



Lightweighting without compromise.™



# Shiloh Industries

## *General Presentation*

# Company Heritage

ESTABLISHED

**1950**

HQ: Valley City, OH

PUBLIC FILING

**1993**

NASDAQ: SHLO

**33 LOCATIONS**

SERVING ASIA, EUROPE & NORTH AMERICA

**4,400**  
EMPLOYEES

ANNUAL TURNOVER

**>\$1 BILLION**



# Shiloh Vision & Mission

## VISION:

We believe in creating innovative solutions for sustainable mobility and a safer, healthier environment.

## MISSION:

We will consistently deliver value-creating, sustainable lightweighting solutions through team excellence and world-class customer service to the global transportation community.

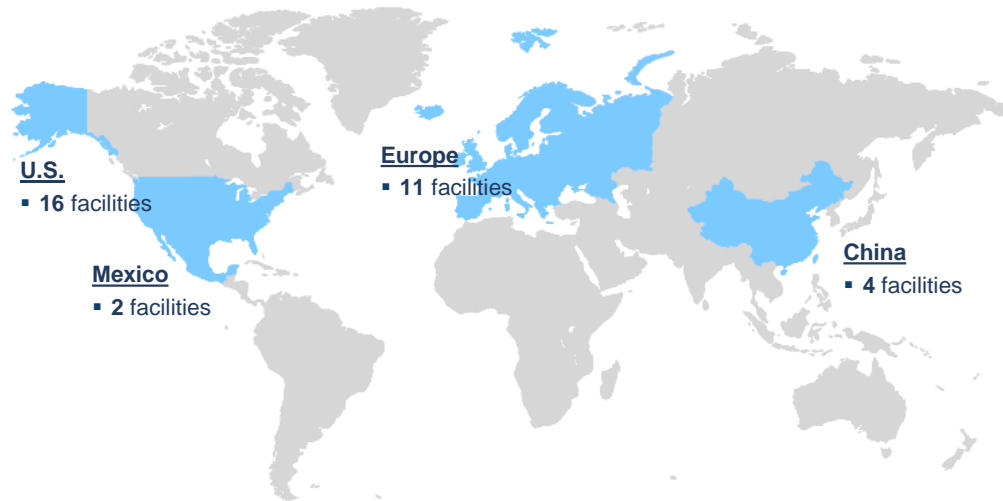


# Executive Summary

## Shiloh at a Glance

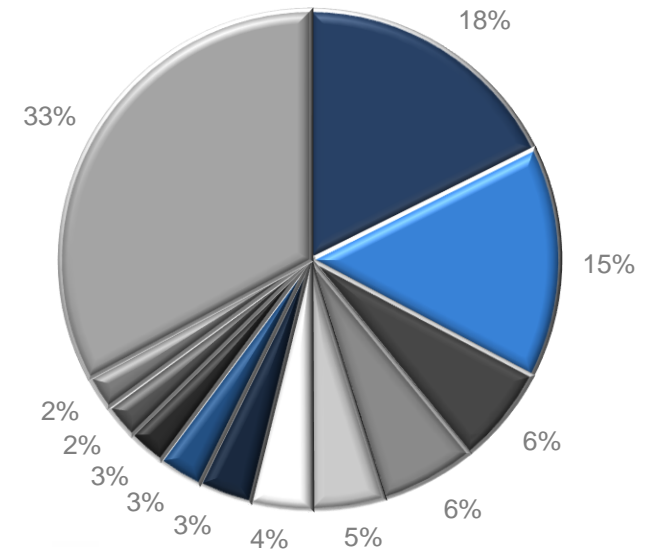
- Shiloh is the leader in lightweighting and noise, vibration, and harshness (“NVH”) solutions to the automotive, commercial vehicle and industrial markets
- Shiloh provides full service supplier, light weight, structural solutions for:
- Body, Chassis, Powertrain, Interior, Seating and more
- Our advanced product design, engineering and manufacturing, utilizes a vast range of alloys in aluminum, magnesium, mild and high-strength steels

### Global Footprint



### Customer Diversity

*Revenue spread globally amongst blue-chip customer base*



# Company Overview

## Principal Processes

### Blanking & Joining



### Die Casting & Machining



### Stamping



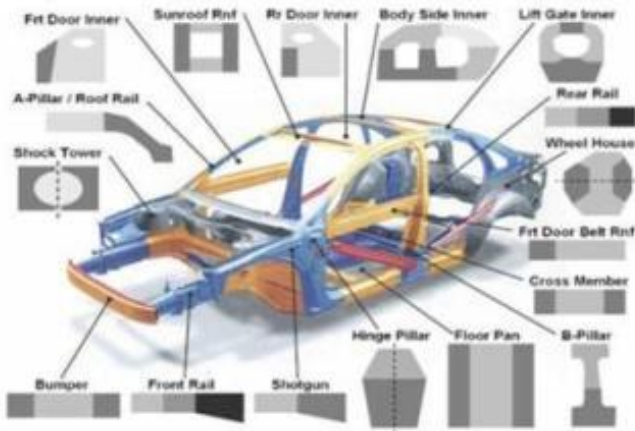
### Acoustic Laminates



### Heat Treatment



### Assembly & Logistics

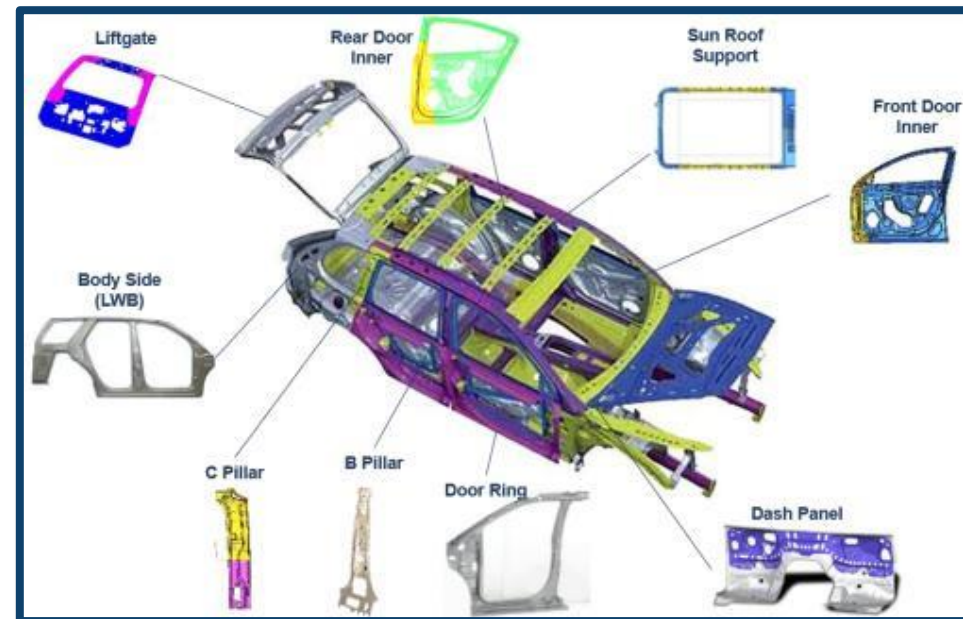
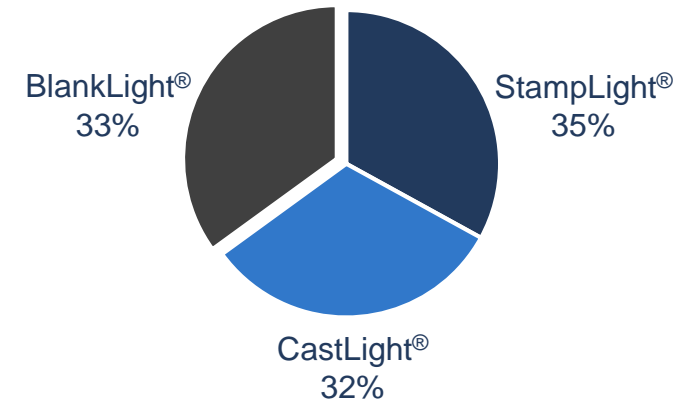


# ***Strategic Brands***

# BlankLight® Products

- Engineered blank solutions
  - Customized for customer needs utilizing advanced materials and technologies to reduce weight, improve noise, vibration and harshness (“NVH”) and to reduce total system cost
- Top producer of laser welded blanks (“LWB”) in North America
- Processes include:
  - Laser welded blanks
    - Fusion laser weld and mash seam resistance
    - Linear and curvilinear applications
  - ShilohCore™ acoustic laminate blanks
    - Acoustic Coil Laminate (ACL)
    - Acoustic Patch Laminate (APL)
  - Precision blanks
    - Proprietary tool designs result in fine blanking quality at conventional speeds. Applications include components where quality of fit and finish is critical
- Primary materials:
  - Mild / high strength steel
  - Increasingly aluminum

