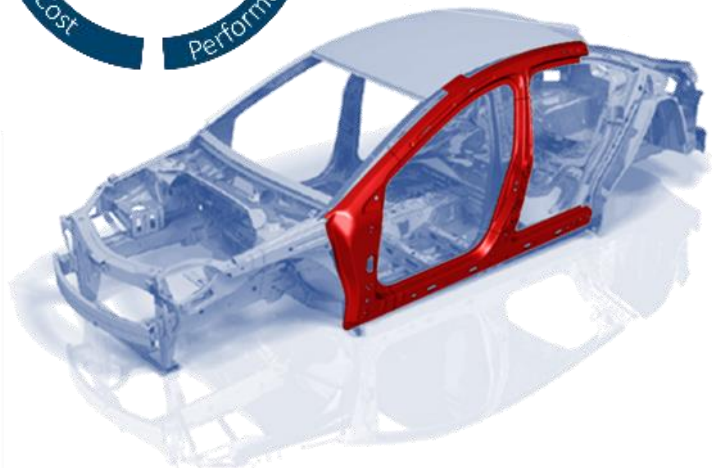


# Hot Stamped, Laser-Welded Blank Door Ring

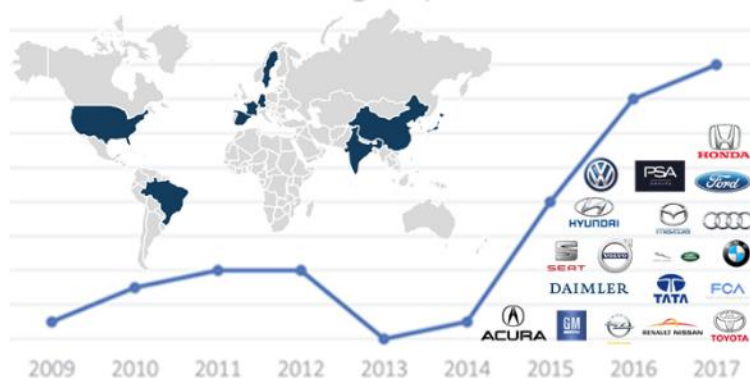
- 6-piece Laser Welded blank
  - 4 gauges
  - 2 material grades
    - Press-quenched grade for lower B-pillar to allow increased elongation and optimize B-pillar mode for side impact



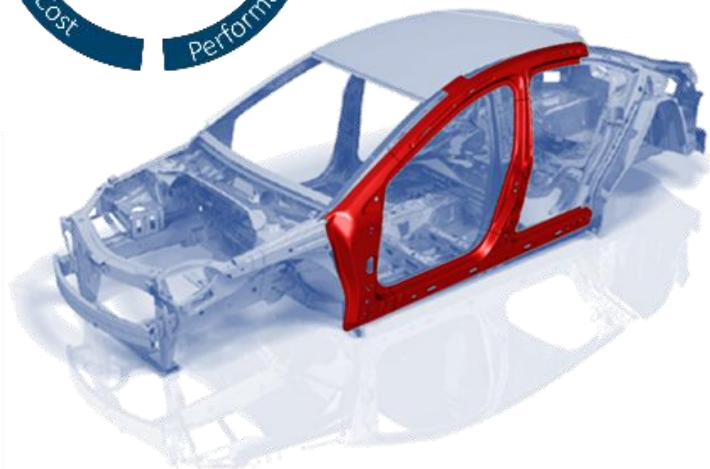
# Gestamp Door Ring Overview



### Door Ring Requests



# Gestamp Door Ring Overview



## Cost savings...

- Reduced Complexity OEM assembly line
- Reduced floor space in customer assembly line
- Reduce tooling investment
- Spot weld reduction
- High Stability
- Improved Efficiency



