

# Optimization of Stellantis Side Structures using Press Hardened Steel Laser Welded Blanks for Side Crash Protection

Milind Parab – Stellantis

Nachiket Gokhale – ArcelorMittal Tailored Blanks

GREAT DESIGNS IN  
**STEEL**™

- 1.) Global Car Program
- 2.) IIHS Test modes
- 3.) Traditional Design
- 4.) Usibor<sup>®</sup>-Ductibor<sup>®</sup> Laser Welded Blank Design
- 5.) Co-Engineering
- 6.) Side Structure Evolution
- 7.) Benefits of Laser Welded Blanks
- 8.) Summary

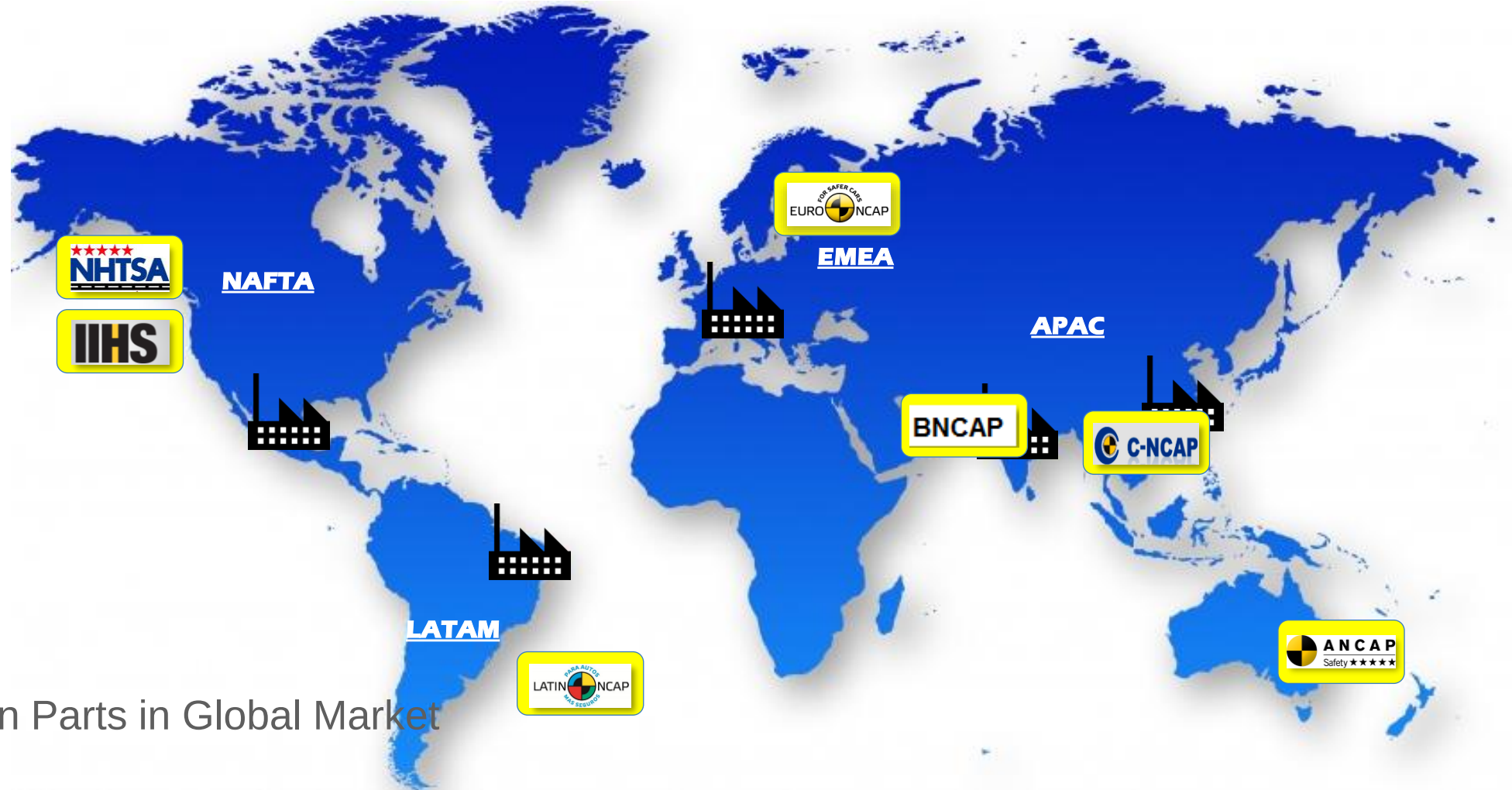
# Global Car Program



→ Maximize Common Parts in Global Market

→ Meet Global Regulations & Ratings

# Global Car Program – Safety Perspective



→ Maximize Common Parts in Global Market

→ Meet Global Regulations & Ratings

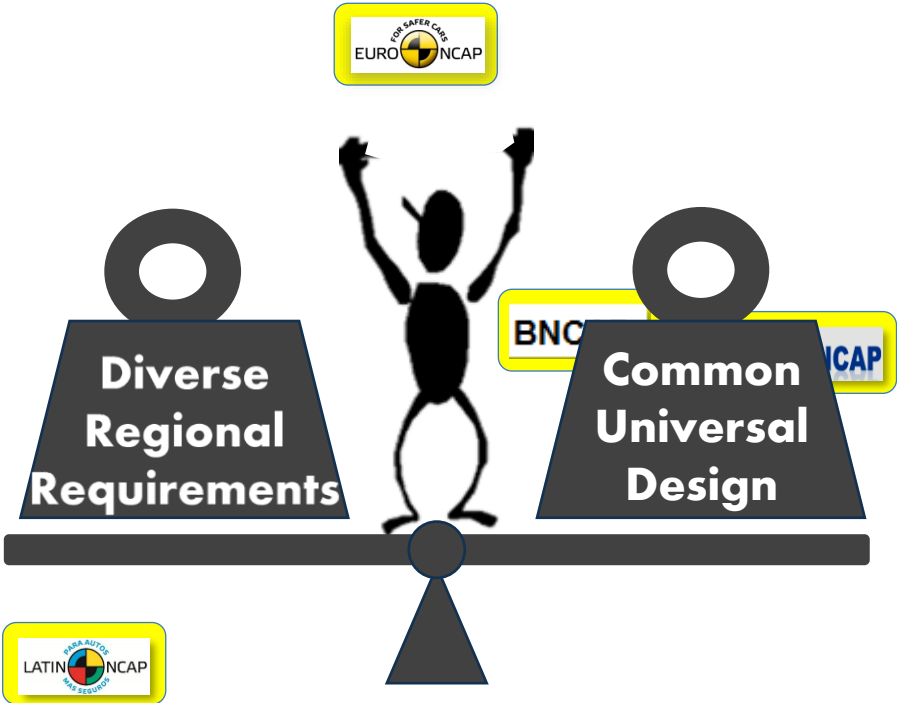
# Global Car Program – Safety Perspective



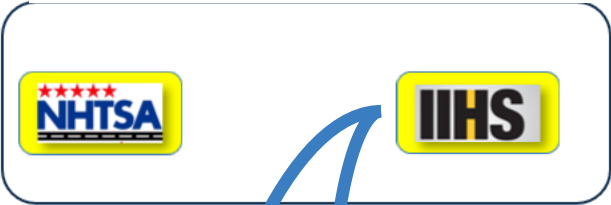
Market with  
→ Heavier Vehicles  
→ Higher Speeds