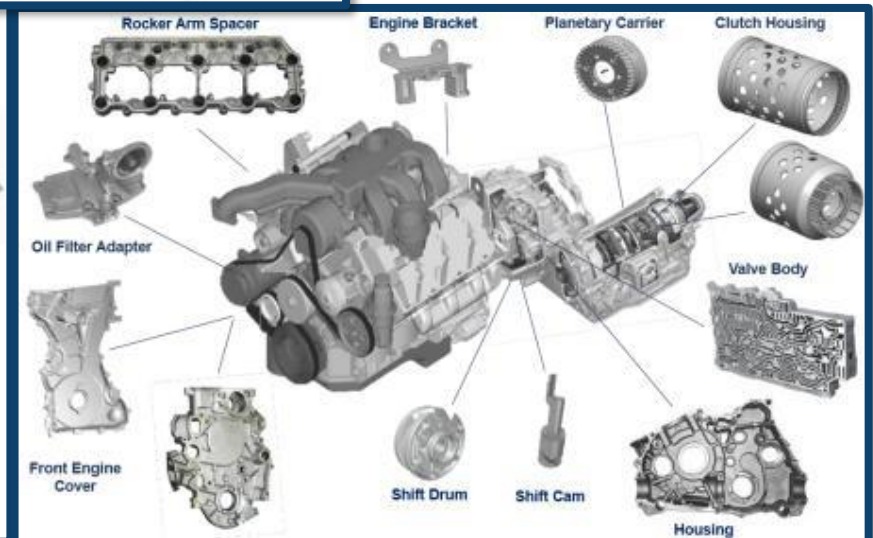
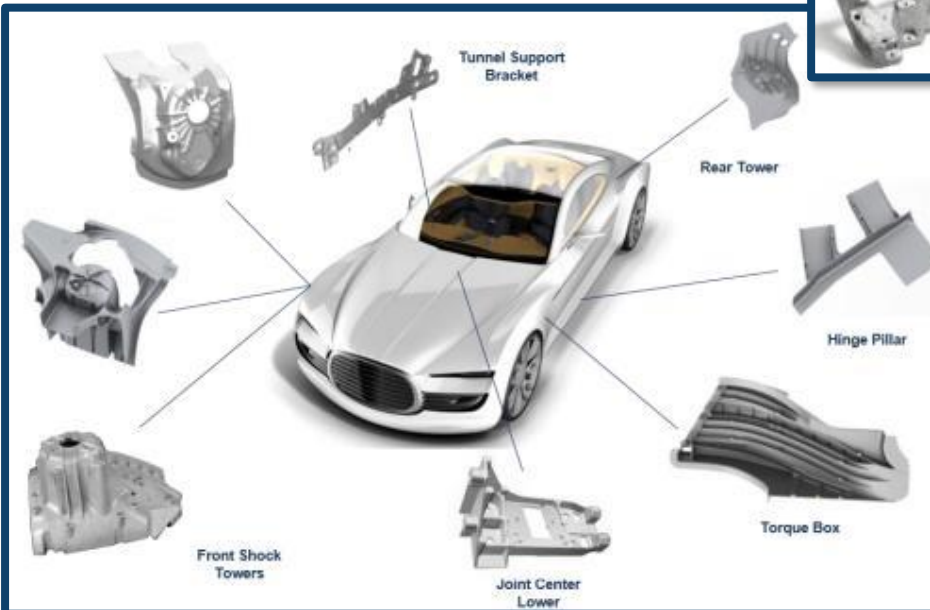
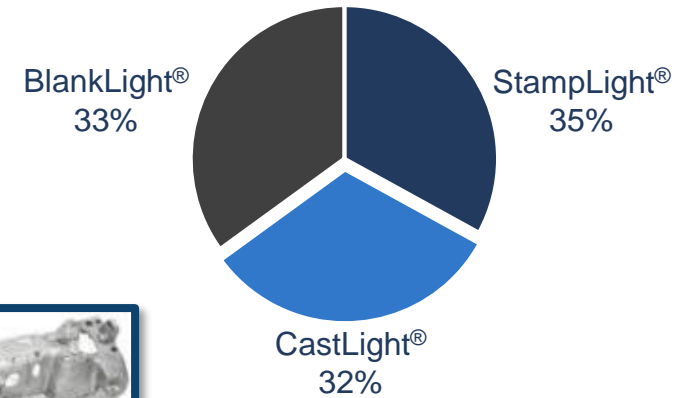
**2018 Revenue by Product Line**



# CastLight® Products

- Leading structural aluminum die caster in North America, and magnesium die caster in Europe
  - Full range of thin to thick walled castings, cross-car beams, shock towers, battery boxes, chassis components
- Processes include:
  - ThinTech™ die cast
  - High pressure die cast
  - Squeeze cast
  - Heat treat
  - Precision machining
  - Assembly
- Primary materials:
  - Aluminum
  - Magnesium

## 2018 Revenue by Product Line

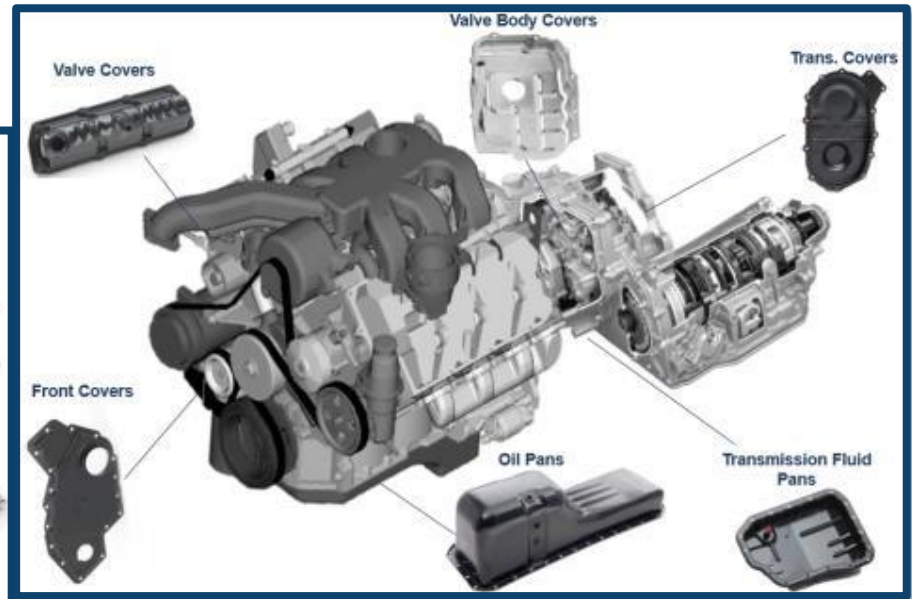
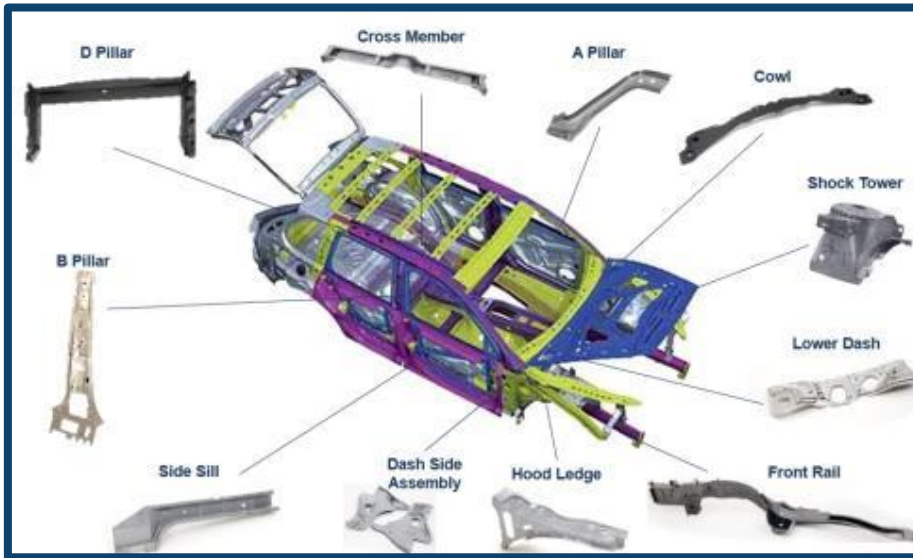
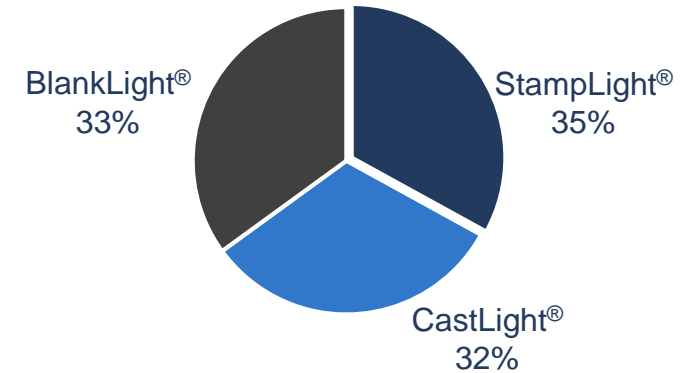




# StampLight® Products

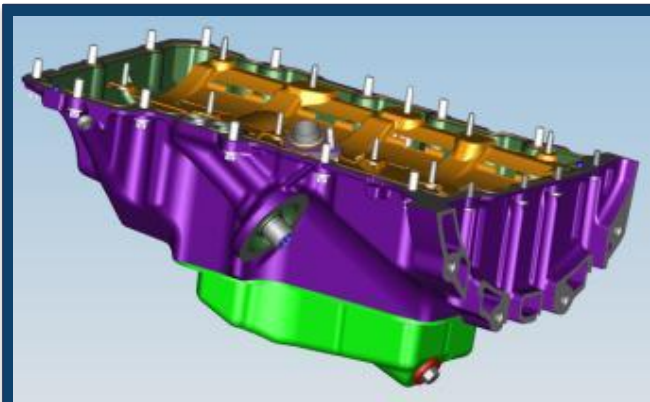
- Major large tonnage stamper
  - Aluminum, steel and steel alloy components in body-in-white, powertrain, seat frames, exhaust and other structural body components for automobiles and commercial vehicles
- Processes include:
  - Single stage
  - Progressive
  - Deep draw and transfer die (stamping)
  - Welding, assembly, painting (assemblies)
- Primary materials:
  - Mild / high strength steel
  - Increasingly aluminum

2018 Revenue by Product Line



# Multi-Material Solutions

- “One Stop Shop” for engineered, hybrid solutions utilizing multiple processes and materials
- Uncompromised balance between lightweighting requirements, system cost, and upfront tooling investment



## 2-Piece Oil Pan

(Thintech™ aluminum upper with ShilohCore stamped lower)



## Multi-Process CCBs

(Mg casting for instruments and center stack with steel stamped support frame)

