GREAT DESIGNS IN STEEL

Tailored properties in advanced hotstamped BIW applications using the TemperBox® technology

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GEDIA USA Holding, Inc.

Table of content

Company profile

GDIS

Automotive supplier

Stamping and forming technology

9 Production sites

Worldwide

Employees worldwide

4.700

GEDIA

Product portfolio

Car body and structural components

Development center

Germany - Attendorn

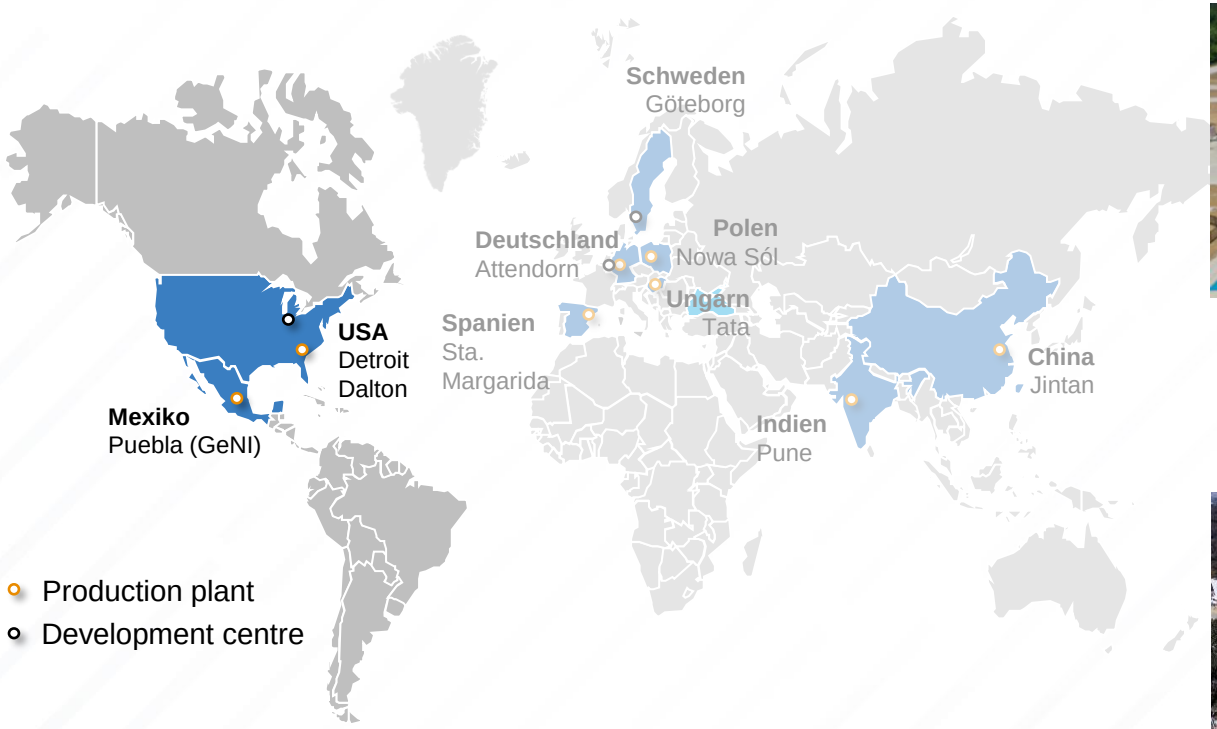
Special features in press hardening

Multilayer chamber furnace with TemperBox®

AP&T

Company profile

NA Locations



Technologies

- Hot forming incl. TemperBox®
- 3D laser cutting
- Spot welding
- Projection welding
- Gluing

Technologies

- Cold forming | transfer presses
- Spot welding
- Projection welding
- Arc welding

Company profile

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Products - Examples of Typical Applications

Audi · BMW · Ford · GM · MAN · Mercedes-Benz · PORSCHE · SCANIA · SEAT · ŠKODA · VOLVO · VW