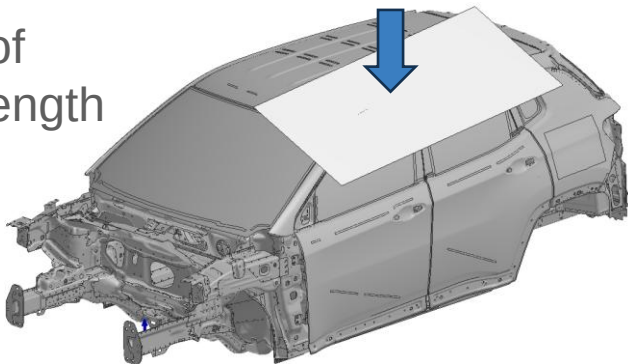
Structural  
Enhancement



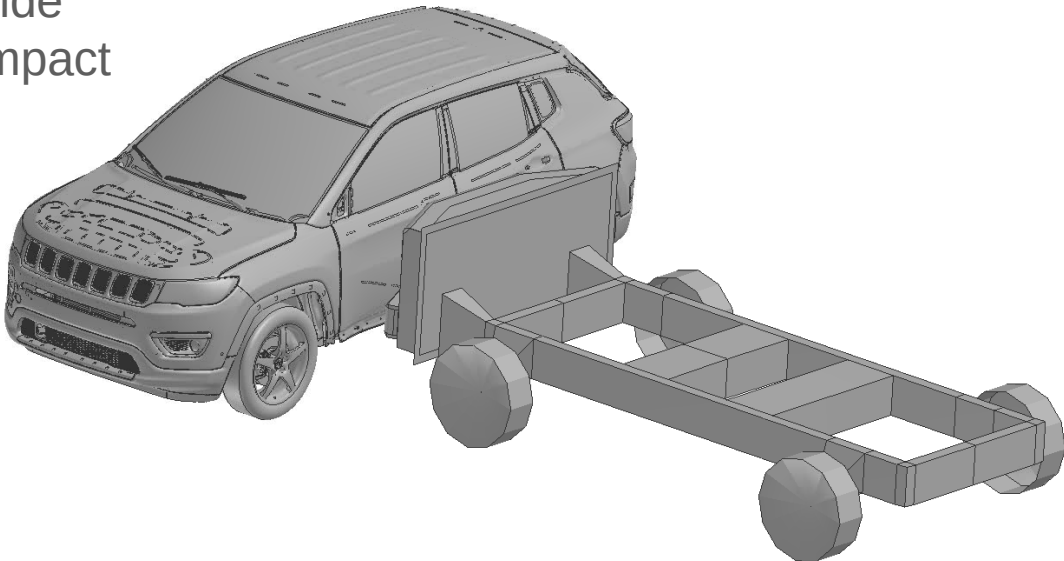
# IIHS Test Modes



Roof  
Strength

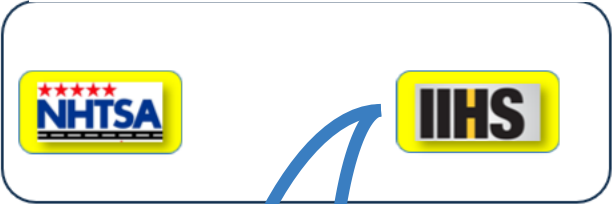


Side  
Impact

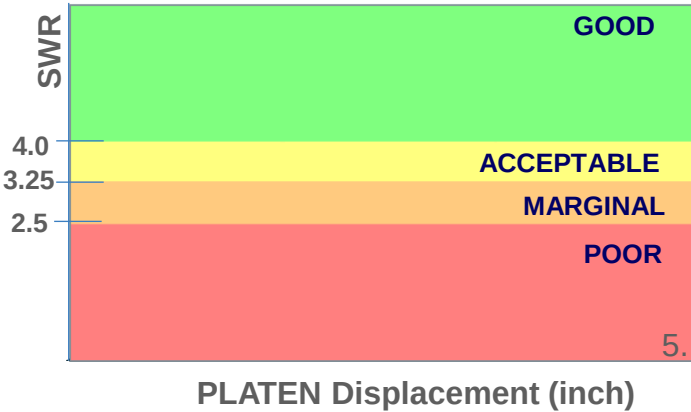
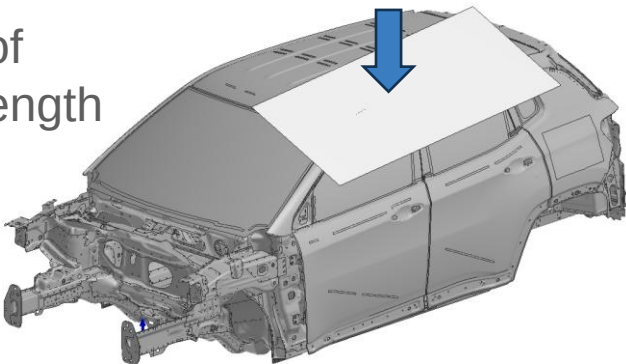




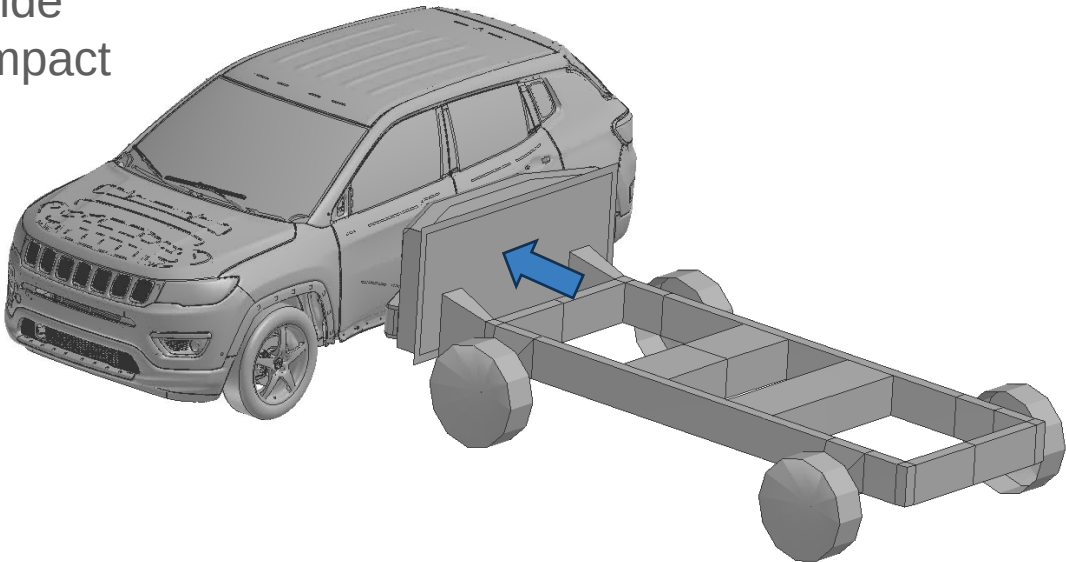
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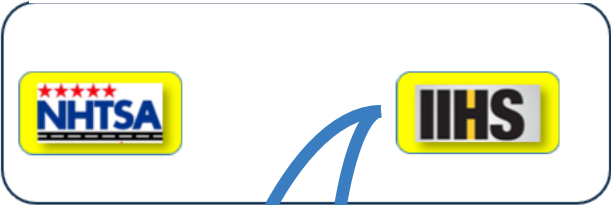
Roof  
Strength



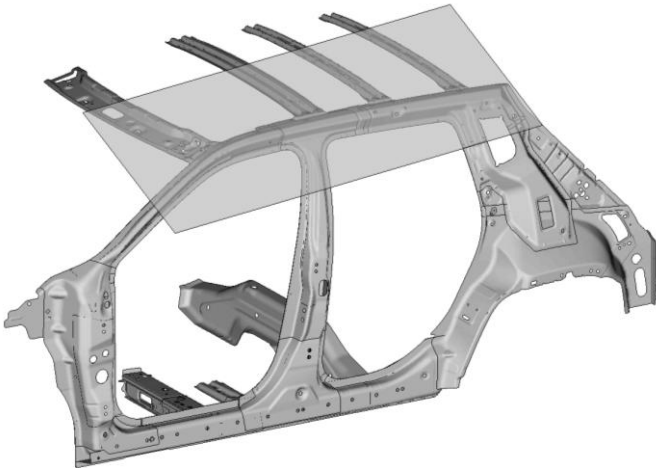
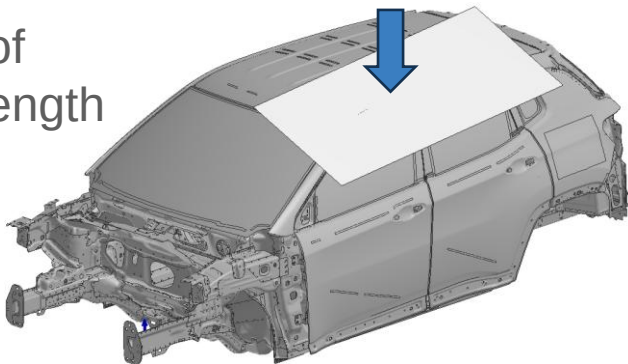
Side  
Impact