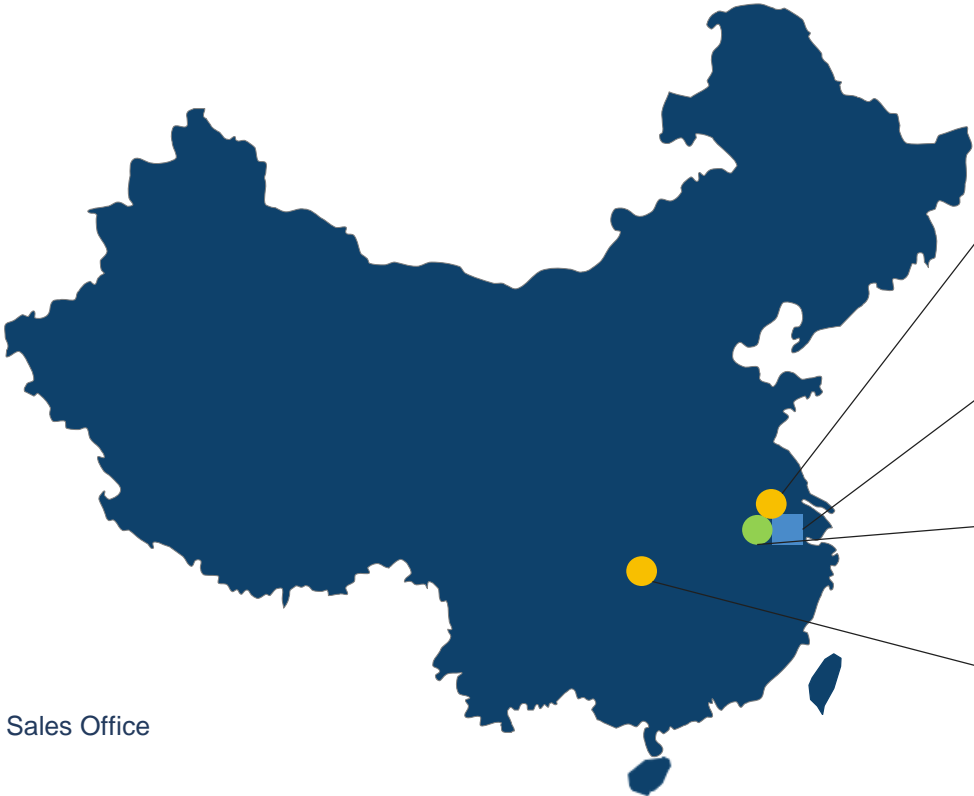
# ***Global Footprint***

# Global Footprint

## Asia



Lightweighting without compromise.™



Nantong



Shanghai



Suzhou



Chongqing

- HQ / Tech Centers / Sales Office
- BlankLight
- CastLight
- StampLight



# Global Footprint

## Europe



# Global Footprint

## North America



# Leading Customer Base

## Select OEM Customers



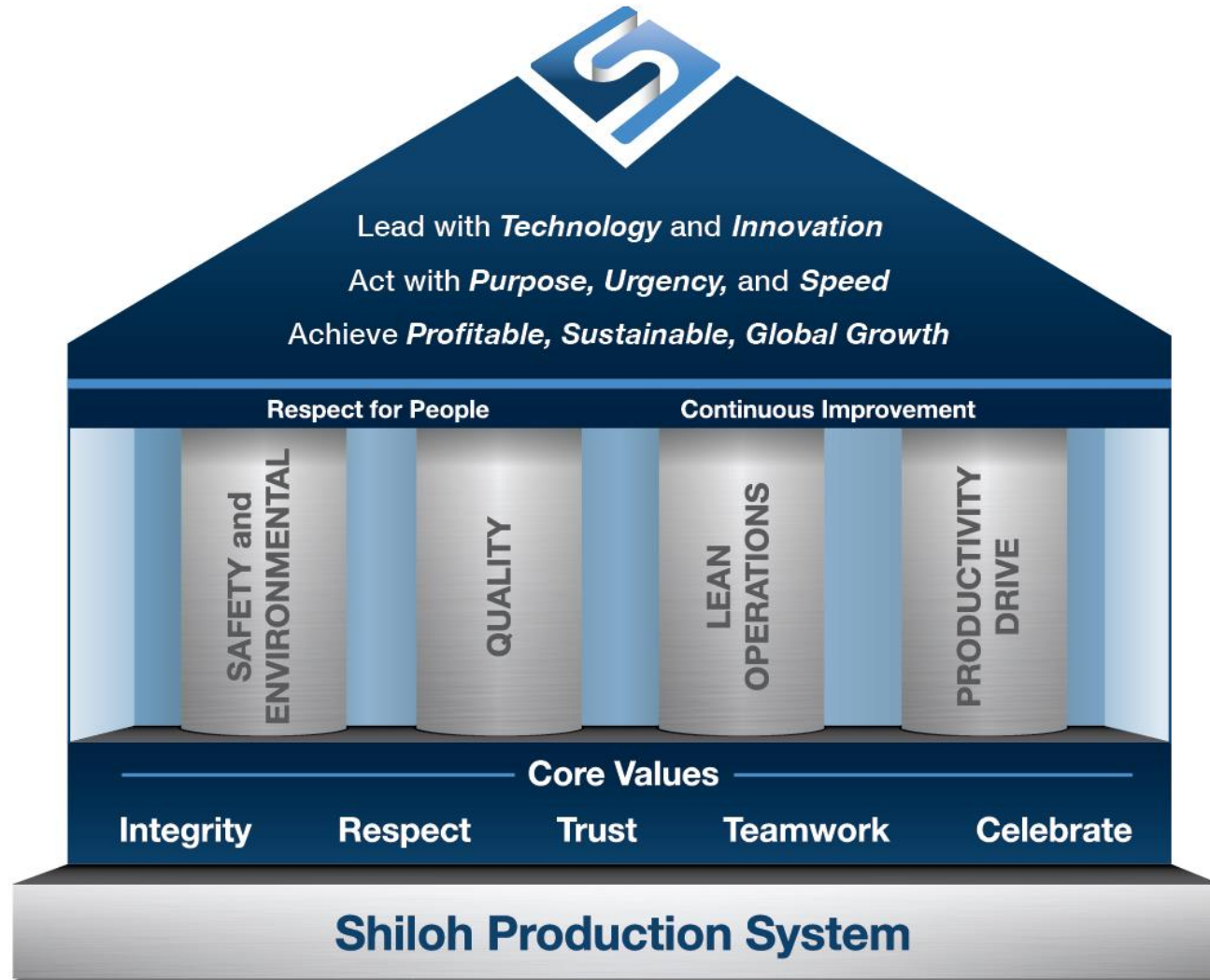
## Select Tier 1 Customers



*Strong Direct Relationships with OEMs and Top Tier 1s – Serving Over 100 Customers*



# Shiloh Production System





# Lightweighting Solutions

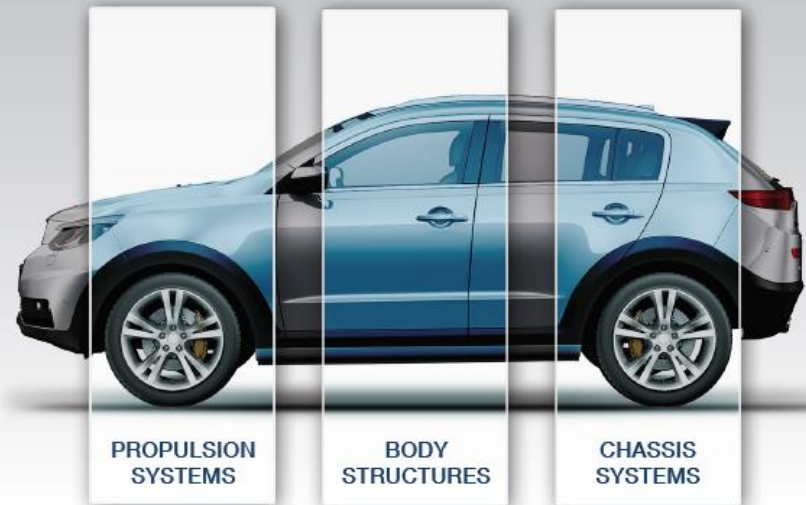
## LIGHT WHERE YOU NEED IT. Lightweighting solutions to optimize system performance.

Shiloh's multi-material portfolio of lightweighting products serving **body, chassis and propulsion** enables:

- Weight reduction without compromising performance or safety
- Reduced NVH without adding weight
- Optimized materials to improve assembly and productivity
- Lower emissions, improved fuel economy and extended battery electric vehicle range



Lightweighting without compromise.®



Safe. Silent. Strong. Sustainable.

Aluminum. Magnesium. Steel.



# Well-Positioned for Success

## Body-in-light™



**Performance gained with every pound you lose.**

Shiloh delivers the leading technology solutions that eliminate weight without compromising performance.

We produce lightweight solutions in aluminum, magnesium, steel and steel alloys, offering the broadest portfolio of products through our expertise in die casting, joining and stamping.



Lightweighting without compromise.™

Safe. Silent. Strong. Sustainable.

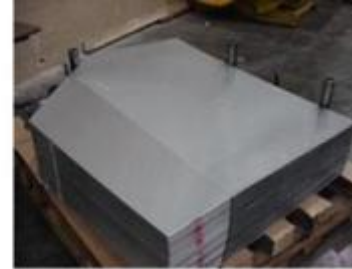
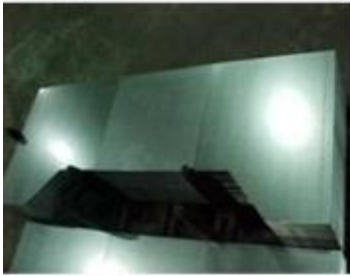
[shiloh.com](http://shiloh.com)