## ... with weight savings

- Joint continuity
- Dimensional accuracy

## Door Ring Requests



# Gestamp Mason Production Plan

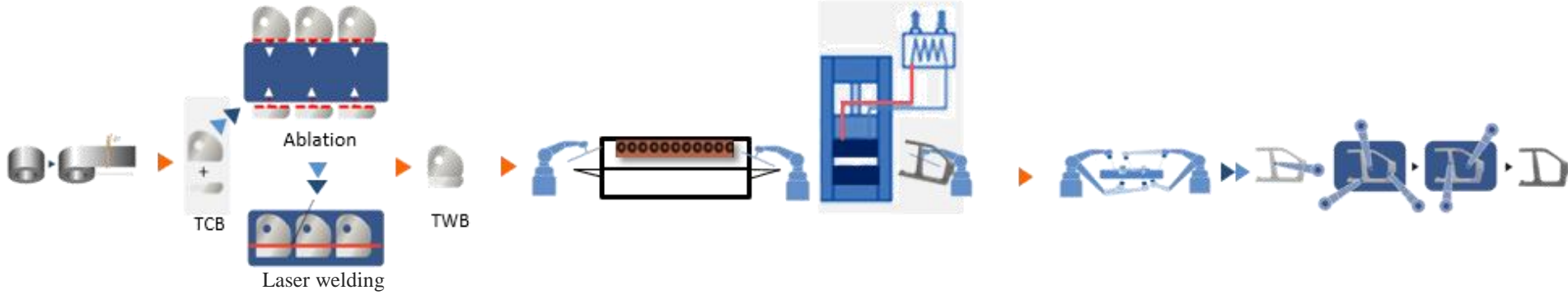
- ✓ 3 specific Press Hardening Door ring lines

- ✓ 1 Door ring laser cutting cell with 9 dedicated robots



# Door Ring Manufacturing Process

## DOOR RING MANUFACTURING PROCESS CHAIN



Blanking

Laser welded blanks

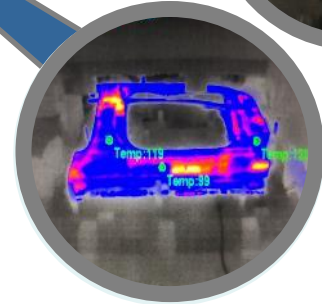
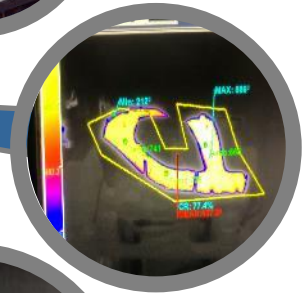
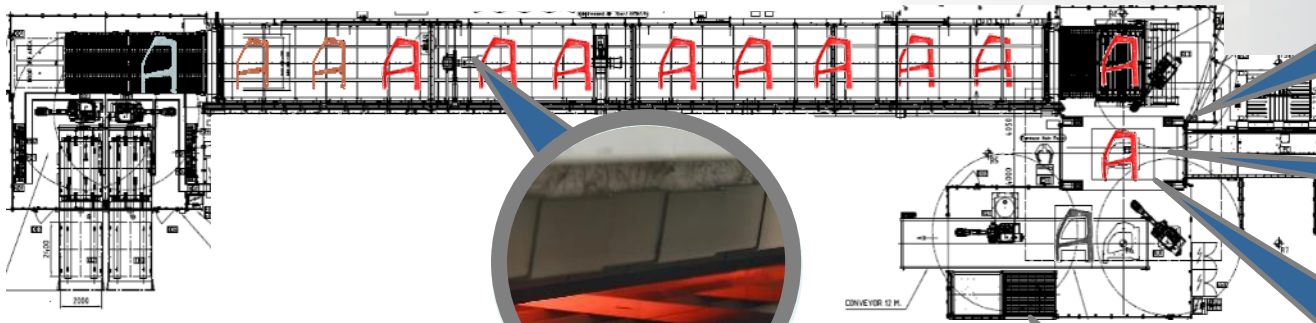
Press hardening process

