

New sustainable Portfolio concept for Body Shop and Paint Shop

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Content

1. Trends in the Automotive Industry
2. Adhesives and Sealants
3. Composites integration on the Car manufacturing concept
4. Conclusions



“To achieve more with less”

Automotive Mega Trends

Fuel Efficiency

Sustainability

**Weight
Reduction**

Modularization

Alternative
Powertrain

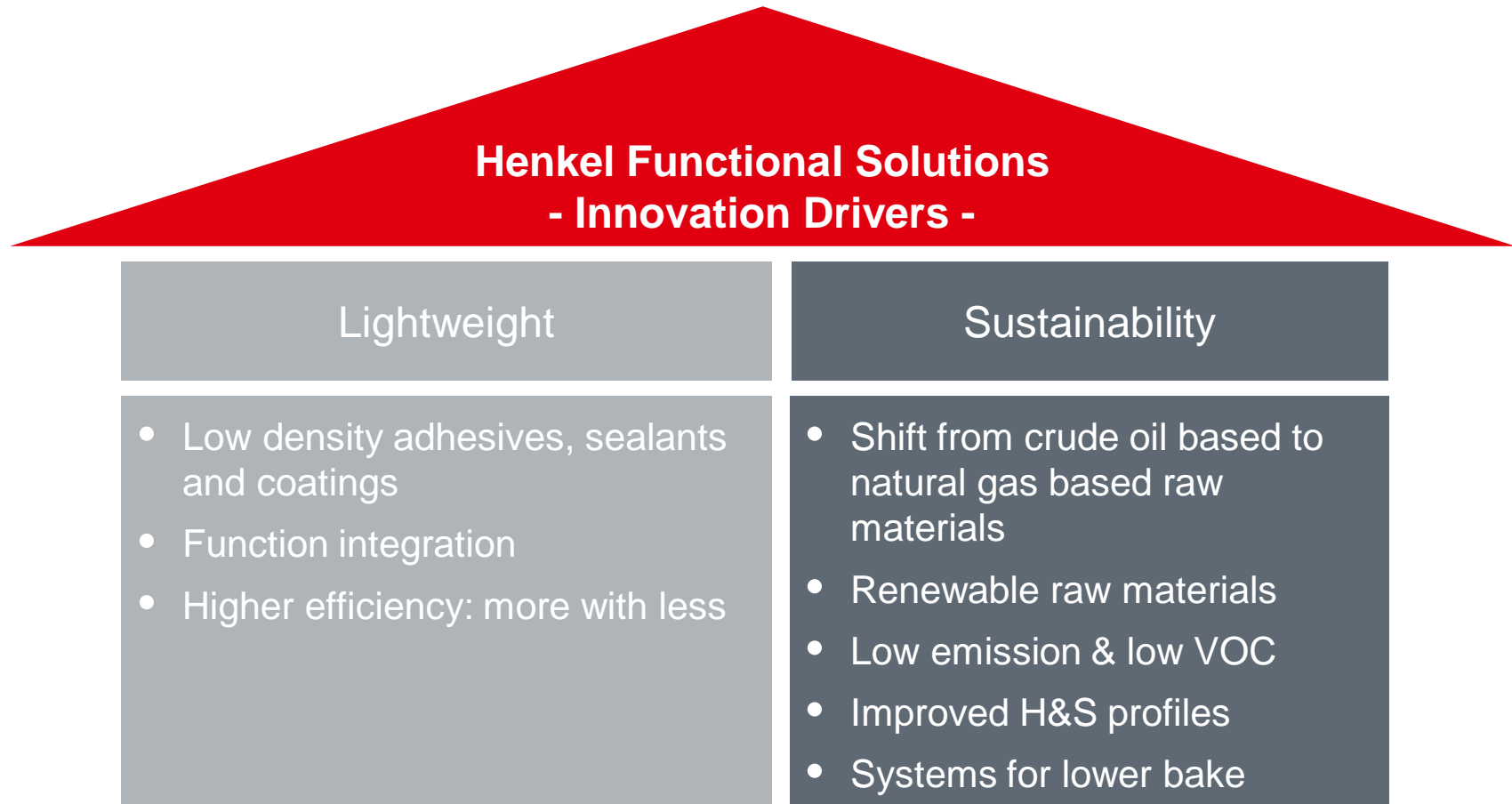
New Battery
Technologies

Lightweight

Sustainability

Bonding, Sealing and Coating on Car Bodies

From market trends to development drivers



5 Innovation Drivers

Requirements / Challenge for automotive OEM lines

Design :

- Difficult shapes, more transparent areas

Substrates :