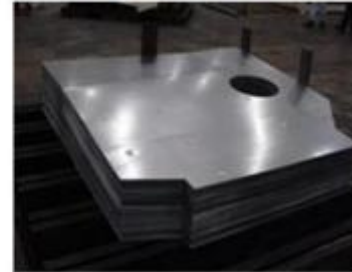
# *Process Expertise*

# Laser Welding

## Linear Welded Components

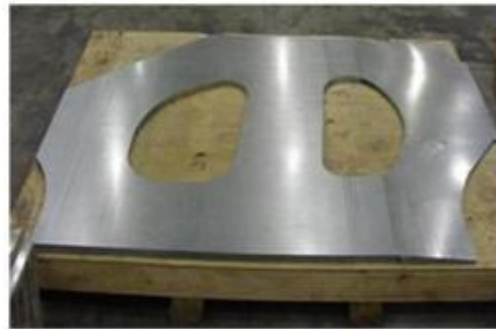


Underbody Components



Door Innern

Body Side Innern



# Laser Welding

## Curvilinear Welded Components

**Rear Door Inner**



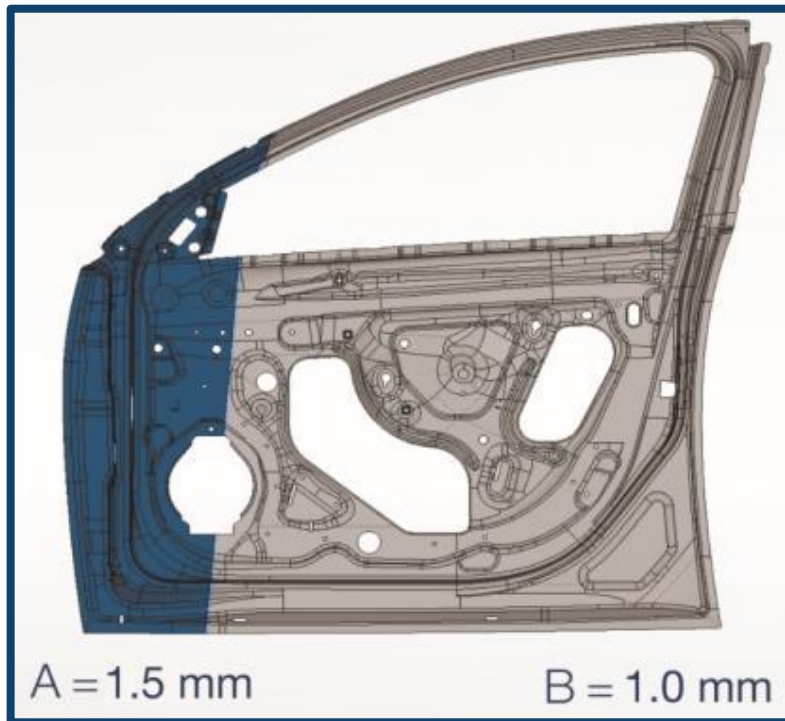
**Window Frame**



# Aluminum Laser Welding

Shiloh's BlankLight® Products

- **Laser welded aluminum door-inner blank**
  - Reduces weight and optimizes material without compromising performance and formability



- Example: (4) single-piece (monolithic), door-inner blanks of similar geometry weigh
  - Switching from steel blanks to aluminum laser welded blanks save nearly 58 lbs per vehicle
- Aluminum (monolithic) door blanks weigh 35.5 lbs, while Shiloh's aluminum laser welded door-inner blanks weigh 26.8 lbs
- A reduction of nearly 9 lbs or 25% per vehicle

# Laminate Products

## ShilohCore™ APL



### Acoustic Panel Laminate

- Base blank panel 0.6 to 3mm thick
- Cover panel 0.4 to 2mm thick
- Base blank max. size 2m x 4.5m
- Adhesive Thickness 0.03mm
- NVH APL treatment is applied only to noise origination for weight and cost savings

## ShilohCore™ ACL



### Acoustic Coil Laminate

- Coils up to 27,000kg, 1.8m wide
- Metal Thickness 0.4 to 1.0mm/sheet
- Adhesive Thickness 0.03mm
- Reduces weight and cost over traditional NVH treatments

### Advantages

- Reduce interior noise by over 2dB
- Reduce mass of damping treatments by 45%
- Reduced total cost by 15% to 20%
- Damping can be applied to areas which are difficult to cover with other materials
- Eliminates additional materials and components in the assembly plant
- Eliminates additional assembly operations

# Stamping

- **Stamping capacity**
  - 20 to 3,000T
- **Presses**
  - Mechanical & Servo
  - Hydraulic
    - Enabling deep drawing
  - Line, progressive, blank fed transfer; coil fed transfer and tandem
- **Various types of metals**
  - Steel
    - Low carbon; high strength carbon alloys (AHSS); stainless
  - Aluminum





# Castings

Aluminum and Magnesium

Global Supplier Capable of a Full Range of Thick to Thin Wall Castings in Aluminum and Magnesium

2 - 4mm (thin)

4 - 10mm

>10mm (thick)

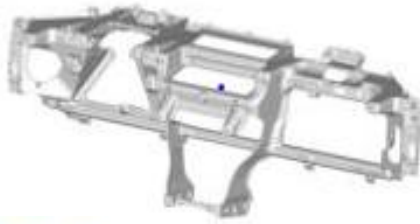
Thintech  
High Integrity Die  
Casting

Vacural HPDC

Enhanced HPDC

Squeeze Cast

500 to 4,000 ton casting press capacity on three continents



Target: Complex Steel Stampings

Target: Complex Geometry/Integrity

Target: Iron Components

- ❑ Structural / body
- ❑ Chassis
- ❑ IP Support

- ❑ Steering
- ❑ Transmission
- ❑ Engine

- ❑ Suspension
- ❑ Axle / Driveline
- ❑ Steering

Market Leader in Technology Converting Complex Ferrous Products to Lightweight Cast Structures



# Castings

## Magnesium

- **High pressure die casting magnesium**
- **Capacity range from 1,100 to 4,000 MT**
  - Enables casting components up to 15 kilograms



# Heat Treatment

- **Equipment**
  - Batch Process Solution Furnaces
  - Continuous Pass-through Solution Furnace
  - Batch Age Ovens
- **Internal Heat Treat Capability**
  - ADC12, A356.2, B390, Aural 2
  - T4, T5, T6, T7
  - Uniformity surveys exceed ASTM requirement
- **Heat Treatment Verification**
  - Heat treat paint
  - Tensile testing
  - Hardness testing
  - Microstructure analysis



# Machining

- **Dedicated dial machines**
  - Robotic load/unload
- **CNC dial machines**
  - 4 axis & robotic load
  - Multi-spindle, rotary transfer, with rotary table
- **CNC machining centers – flexible volume**
  - 3, 4, & 5 Axis
  - Horizontal mills, Vertical mills, Horizontal Turning Centers
  - Robotic and manual load/unload
- **Tight Tolerance**
  - Typical true positions - .020mm
  - Typical diameters – 0.015mm
  - Matched set machining
  - Automated gaging - Hommel Etomic



# Joining

- **Ready-to-mount products**
- **Joining techniques**
  - Press and arc welding,
  - Clinching and other fastening technologies
- **Experienced in joining**
  - multi-material products



# Assembly

- **Logistic solutions and local assembly/joining to optimize landed cost**

JIT centers

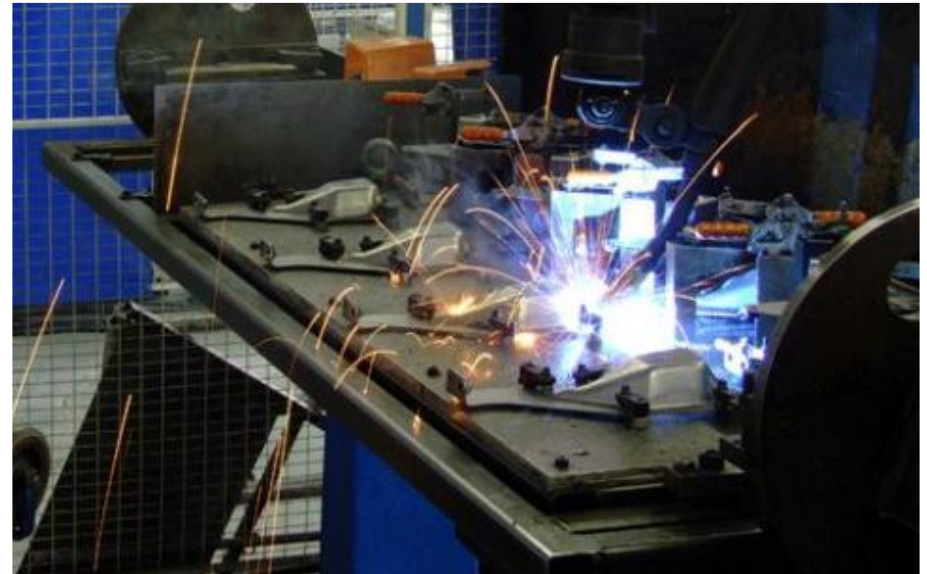
Sweden

Great Britain

Belgium

France

- Products are sent in parts/modules for assembly close to the customer. Within the framework of ongoing production, the products can be adapted to the customers' individual wishes and operating circumstances.
- Production and assembly units are strategically located, often in proximity to our clients' production facilities
- Efficient logistics solutions helps finding the right packaging system and transportation



➔ Optimize supply chain to reach best landed cost

# Assembly

- **Manual and Robotic Welding**
  - Resistance projection weld
    - Spot and Mash
  - Automated braze welding
  - Drawn-arc studs
  - MIG & TIG