Increased requirements on safety parts

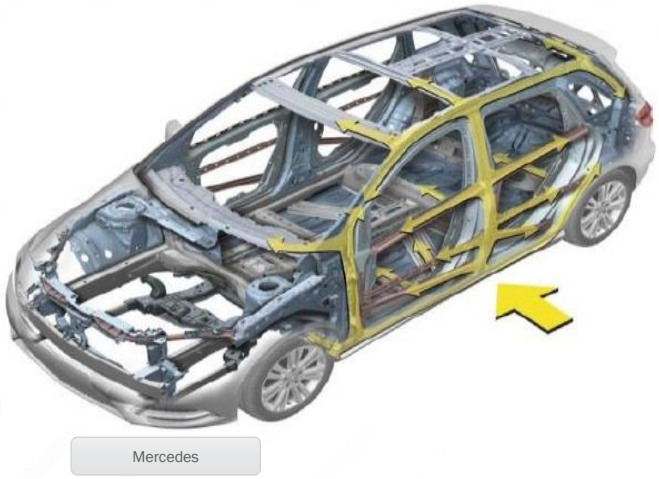
- OEMs change to BEV and HEV concepts
  - Total car weight increases due to batteries and electronic devices
  - Makes weight reduction in the car body necessary
  - Increases requirements on crash performance
  - Increases requirements on stiffness and durability
- Reducing Emissions for a lower CO_2 footprint in production and product lifecycle
  - Less material usage for more sustainability in production
  - Leightweight design aspects for more sustainability in product lifecycle

Increased requirements on safety parts

- Press hardened steels as „backbone“ of car body structure
- Use of PHS-Material, 1000 MPa / 1500 MPa / 2000 MPa, enables weight reduction while achieving crash performance targets
- As material strength increases, ductility decreases and brings new design considerations:
  - The influence resistance spot welding heat affected zones
    - Edge crack initiation and propagation
- Design challenges presented by UHSS can be managed through multiple PHS technologies like Patchwork blanks and Tailored Tempering