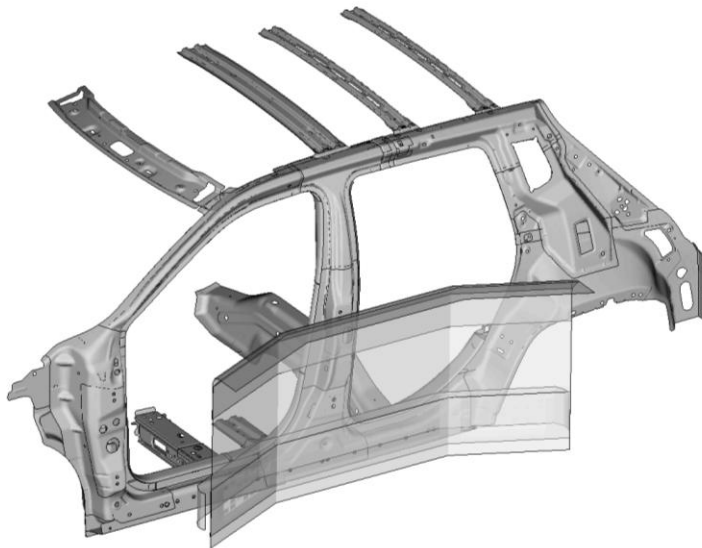
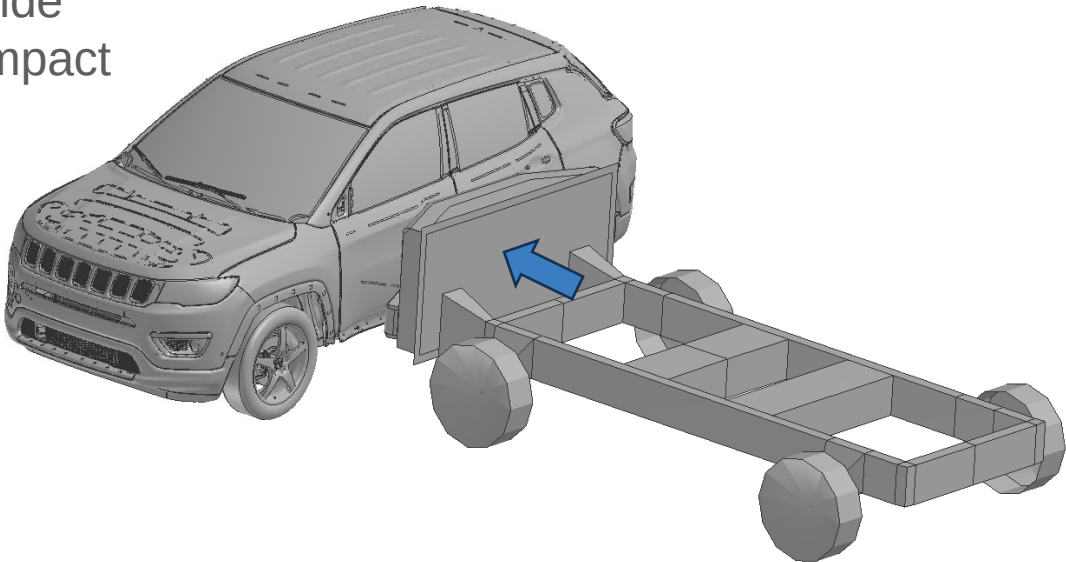
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Strength



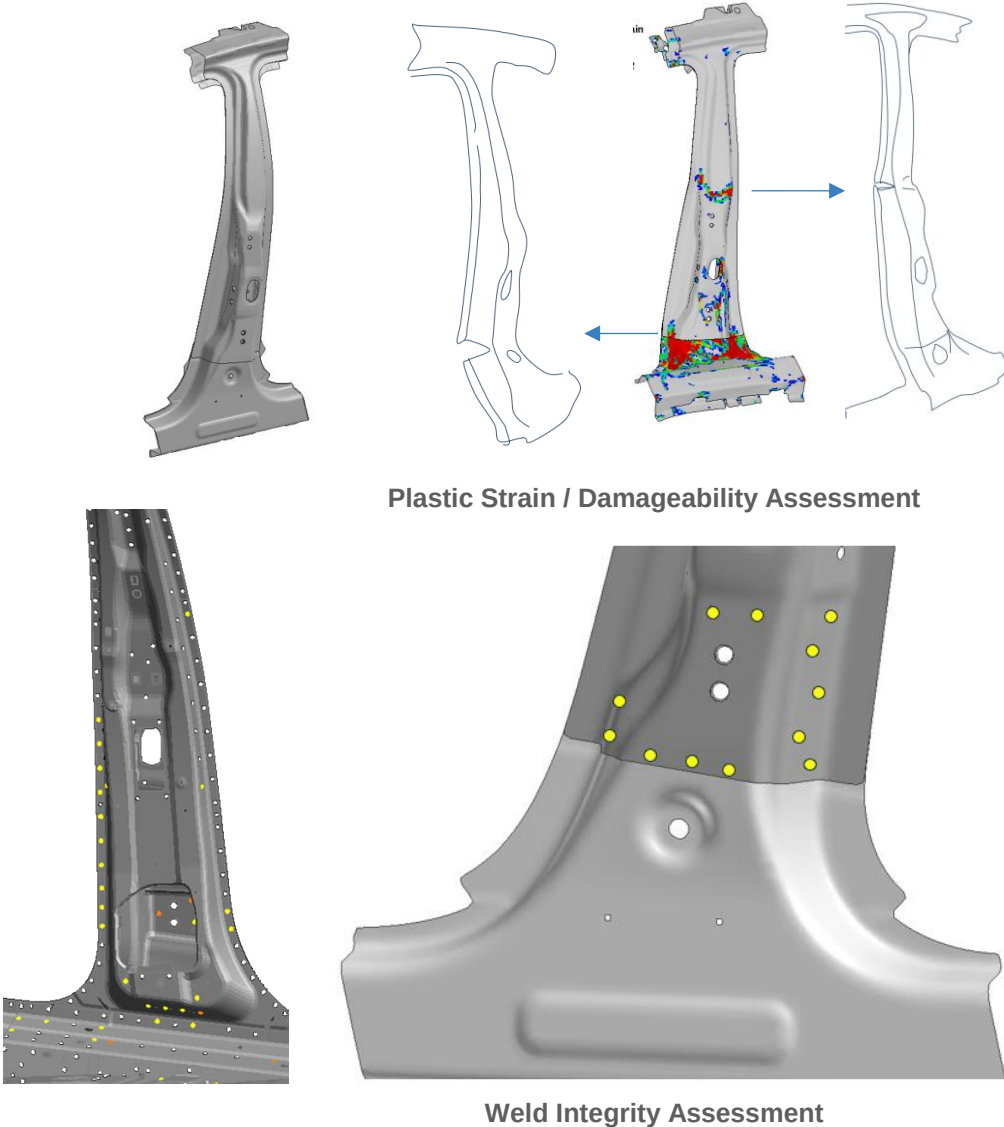
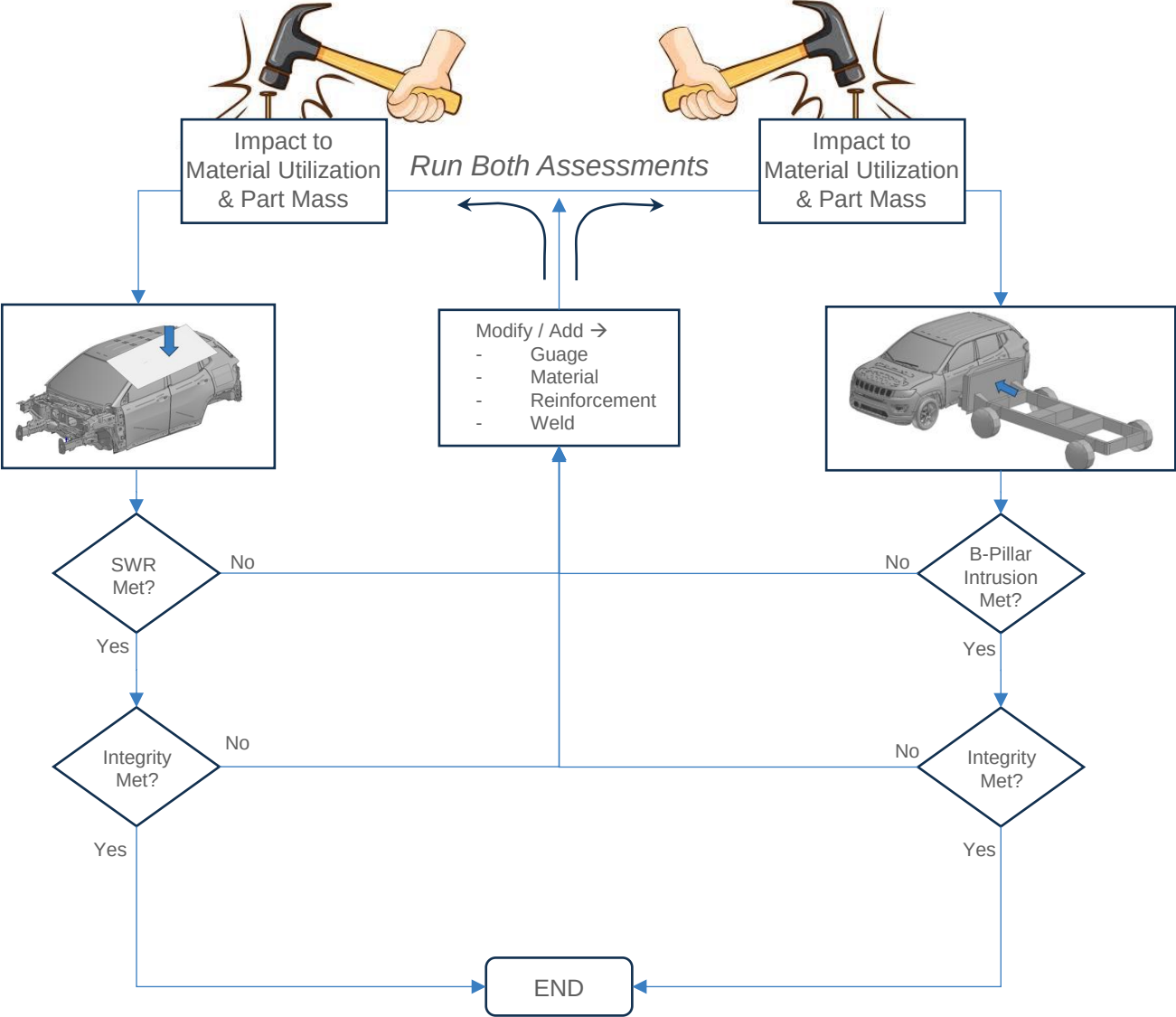
Side  
Impact