Robot laser cutting & Final welding assembly



# Gestamp Mason Production Plan

## GESTAMP STANDARD DOOR RING PH LINE



### Key features

- ✓ Sized for Door Ring efficiency
- ✓ 1600 Ton high speed hydraulic press
- ✓ Full process parameter control, monitoring & data storage
- ✓ CQI-9 Standard compliance & cloud connected
- ✓ Automatic racking system

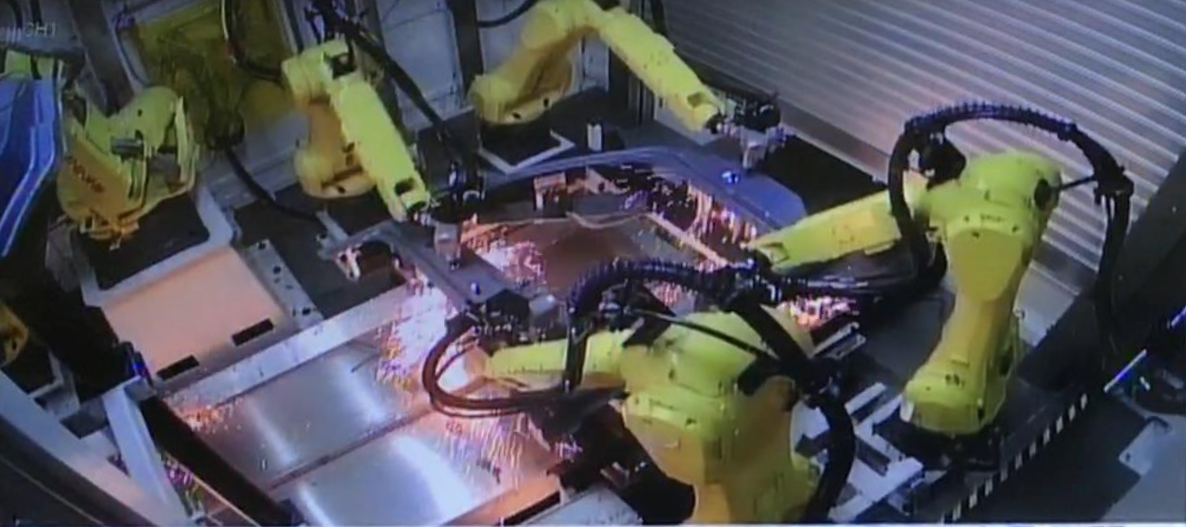


# Gestamp Integrated Laser Cutting/Assembly

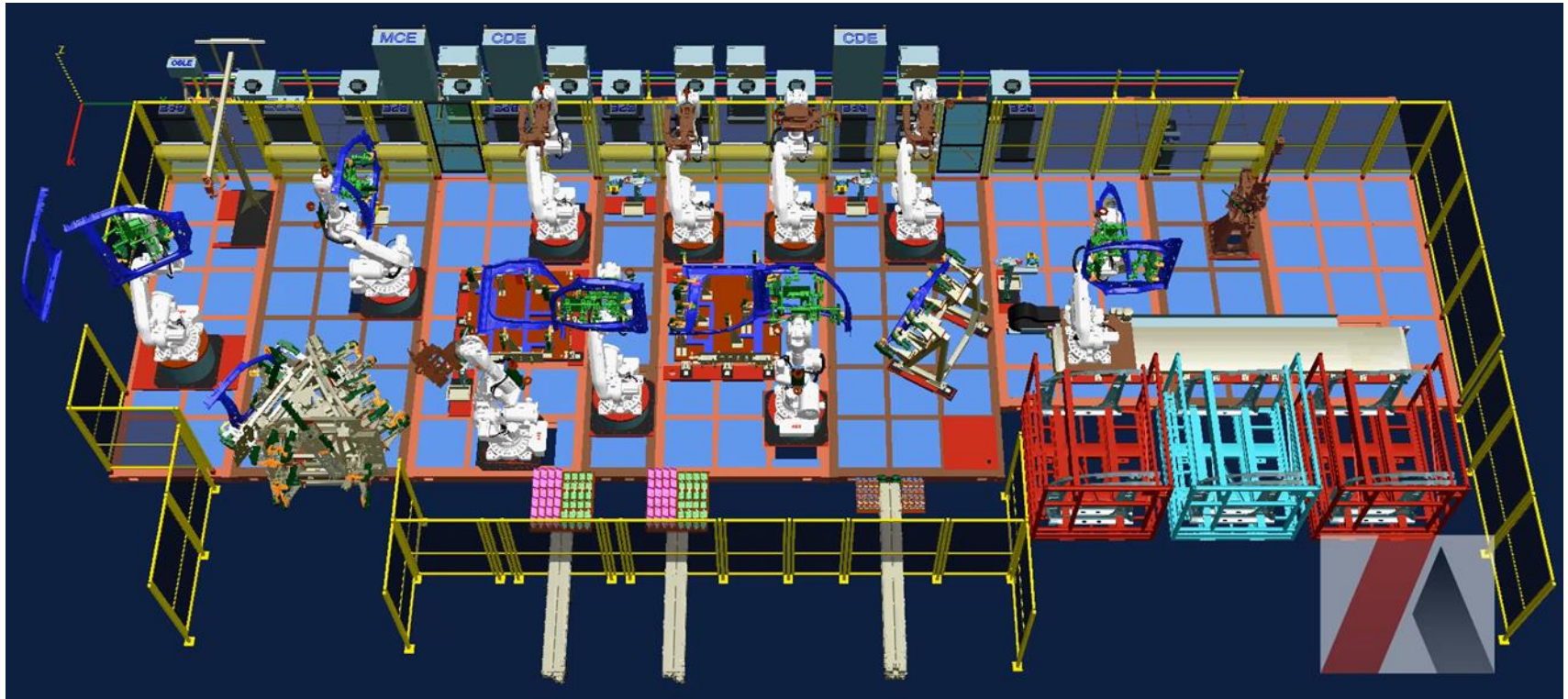