Tailored properties

Process Overview



Load Bearing Components

Press Hardening

Material
Conventional Press Hardening

- TRB (tailor rolled blanks)
- TWB (tailor welded blanks)
- Patch blanks

Process
Partial Press Hardening

- Partial Austenization
- Partial Quenching
- Partial Tempering

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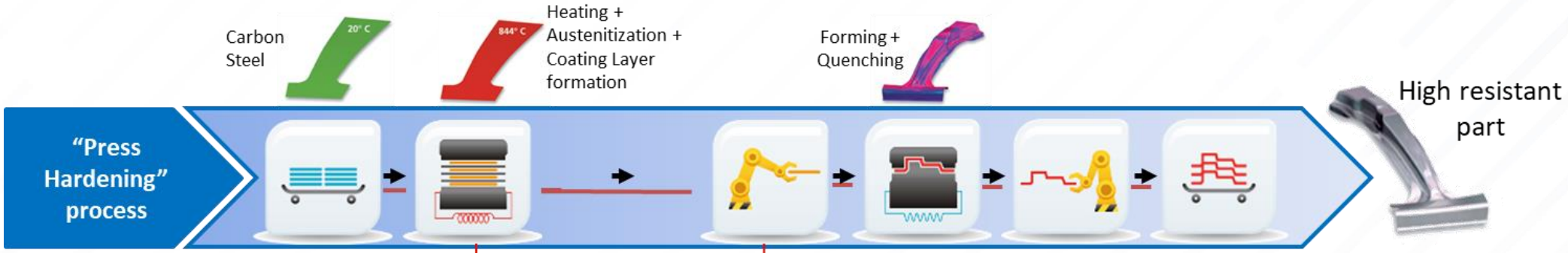
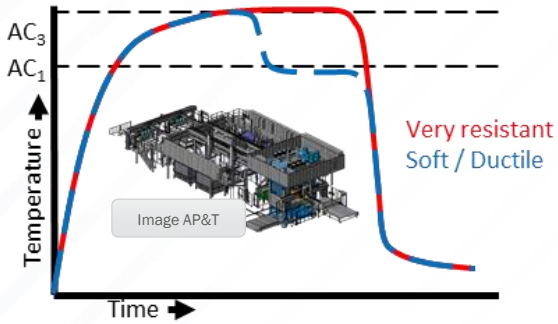
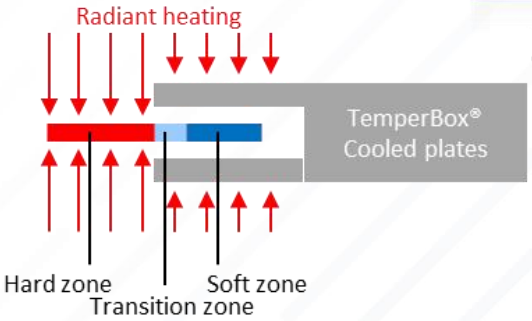
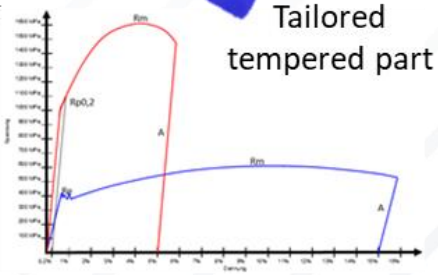
Process discription







Special final properties for a controlled deformation trigger and energy absorption after a crash



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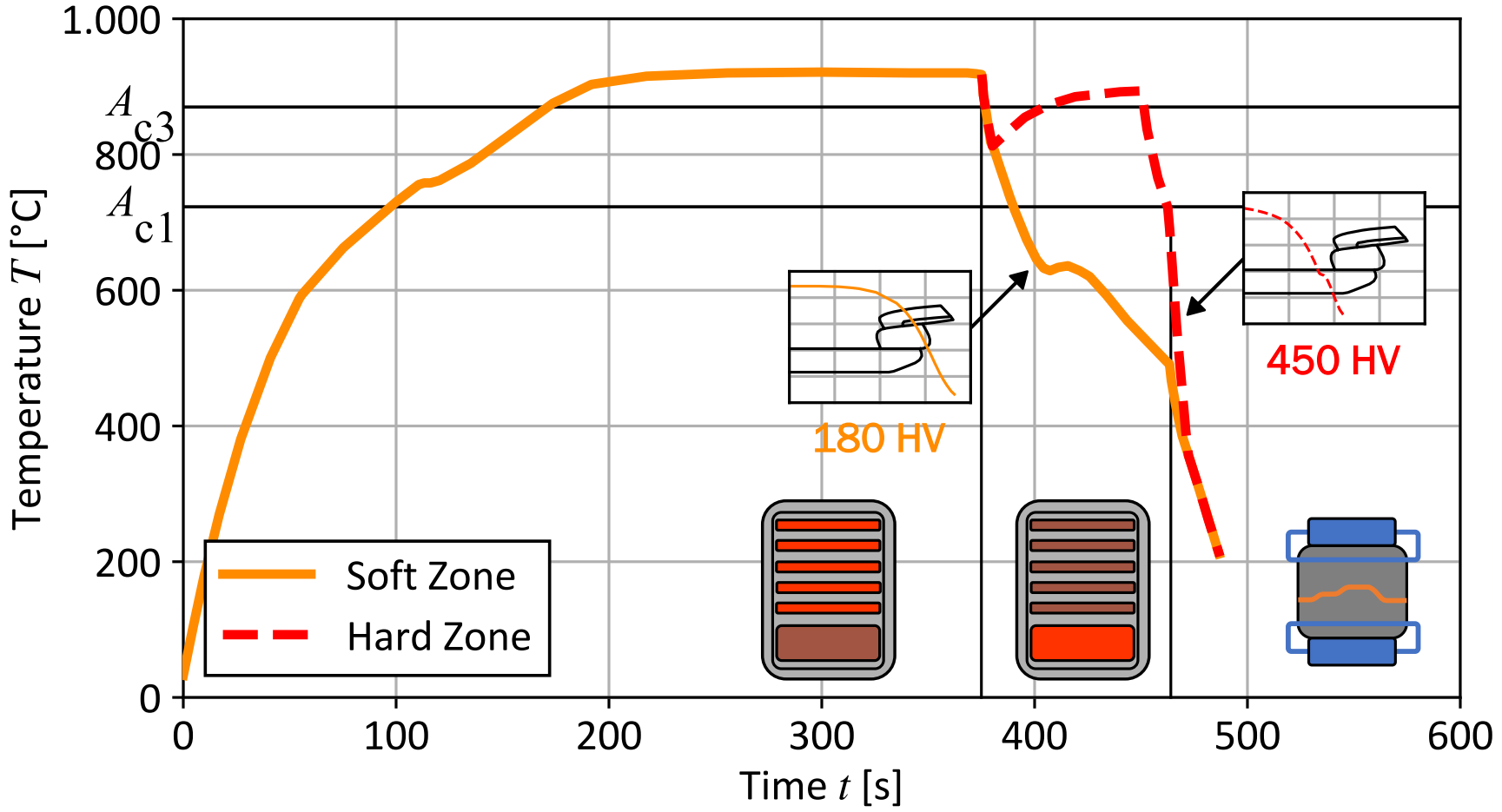
Time Temperature Conversion Diagram 22MnB5