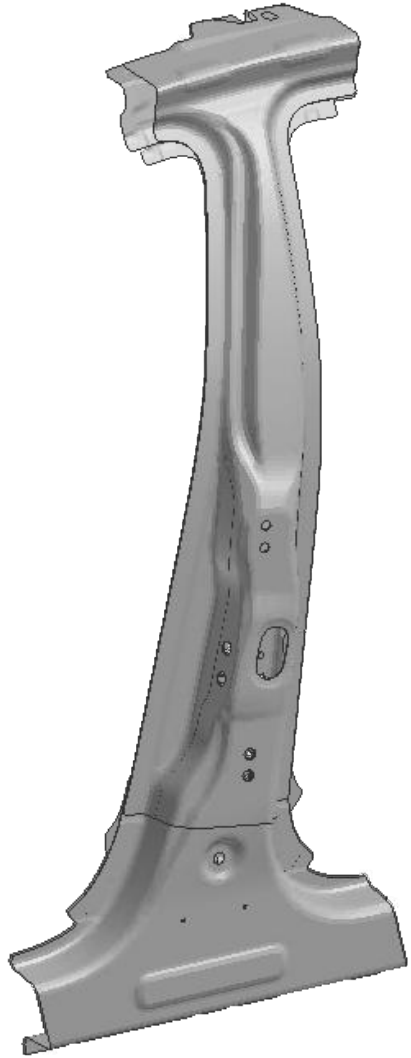


# Traditional Design Solutions

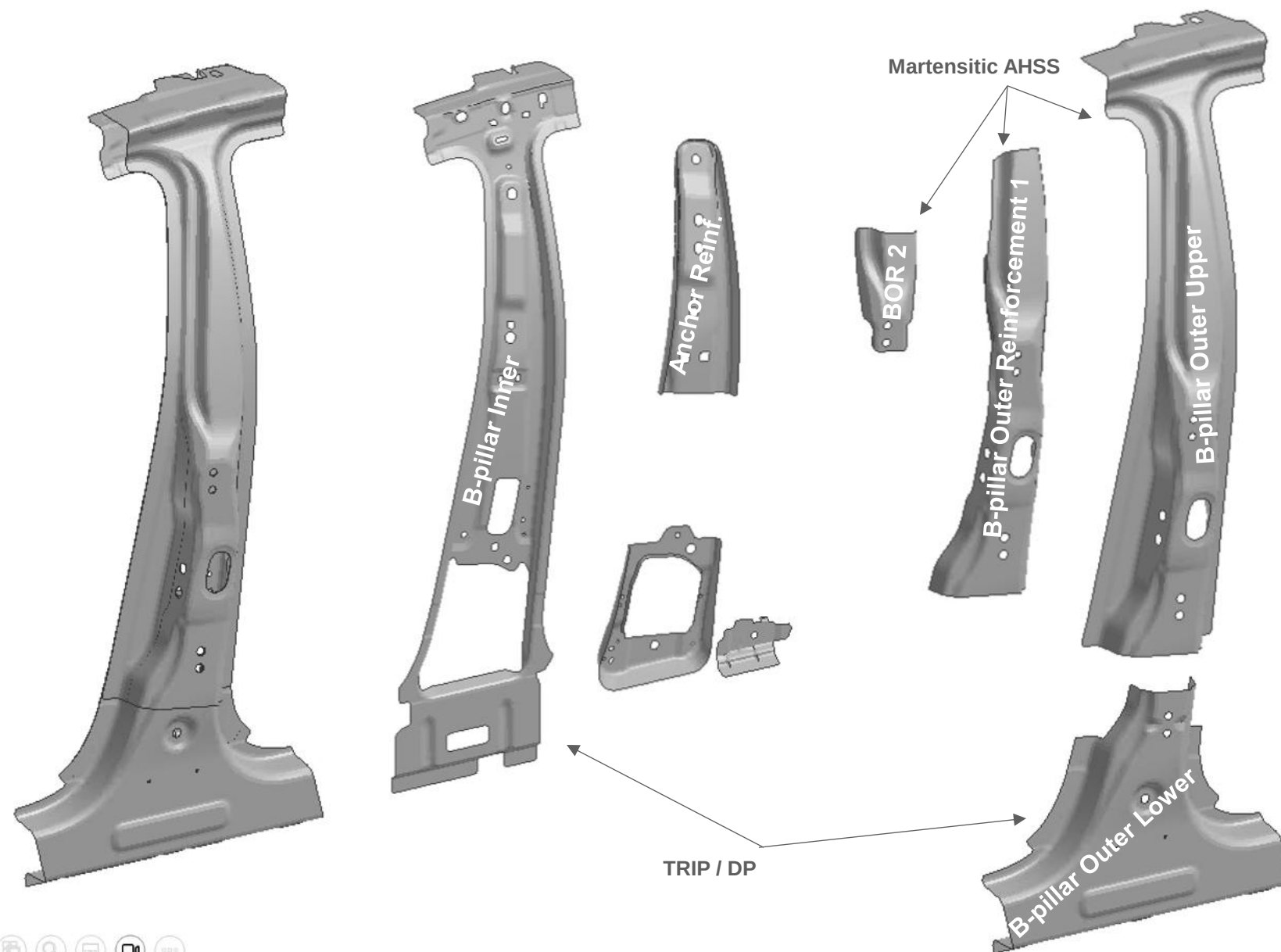
GDIS



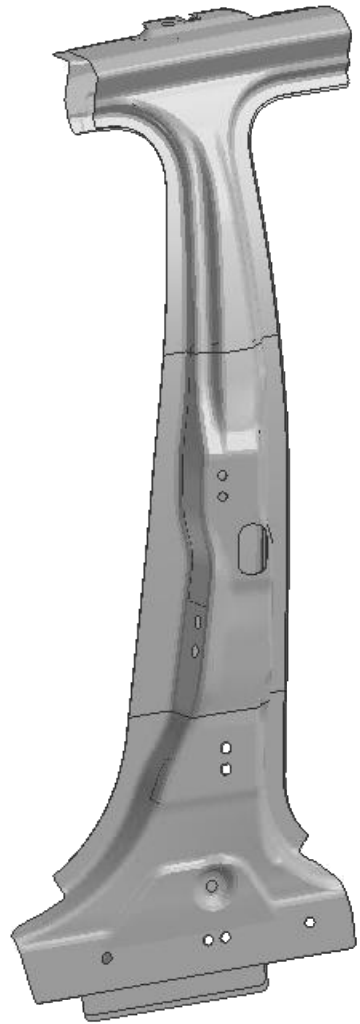