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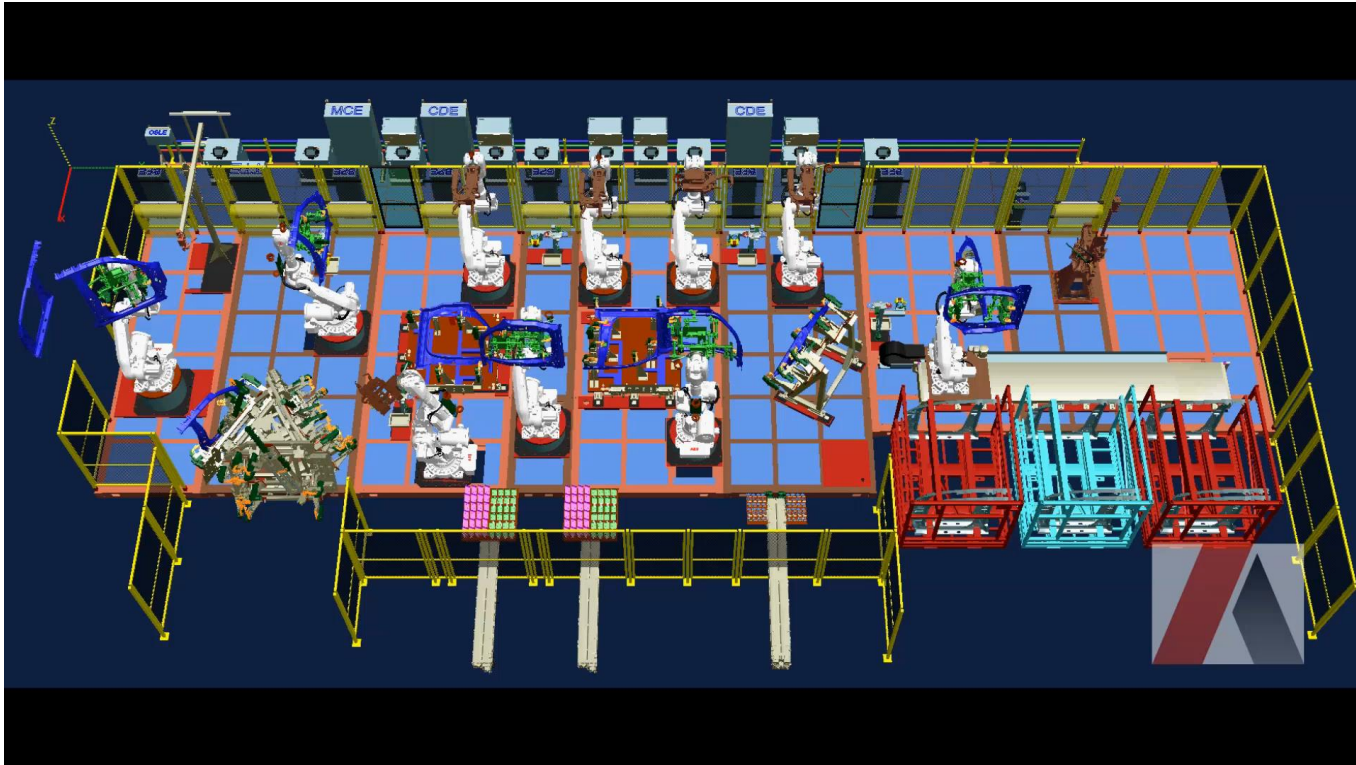




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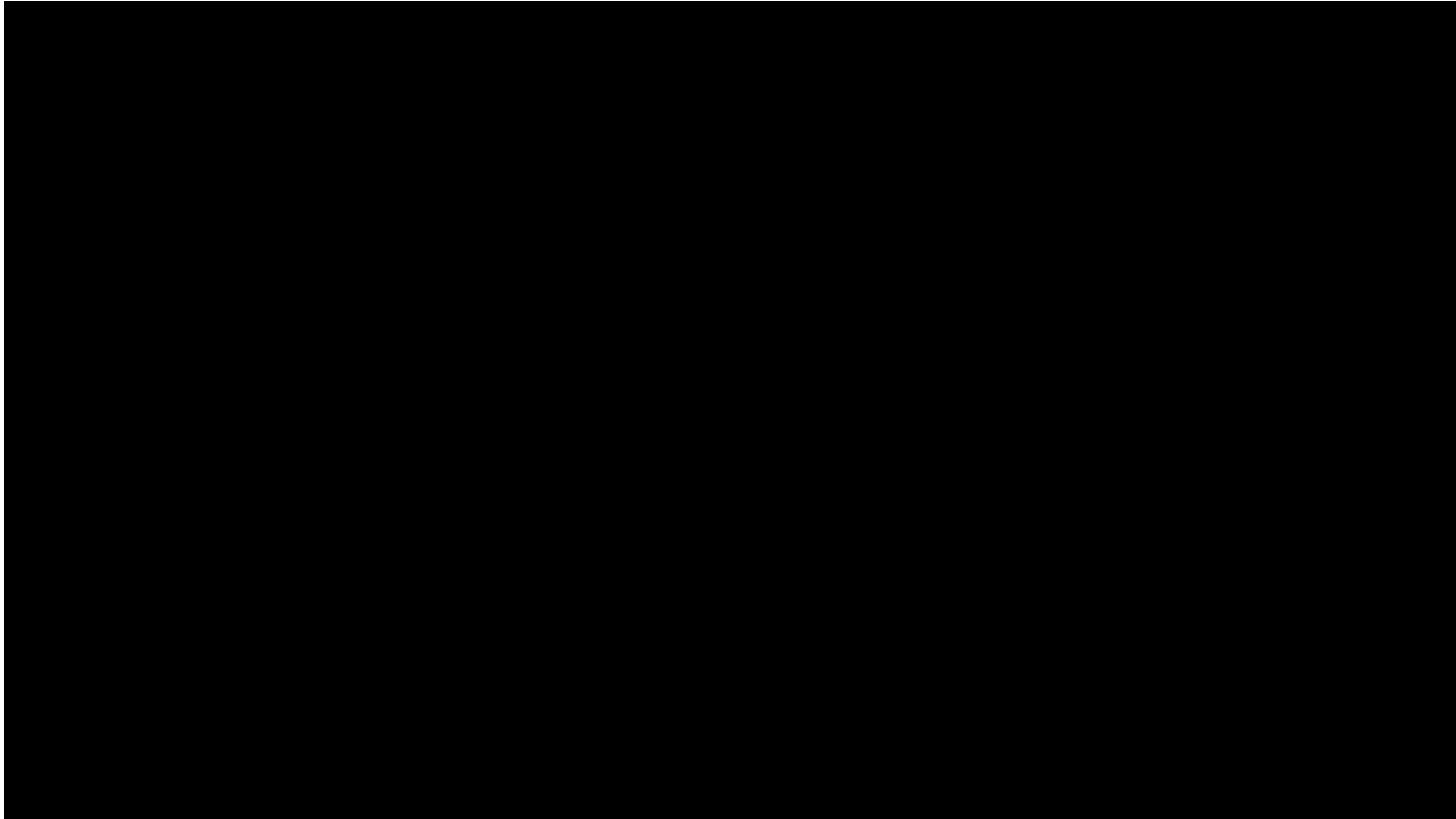
# Gestamp Integrated Laser Cutting & Assembly