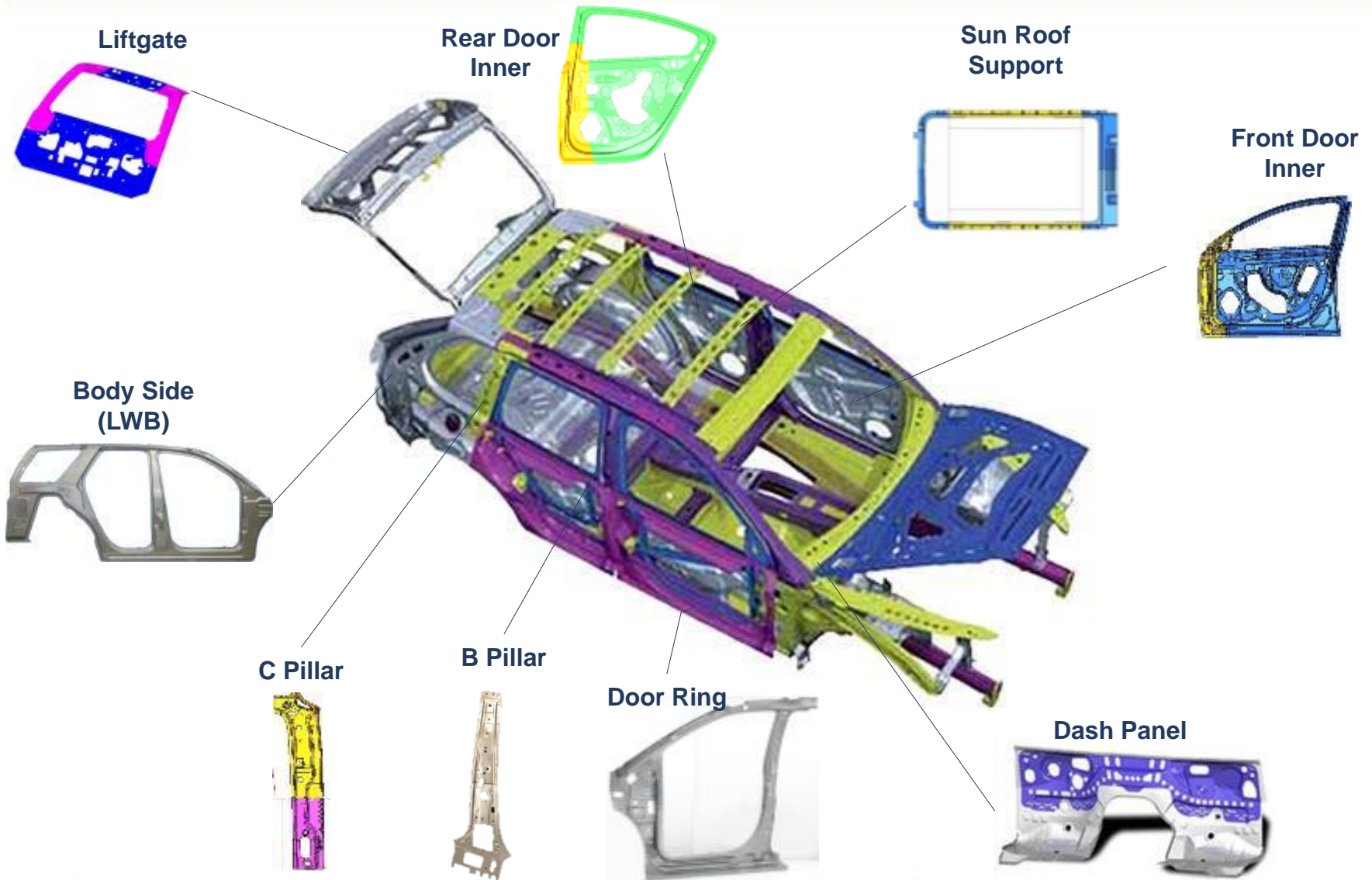
# *Appendix*



# ***Products***

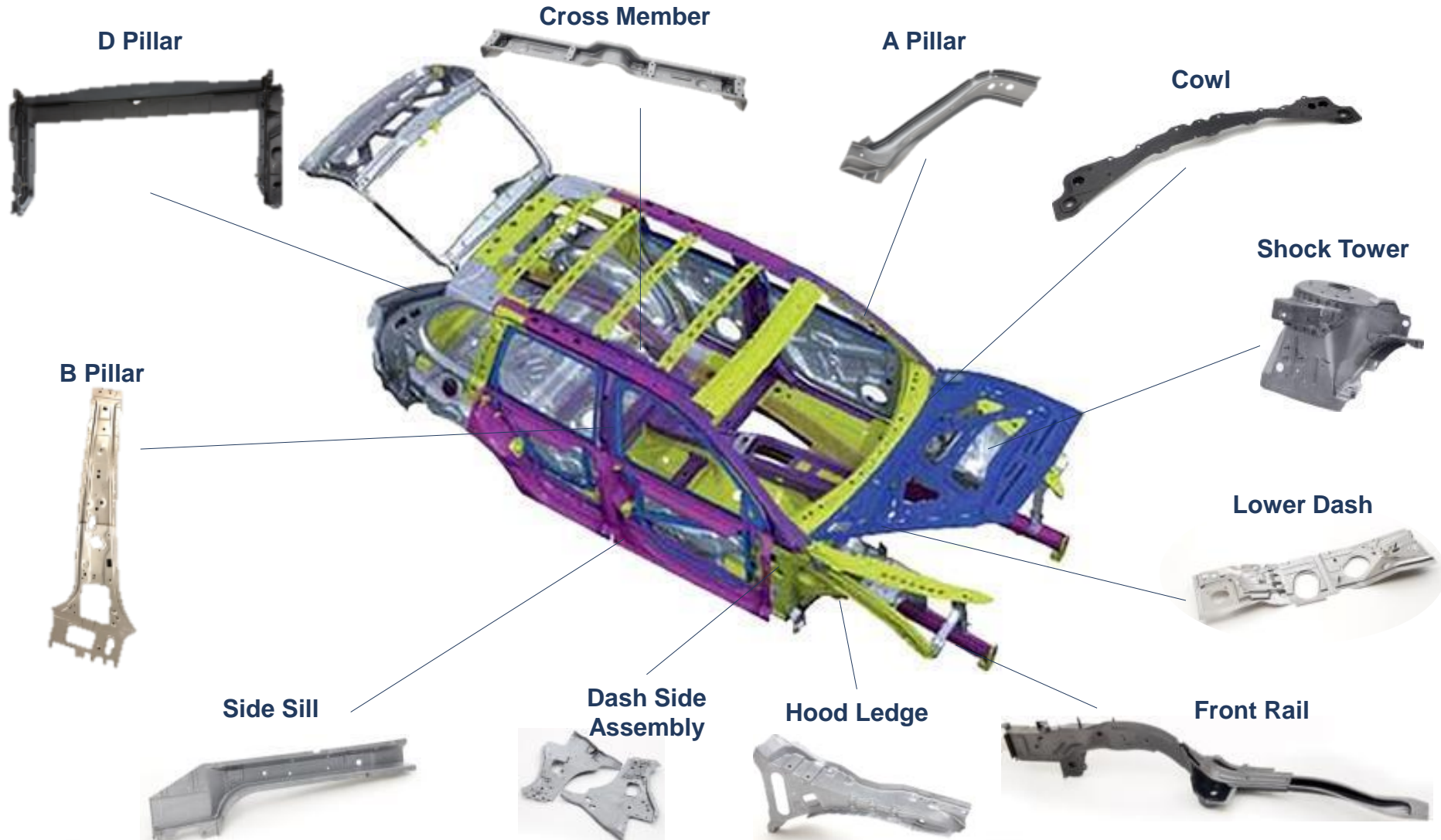
# Body Structures

## Blanking & Laser Welding



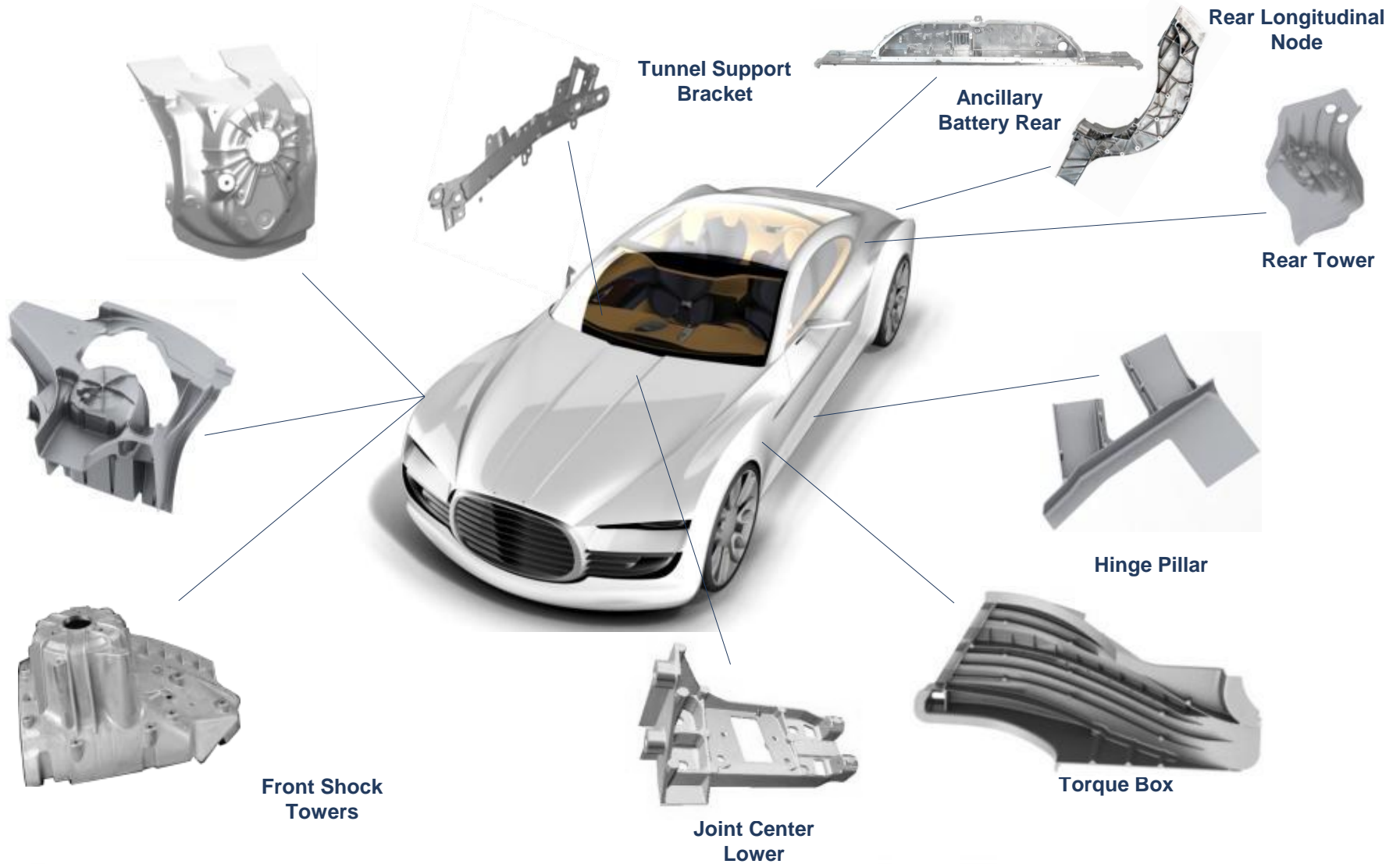
# Body Structures

## Stamping & Assembly



# Body Structures

## Aluminum Casting

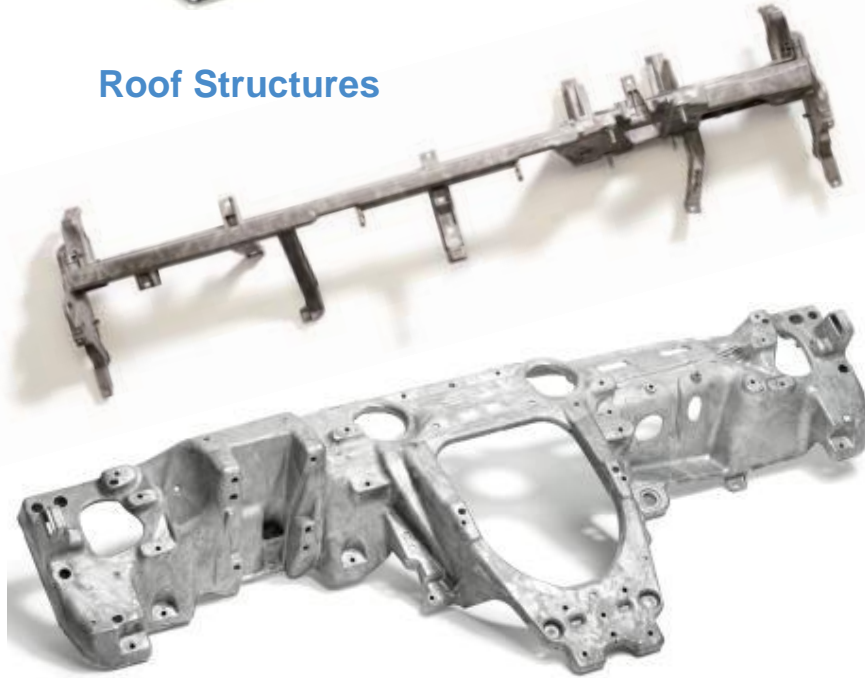


# Body Structures

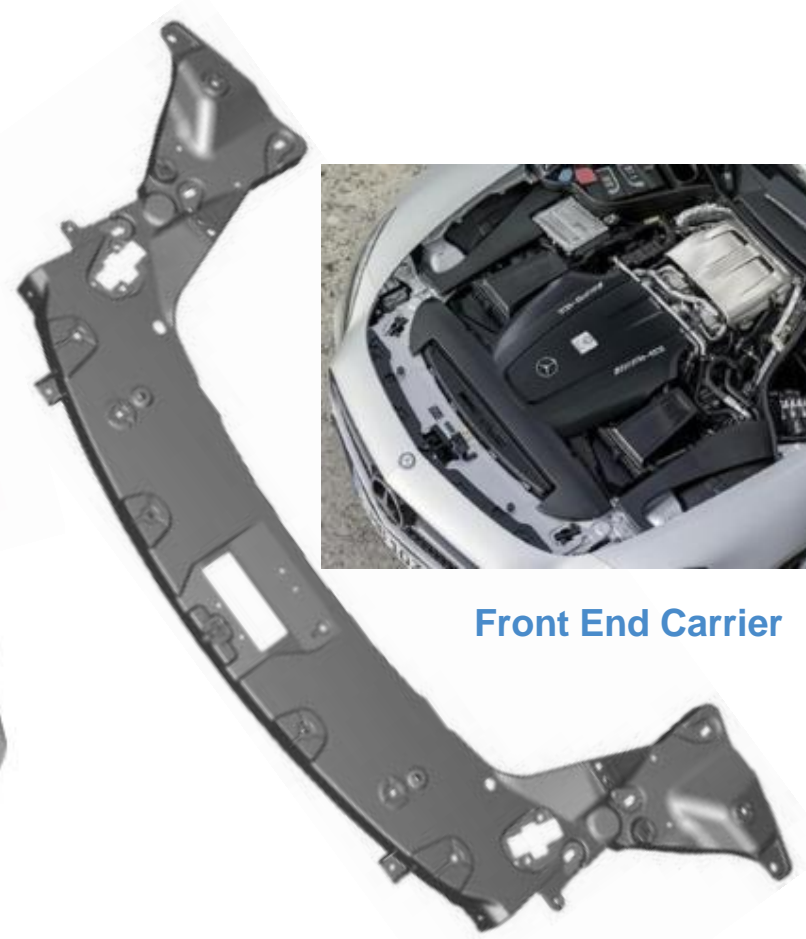
## Magnesium Casting



Roof Structures



Cross Car Beams