# Traditional Design - Challenges



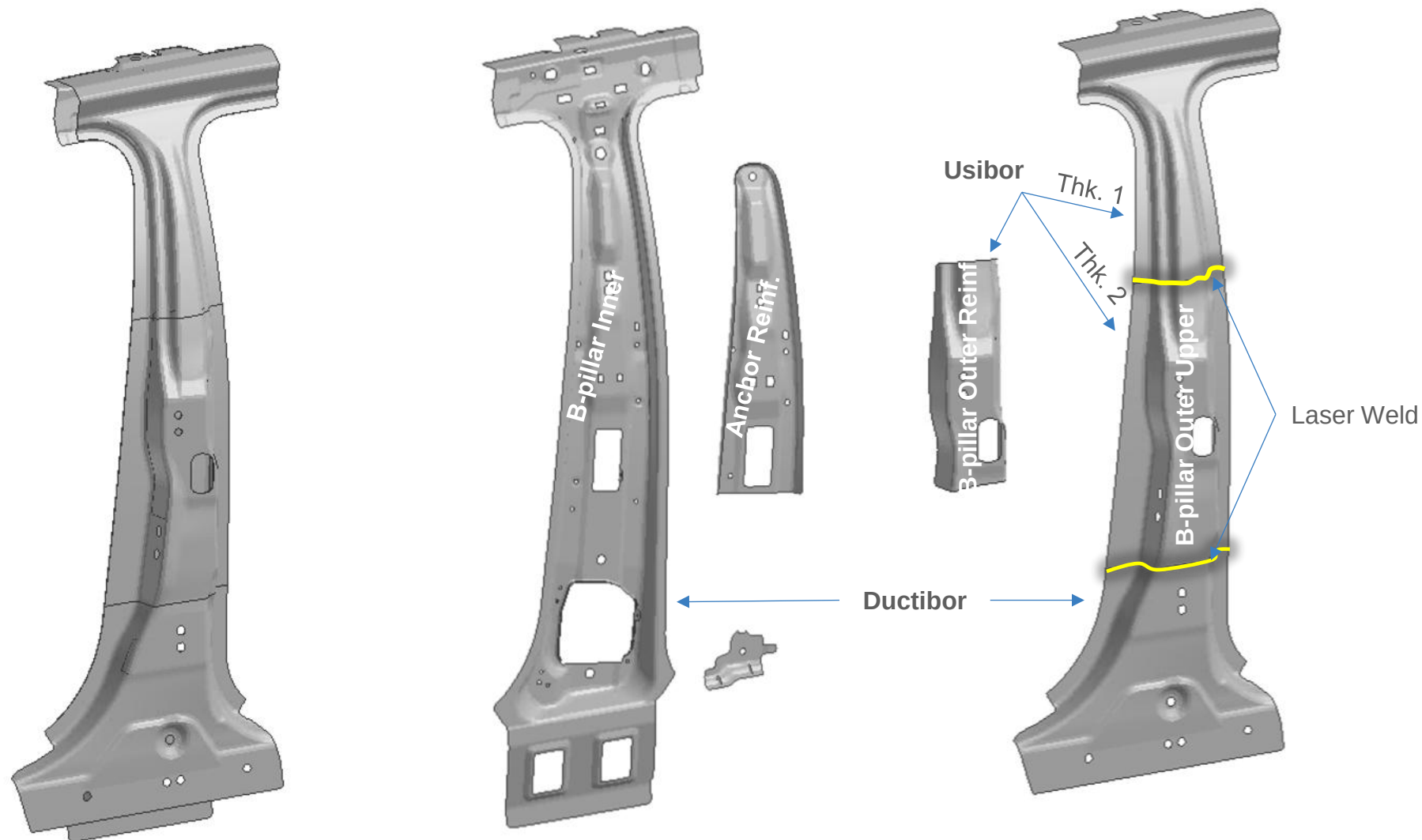
# Traditional Design - Challenges



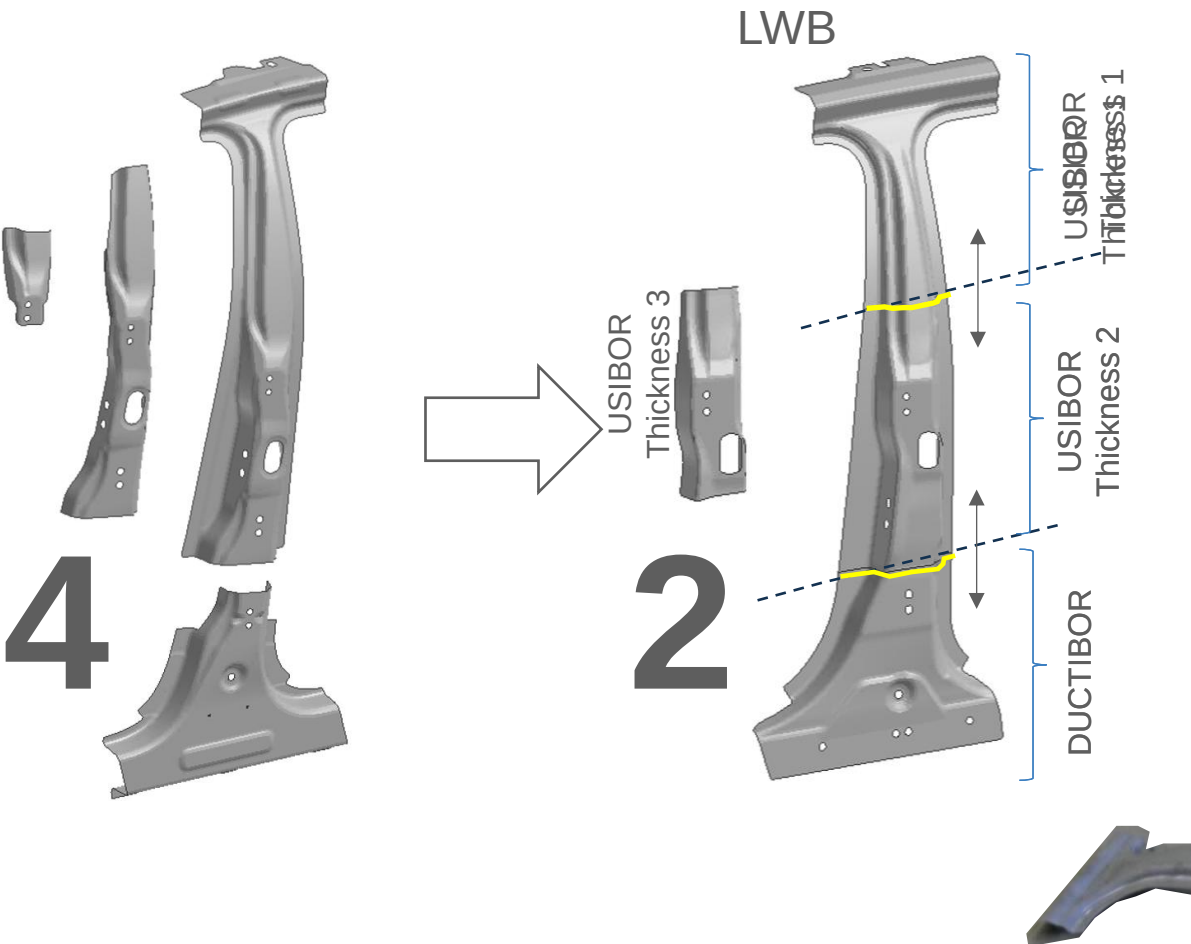
# Usibor<sup>®</sup>-Ductibor<sup>®</sup> LWB Designs