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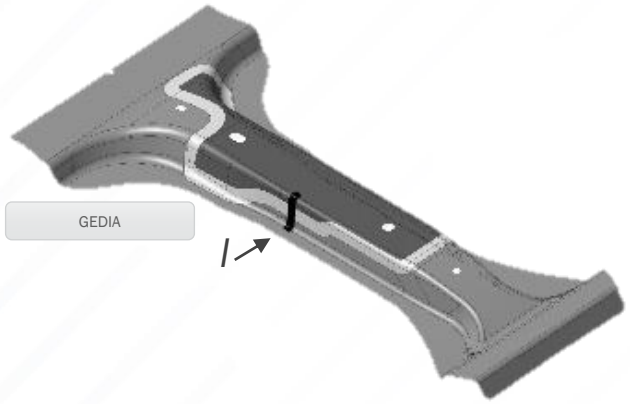
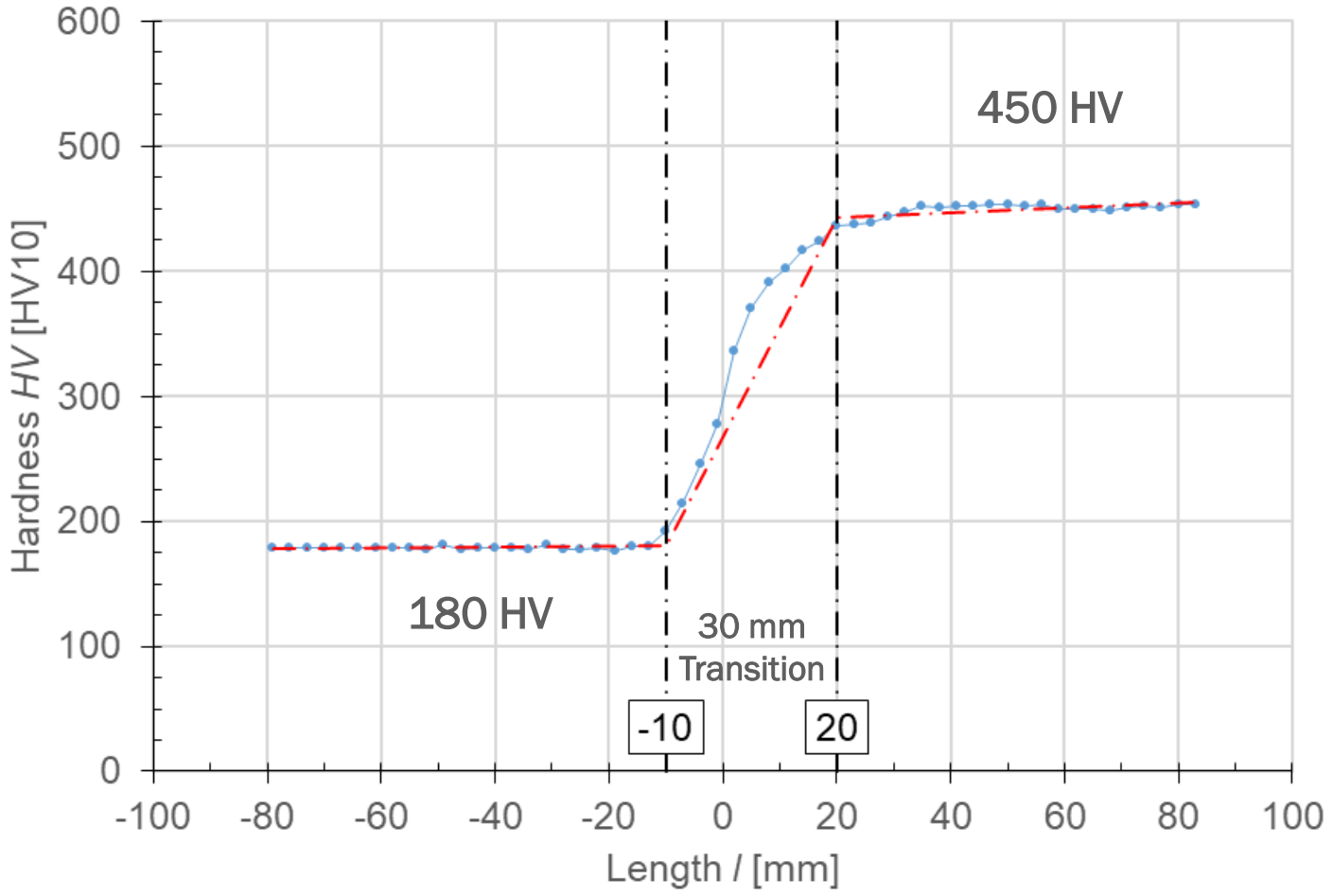
Hardness gradient 22MnB5