- Advantages: Assembly laser cutting cell vs. multiple cabinets
  - Dimensional variation minimized
  - Significant floor space reduction (~70%)
  - Zero direct operators (reduction ~10)
- Adjust features or trims easily & quickly
- No mechanical moving parts other than Robot's –Improved OEE
- Laser cutting operation synchronized with assembly –Reduces WIP and increases efficiency
- Plant work flow improved -Indirect operators significantly reduced

# Gestamp Mason DT Door Ring Line



# Gestamp Mason DT Door Ring Line



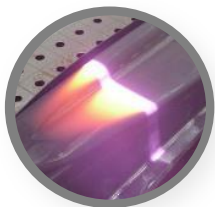


# Gestamp Door Ring Future Innovations



## GesWire - Gestamp LWB

AlSi coated steels laser blank welding technology without coating removal pre-process



## BKT – Softening by laser

Controlling final microstructure transformation with optimum strength and ductility for each material grade



## Zn coated material

Cathodic corrosion protection with no need for ablation in the laser blank welding process



## Next Gen PHS Grades

1000 & 2000 MPa steels to create lighter and stronger solutions



## Press-Quenched High Elongation Steel

Kinematics control with soft material, crash energy absorption with crack/failure avoidance



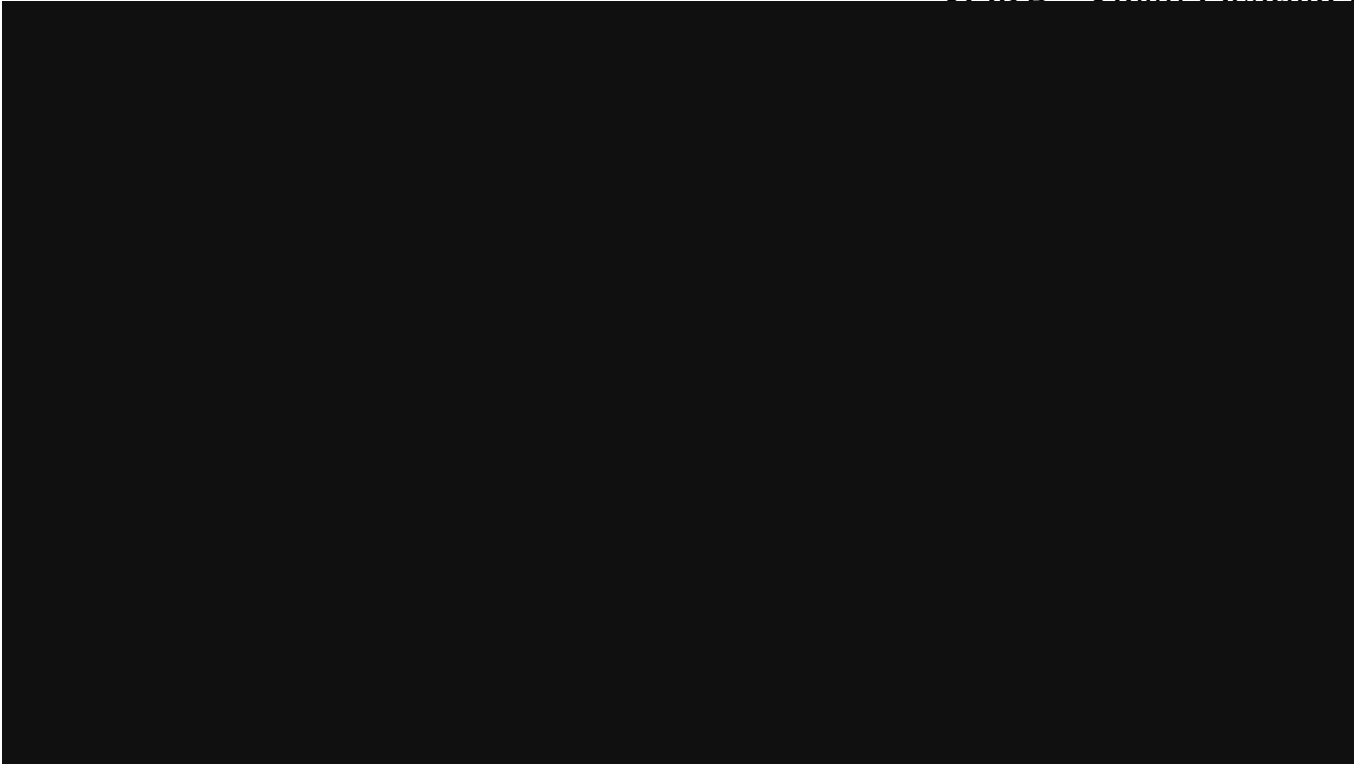
# Body Strength – SORB Test

SORB - Small Overlap Rigid Barrier



# Body Strength – SORB Test

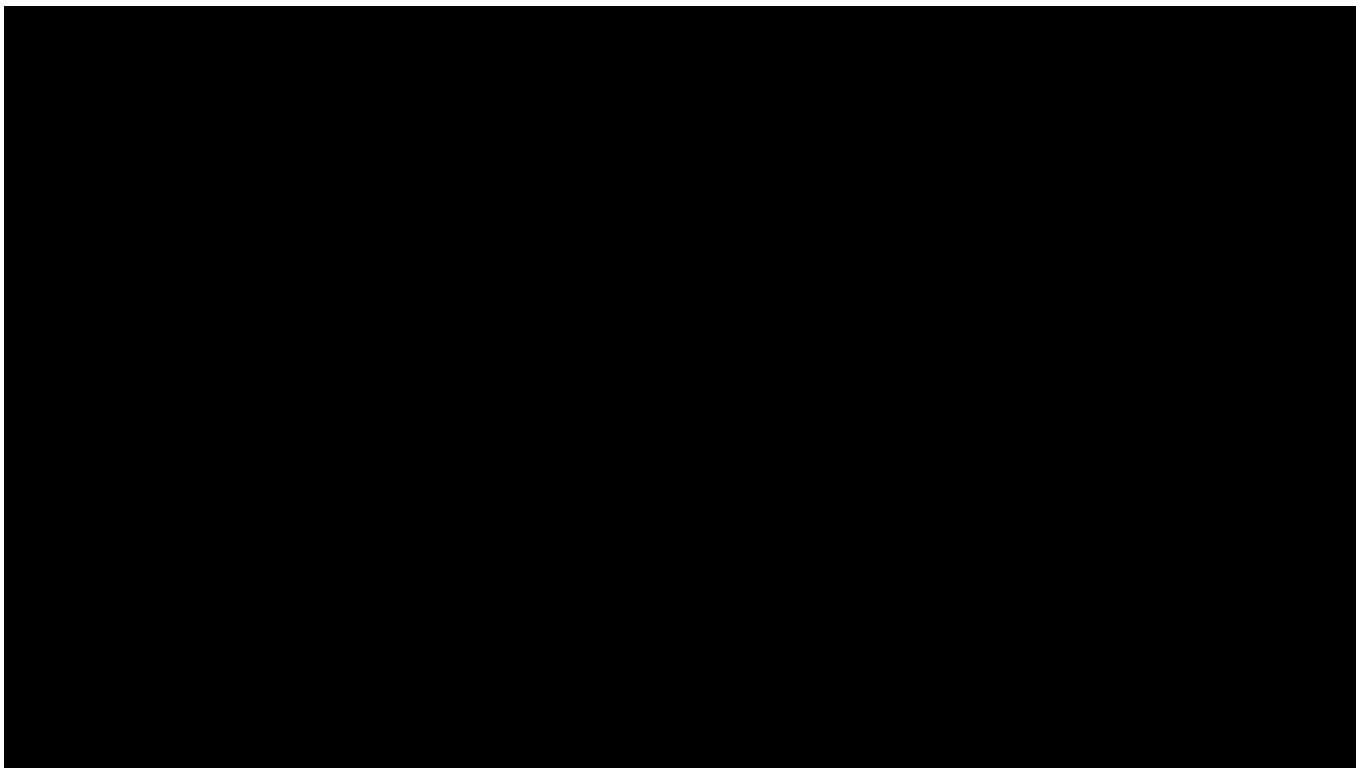
SORB – Small Overlap Rigid Barrier



# Road Test Simulator Video



# Road Test Simulator Video



# 3<sup>rd</sup> Party Feedback



***“In what’s about to become the hottest year ever for new pickup unveilings, the 2019 Ram 1500 hits the road first with a smooth, quiet ride and high-end features no competitor can top.”***



***“Ram’s opulent interior options, ever-improving ride quality, and revised powertrains can only mean one thing: war.”***



***“The truck is chock-full of the latest technology, it’s off-road skills have been increased, and it’s work efficiency has been enhanced. Overall we are impressed.***



***“And unlike past Ram interiors, all of the switches and knobs look like high-quality bits that were made for this specific truck instead of belonging to some overused corporate Lego set.”***



***“On the San Antonio freeways and the outer-ring highways, the suspension tuning was a standout feature, turning choppy ruts and expansion joints into invisible obstacles.”***

# Summary

- Improvements in steel technologies have helped make the All-New 2019 Ram 1500 a more capable and lighter truck
  - 225lbs of vehicle weight reduction
    - Increased fuel economy
    - Higher payloads and towing capability
  - 101lbs weight save from the body structure
- Strategic mix of a wide range of commercially available steels
  - Improved comfort, safety and NVH refinement
- A new standard hot stamping line with integrated laser cutting and assembly has been developed for efficient door ring press hardened production



# For More Information

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