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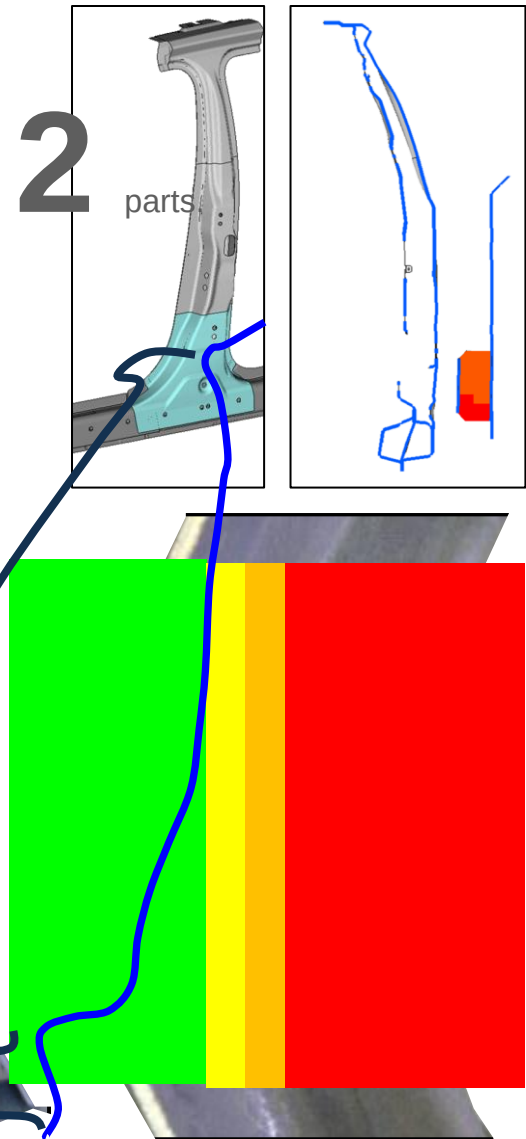
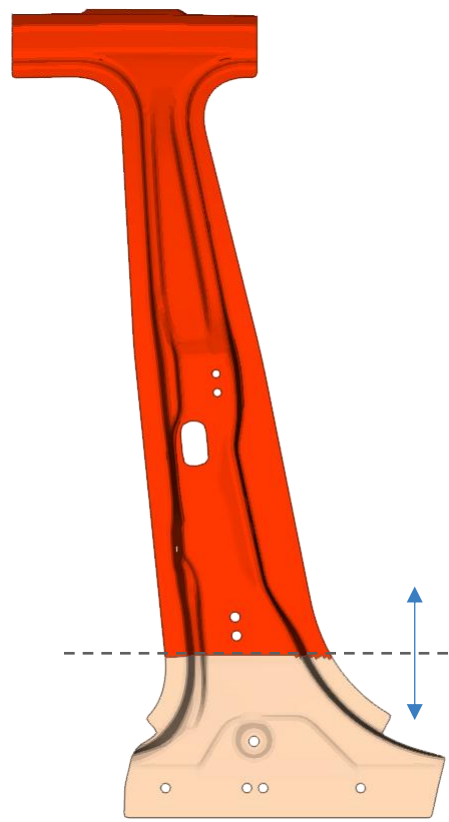


# Usibor®-Ductibor® LWB Designs- Benefits



## 3.) Benefits Multiplication

- B-pillar Upper - Usibor Material
- B-pillar Lower - Ductibor Material
- High energy absorption
- Uniform properties.
- Stamping Die Investment reduction

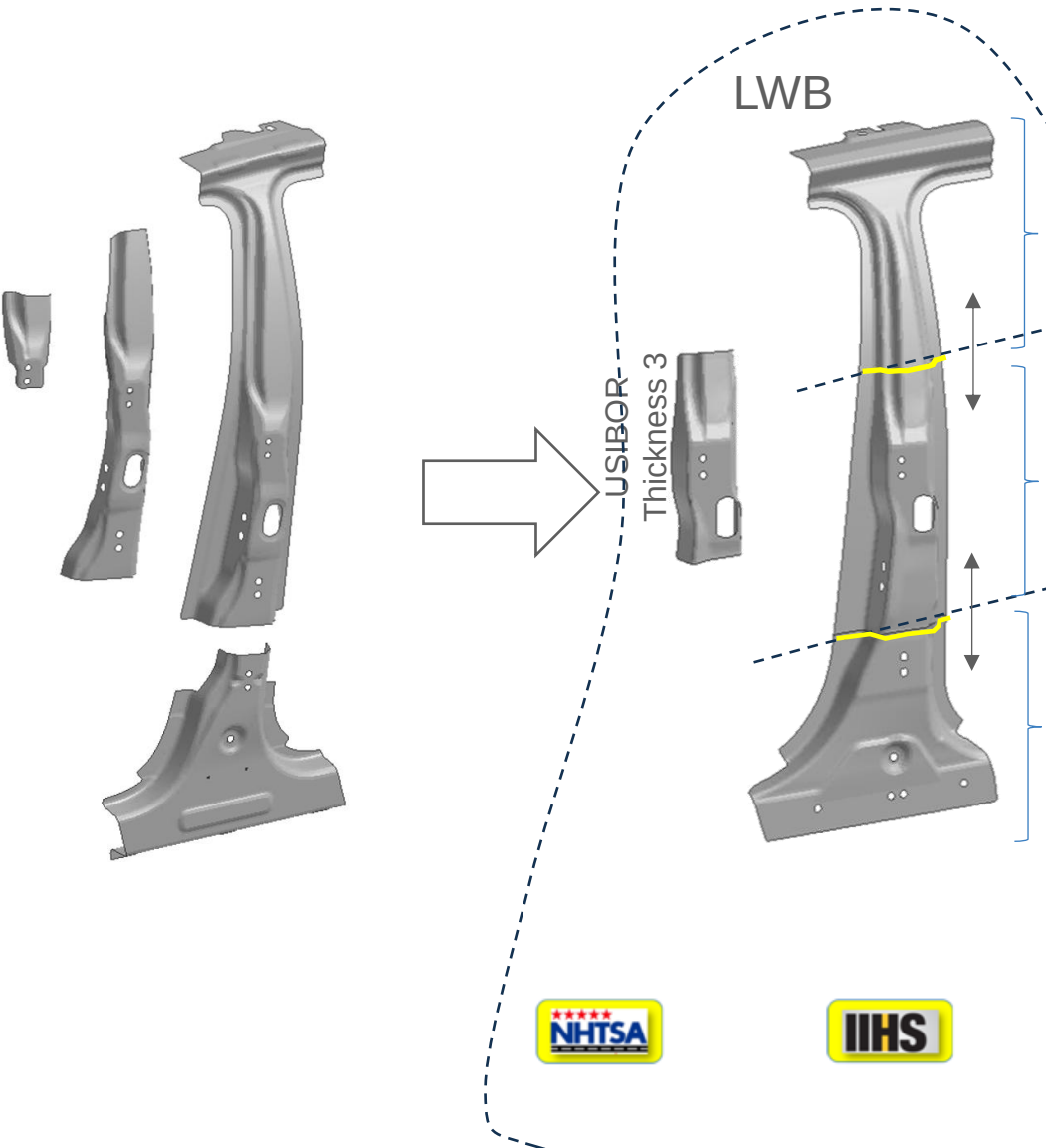




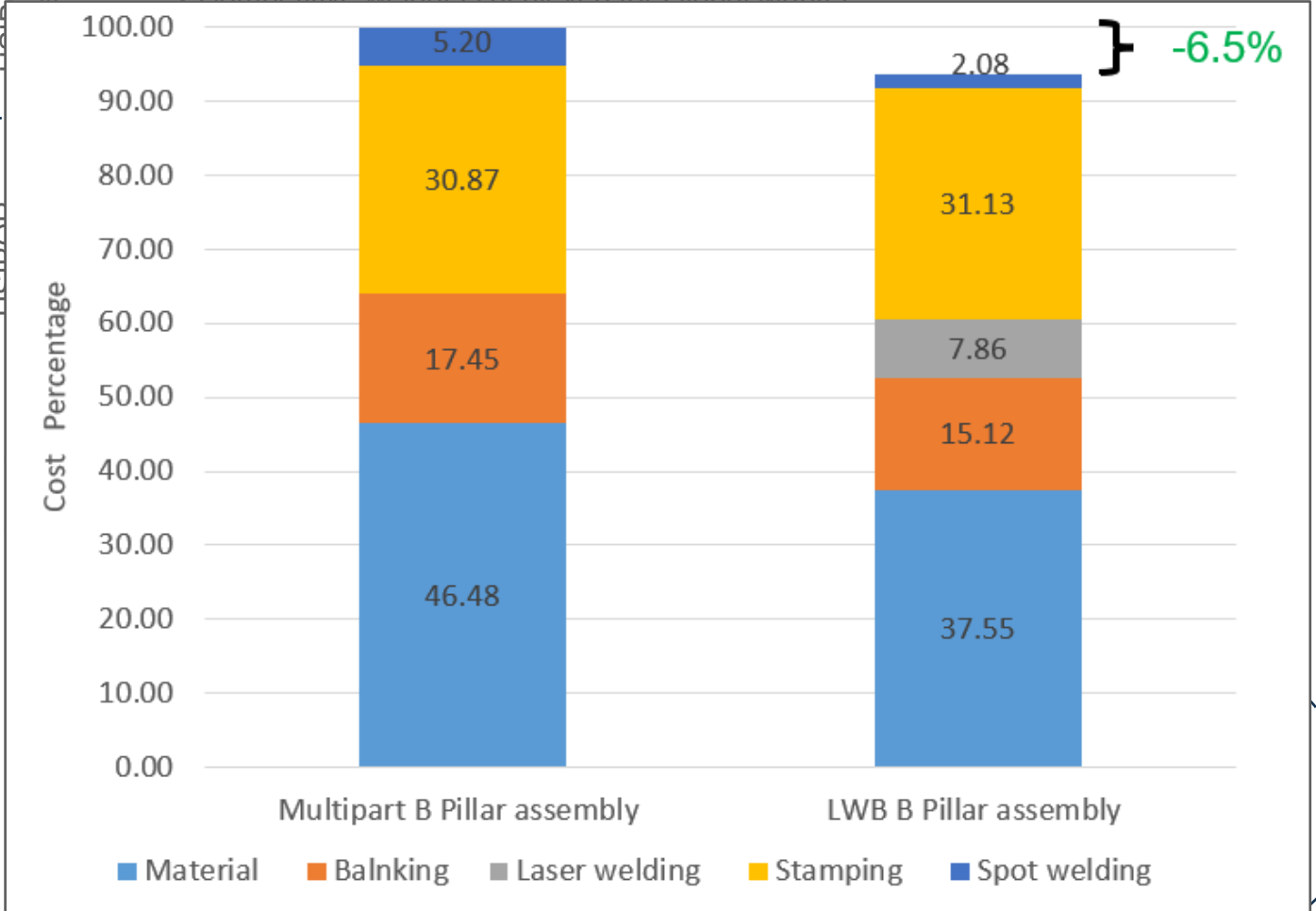
# Usibor®-Ductibor® LWB Designs- Benefits