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Advantages

- Several ductile areas within one part
  - Variable mechanical properties
- Design of soft area shape(s) is highly flexible
- Adjustable transition zones
  - Width of transition zone can be between 30 - 70 mm
- Cycle time neutral series production process
- Quickly adaptable
  - Changes possible during late project phases at low cost

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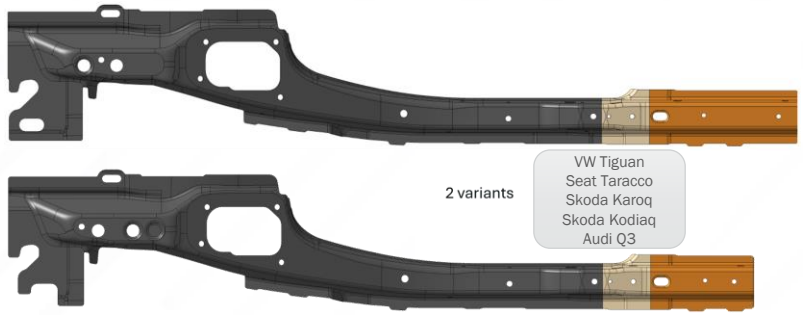
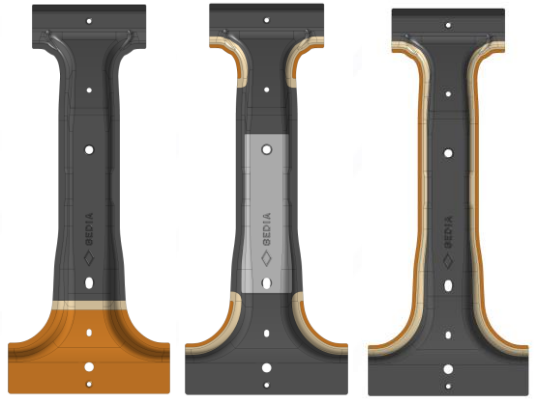
Some typical Applications