Front End Carrier



# Brake Components

Heavy Gauge Blanking & Laser Welding



**Flanges**



**Brake Webs**



**Air Chamber  
Brackets**



**Heavy Truck  
Suspension Blank**

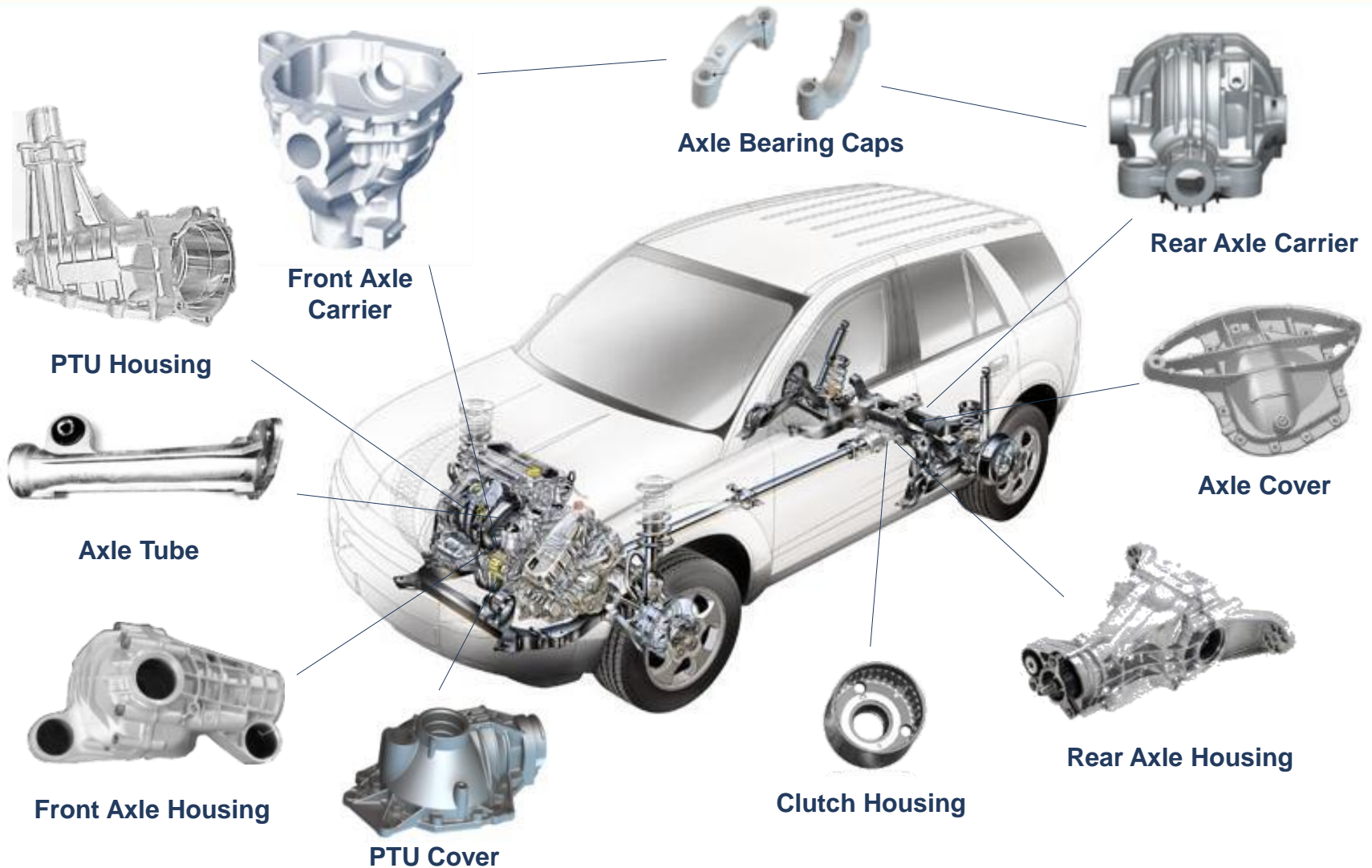


**Wheel Blanks**



# Driveline

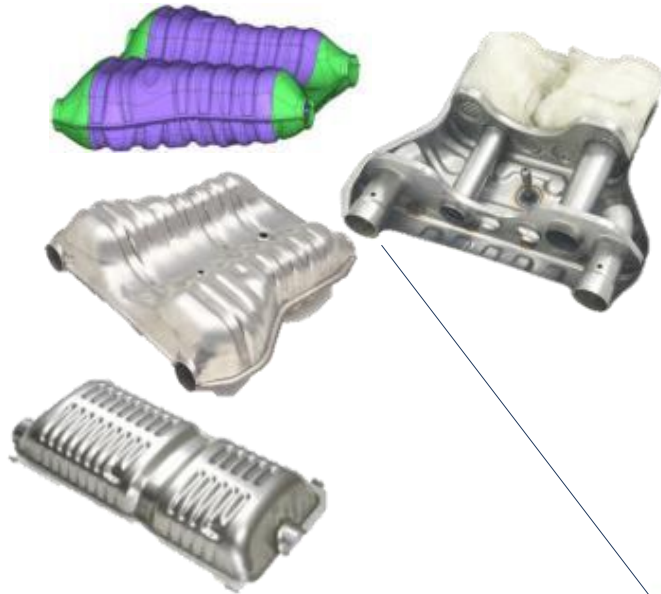
## Aluminum Casting



# Exhaust

## Stamping & Assembly

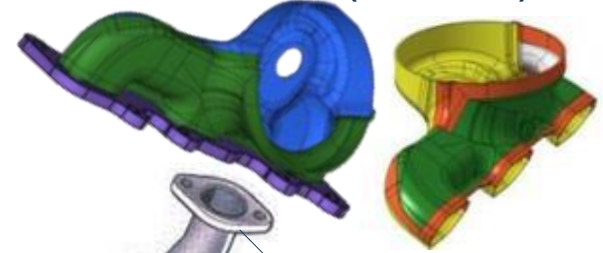
**Muffler Shells (Plain & Laser Welded)**