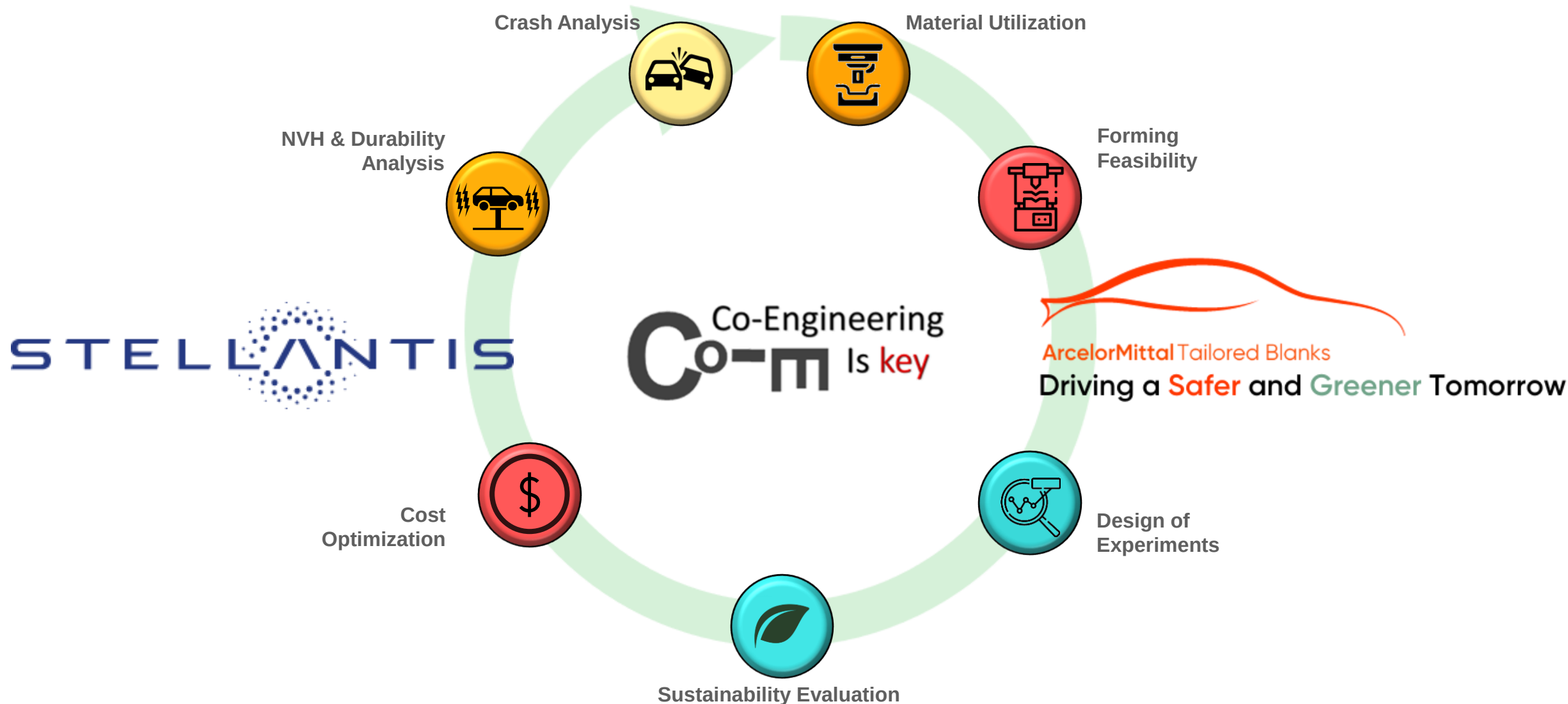
## 3.) Weight Reduction



Engineering Costing Only  
→ 2025 material pricing assumed  
→ 66% weight reduction  
→ Fast Weld possible  
→ Competitive weight is achieved for Global Market