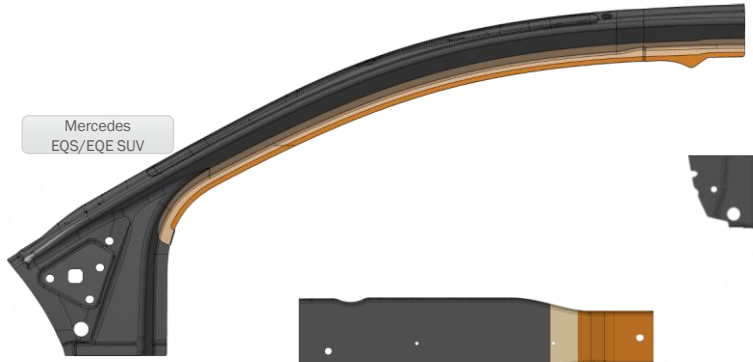


2 variants

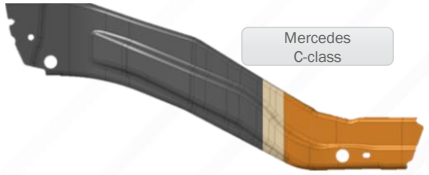
VW Tiguan
Seat Taracco
Skoda Karoq
Skoda Kodiaq
Audi Q3

Mercedes
EQS/EQE SUV





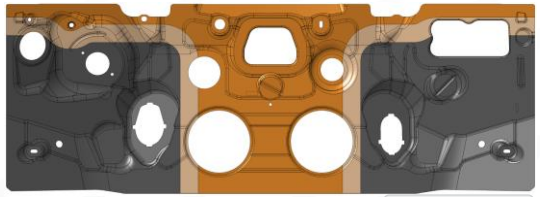
Mercedes
EQS/EQE SUV



Mercedes
C-class

2 variants

Audi 416
Porsche 426



Mercedes
EQS/EQE SUV

Ductile (cold)

Transition

Hard (hot)