**Heat Shields**



**Manifolds (Maniverter)**



**Flanges**



**Cones**



**Baffles**





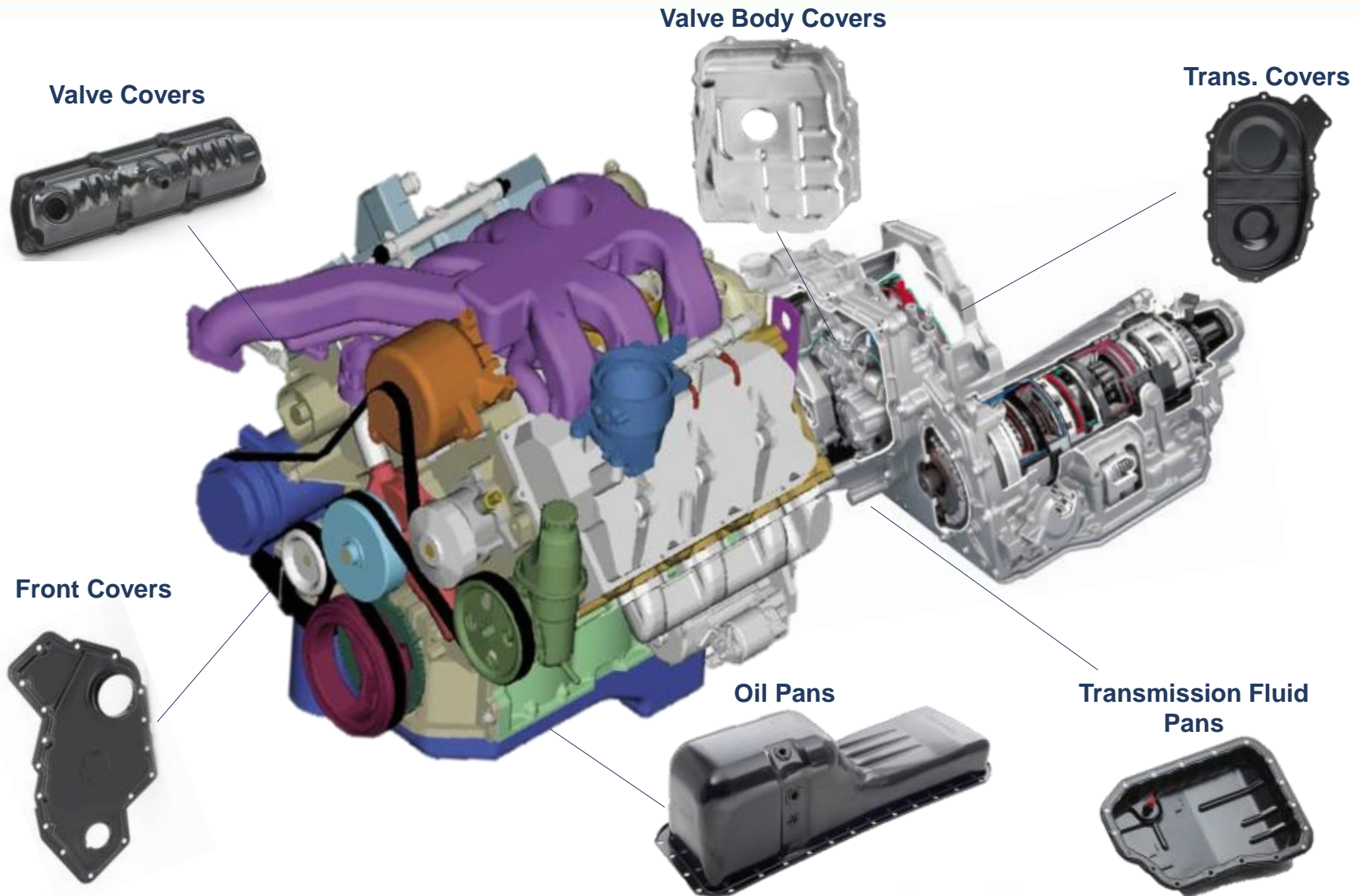
# Interior

## Stamping & Assembly



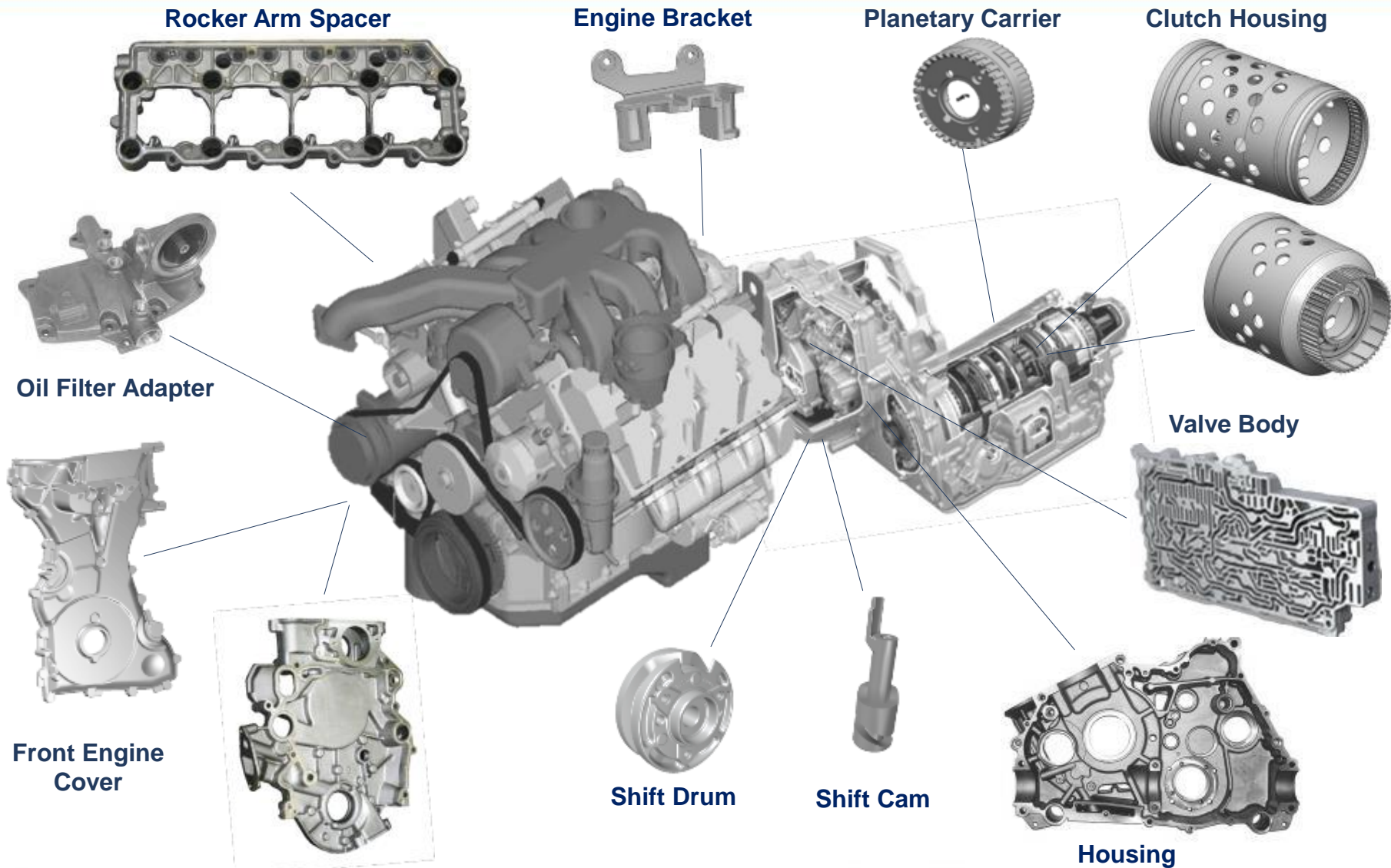
# Powertrain

Stamping & Assembly



# Powertrain

## Aluminum Casting



# Seating

## Stamping & Assembly

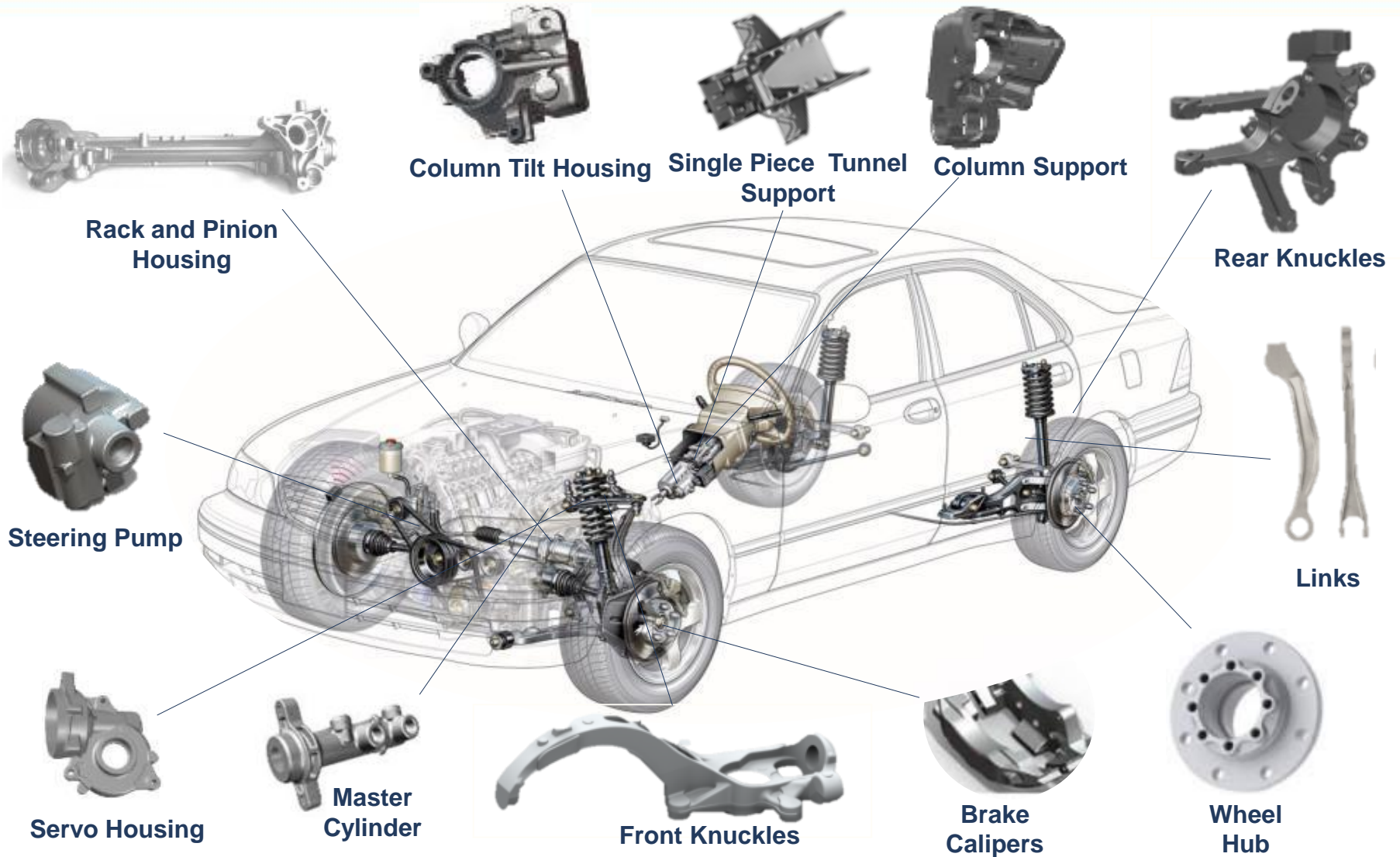


Lightweighting without compromise.™