# Stellantis – AMTB Co-Engineering



Co-engineering is key for developing safe and green laser welded solutions

# The Side Structure Evolution

**GDIS**

## Multipart Design



\*Reference Design



22 stampings

## B pillar Outer



19 stampings

## Door ring Outer



11 stampings

## Door Ring System



\*Generic images



7 stampings

## Double Door Rings Sys.



\*Generic images

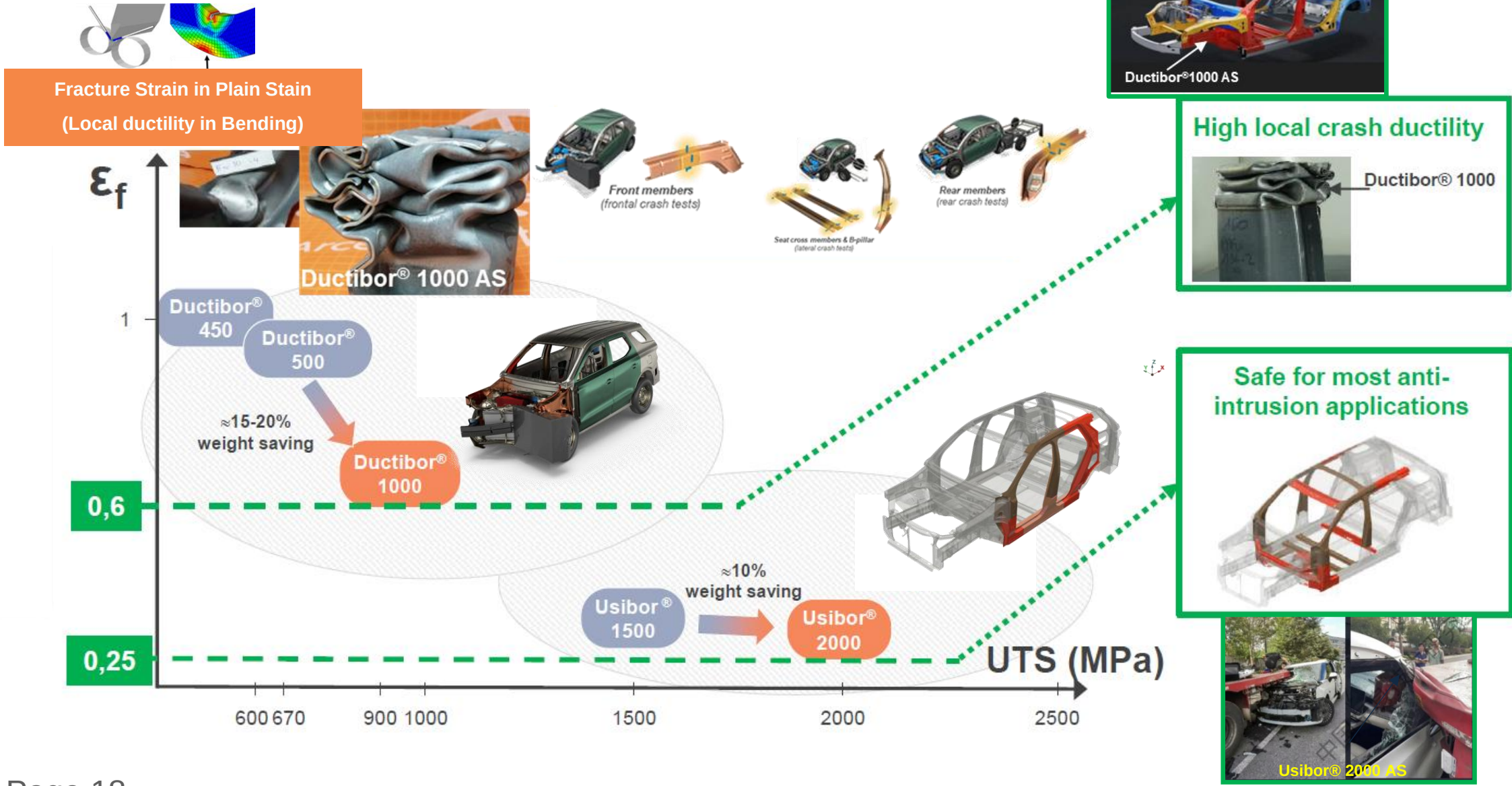


2 stampings

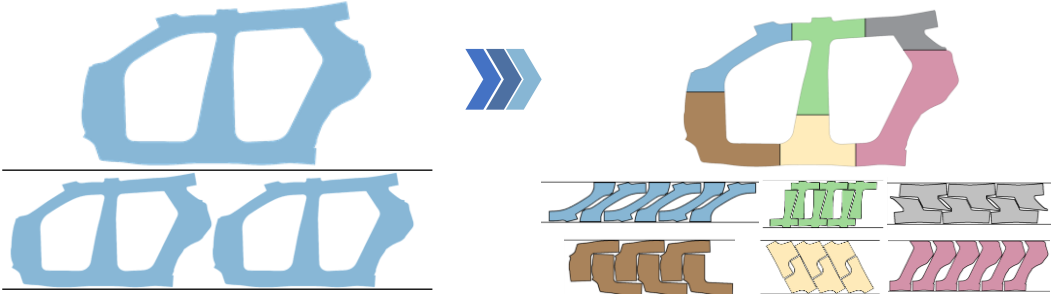
AMTB has implemented multiple side structure designs evolving with the market needs



# Press Hardened Steel Evolution



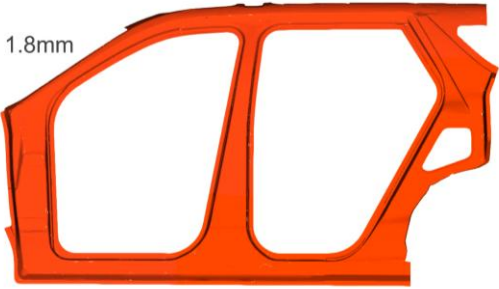
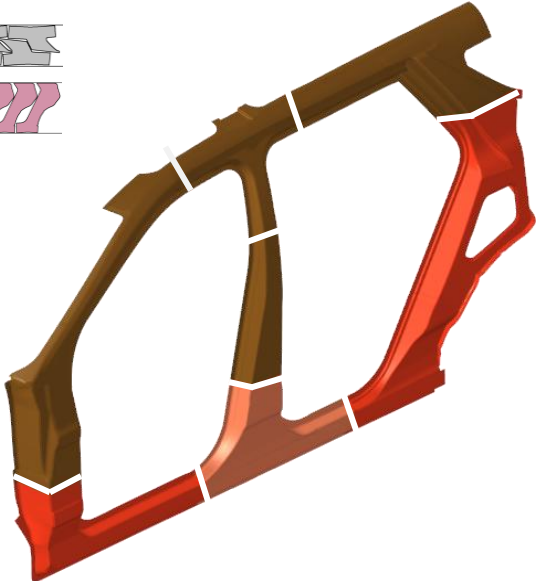
# Press Hardened Steel Laser Welded Blank Benefits



44.30%  
Blanking Efficiency

77.46%  
Blanking Efficiency

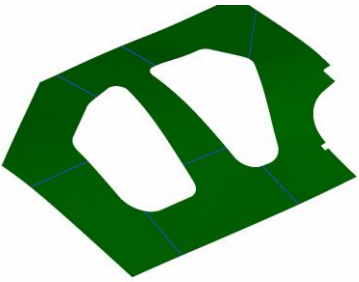
Improved Material Utilization



- Ductibor®1000
- Usibor®1500
- Usibor®2000

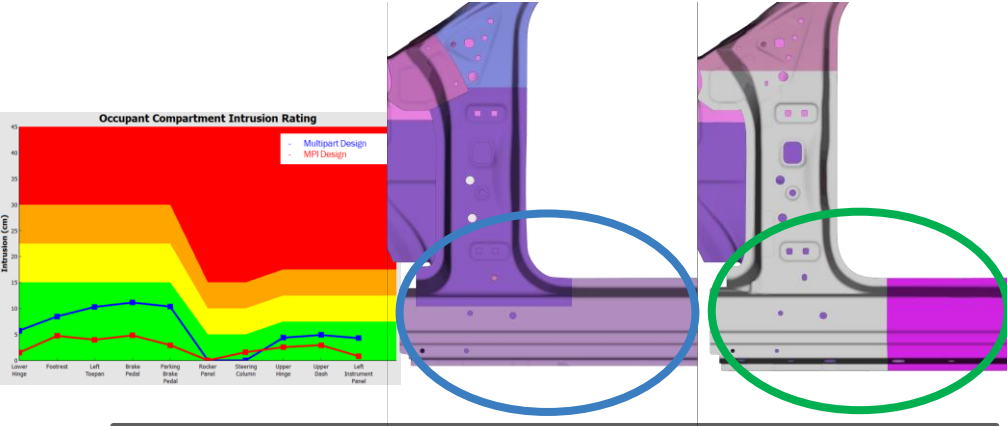
Part Mass Reduction: 0.00kg/side

Right Thickness, Right Location



M23-0244\_DDRO\_Rev0  
Time From Start / Distance To Bottom: 5.743 s / -268.61 mm  
Operation Step: D-20 CIs Binder  
Thinning / Thermal Simulation: Mechanical Thinning, Middle Layer  
-0.200 0.200

Complex Forming



Continuous Joints for Efficient Load Transfer

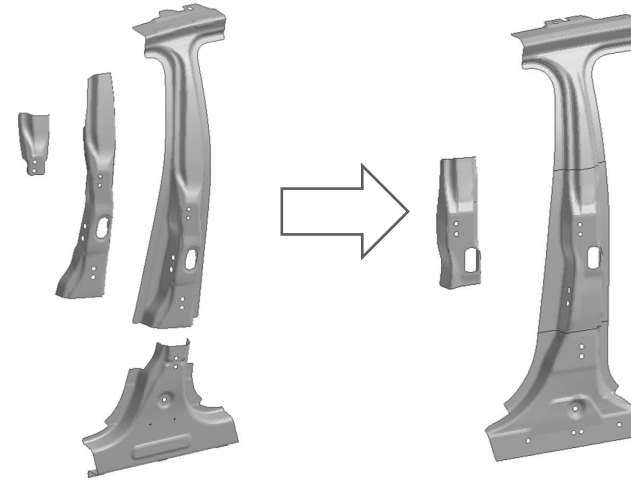
Laser welded blanks are an ideal balance between weight, cost and performance

PROCESS ROBUSTNESS FOR LASER WELD SEAM FOR HOT STAMPED STEEL APPLICATIONS



# Summary & Conclusion

- Laser Welded B-Pillar was a result of extensive collaboration between Stellantis and ArcelorMittal Tailored Blanks
- The key highlights of the Laser Welded B-Pillar system are:
  - 4 stampings consolidated into 2 stampings
  - 7% weight reduction achieved
  - 6.5% cost savings achieved
  - Met crash performance requirements for all markets
- **Co-engineering is Key!**
- Side structures have evolved from Laser Welded B-Pillars to Door Rings at Stellantis
- Stellantis along with AMTB continues to push the boundaries of engineering by
  - Evaluating complex part types like Double Door Rings for assembly simplification and CO2 emissions
  - Evaluating new material grades



Stellantis & AMTB continue to push the boundaries of innovation for safer, lighter and greener solutions