Patch

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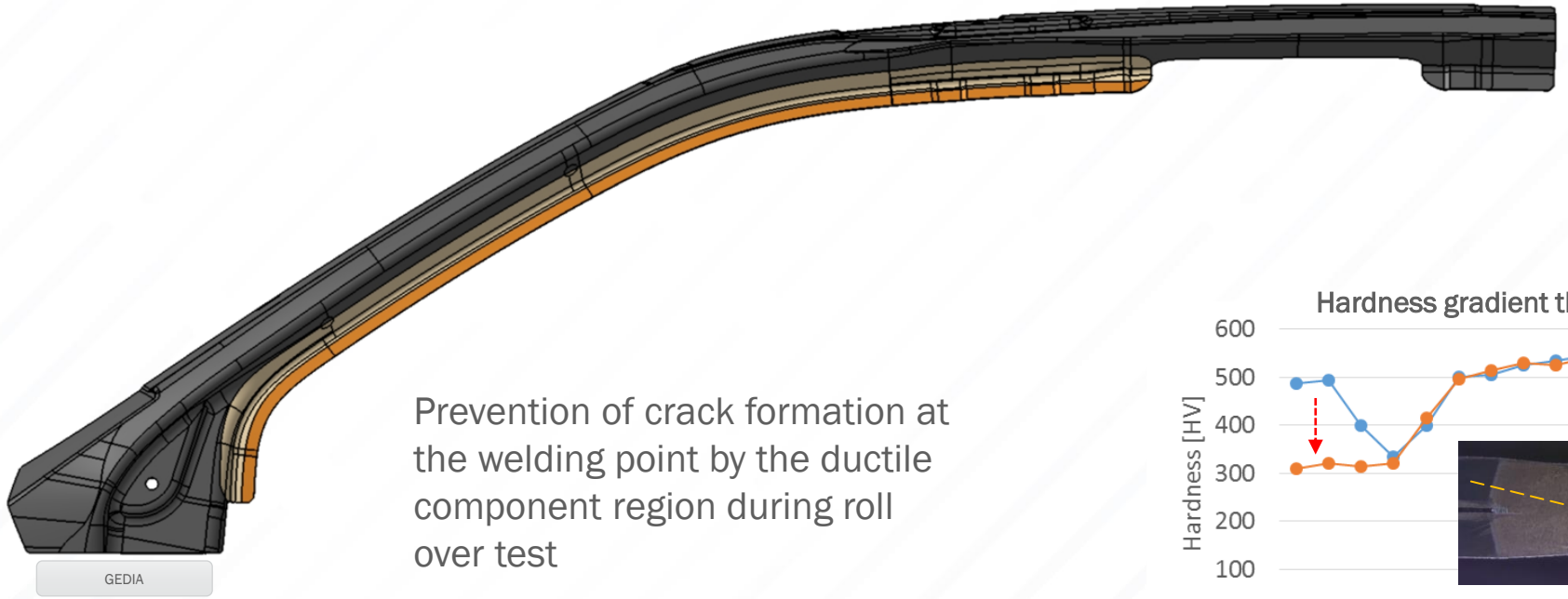
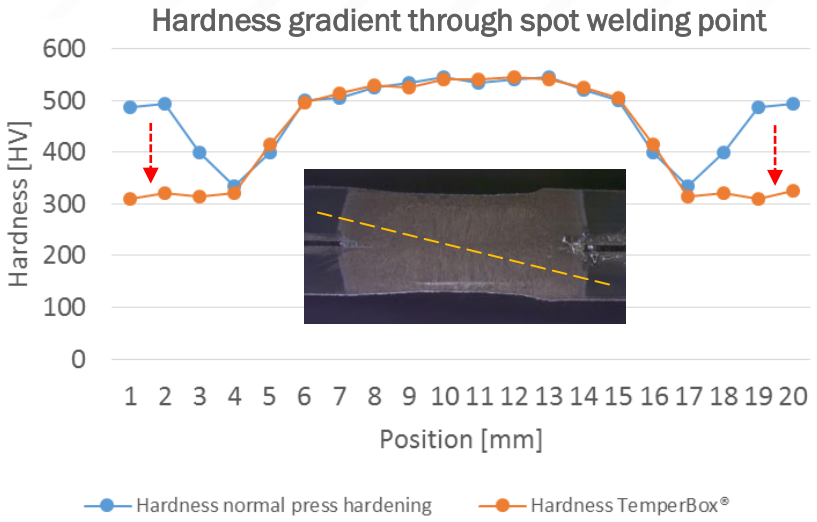
Joining technology robustness on the example of an A-pillar (Resistance spot welding)



Prevention of crack formation at the welding point by the ductile component region during roll over test



Conclusion

- Press hardened steels as „backbone“ of car body structure
- Use of PHS-Material, 1000 MPa / 1500 MPa / 2000 MPa, enables weight reduction while achieving crash performance targets
- Design challenges presented by UHSS can be managed through multiple PHS technologies like Patchwork blanks and Tailored Tempering
- TemperBox® offers more advantages than other methods

For more information

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