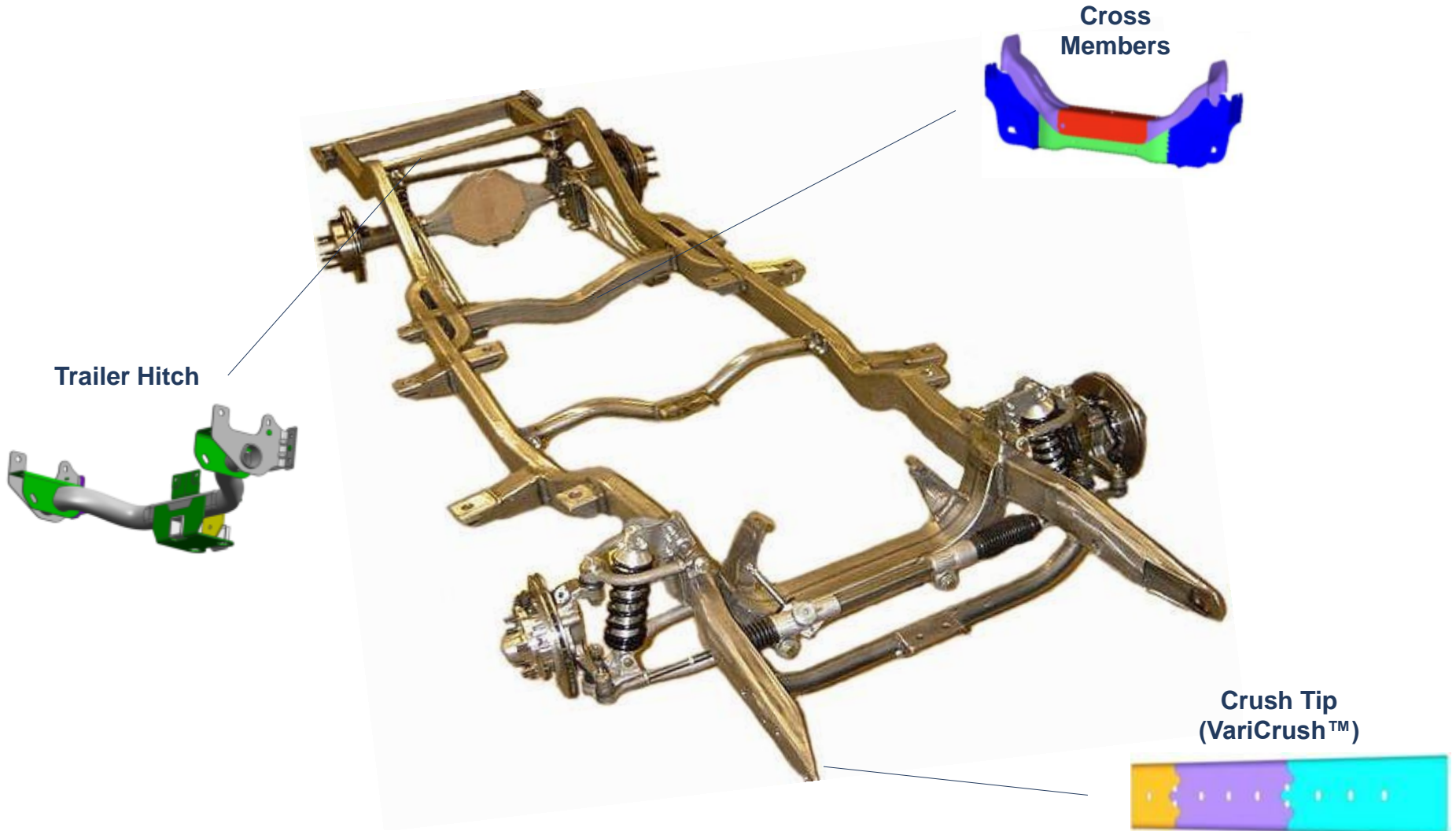
# Steering & Suspension

Aluminum Casting



# Steering & Suspension

## Blanking & Laser Welding

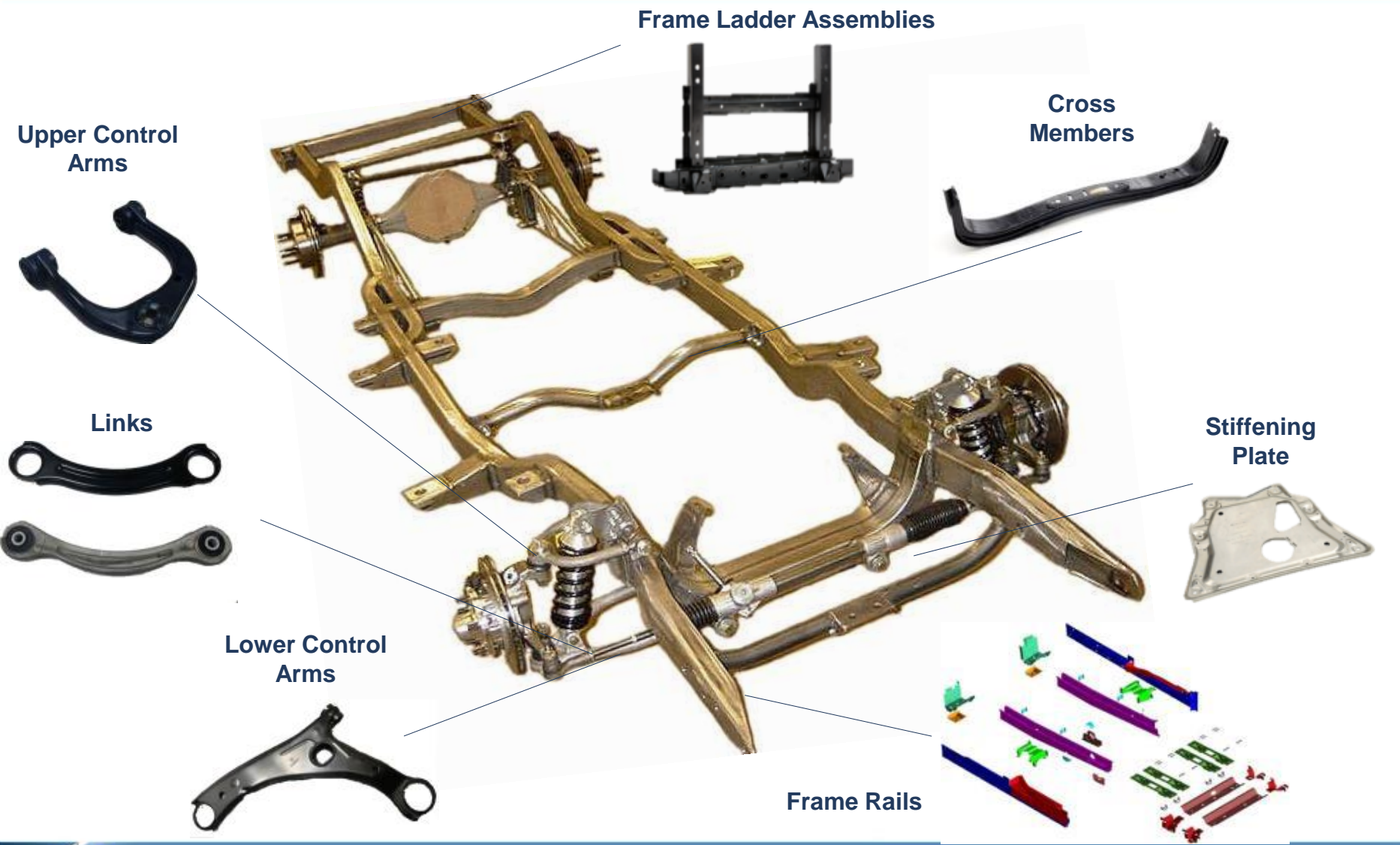


# Steering & Suspension

Stamping & Assembly



Lightweighting without compromise.™



Frame Ladder Assemblies

Upper Control Arms

Cross Members

Links

Stiffening Plate

Lower Control Arms

Frame Rails