- Use of New Material and substrates.(Al, Mg,..)
- Composites.
- Increased “Mix” of substrates
- Diverse source of metals / Oils

Cost :

- Consumptions
- Energy, maintenance cost.
- Low investment

Manufacturing Process :

- Flexibility/ multi OEM
- Globalization.
- Robustness

Safety, Health and Environment :

- VOC Reduction.
- Reduction of operator exposure
- Reach

Contribution to reduced carbon footprint (raw materials, energy, weight, CO₂ emissions)

No compromise in technical performance

Easy process integration into automotive production lines

Easy to adapt to new future paint systems and bake conditions

Content

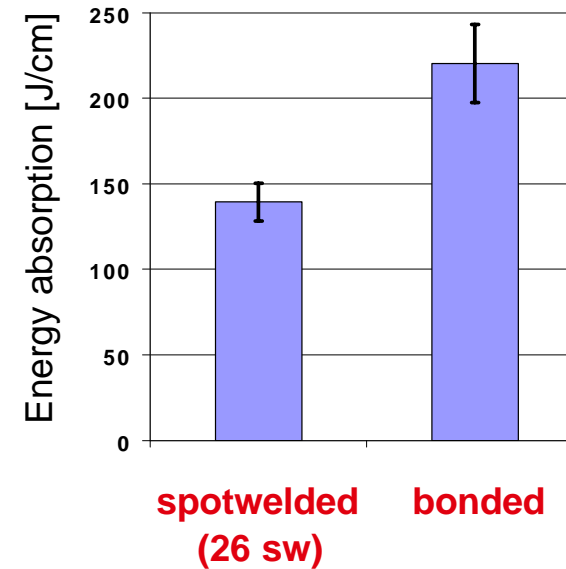
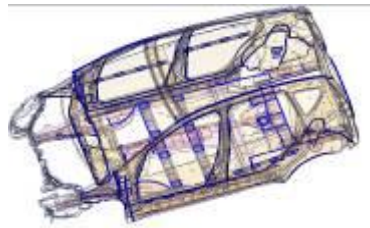
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Structural Bonding in Automotive Industry

Light weight : multisubstrates high performing steels and alloys

Teroson EP 4552

Crash simulation
using box beams



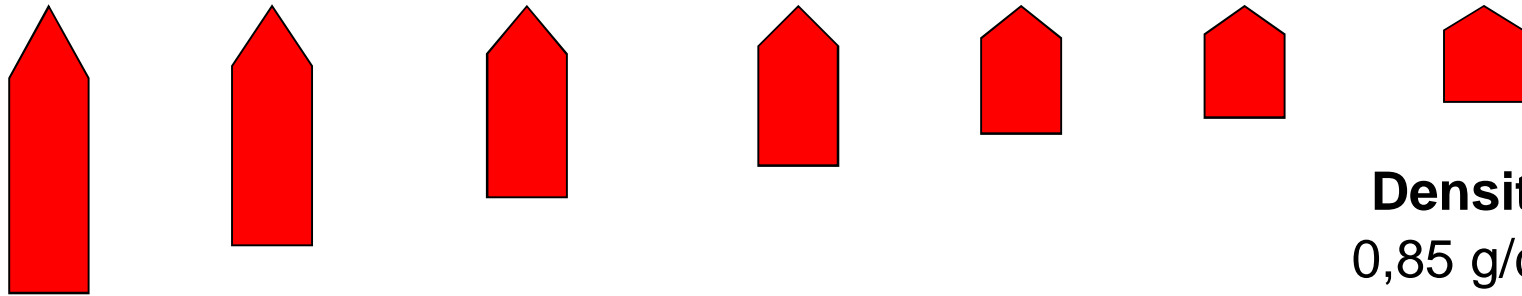
Accepted benefits of structural bonding

- Improved stiffness of car body assemblies
- Up to 25 % increase of energy absorption in the metal structures
- Increased fatigue durability

Paint Shop Sealing in Automotive Industry

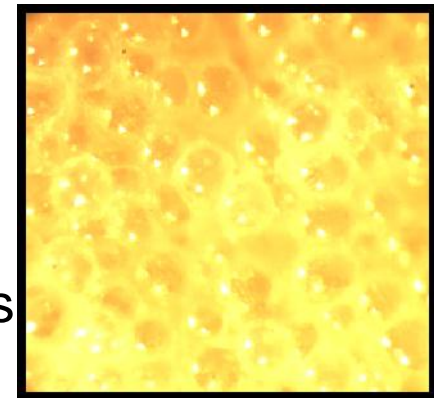
Light weight : low density

Weight reduction of : 43 %



Density :
1,5 g/cm³

Density :
0,85 g/cm³



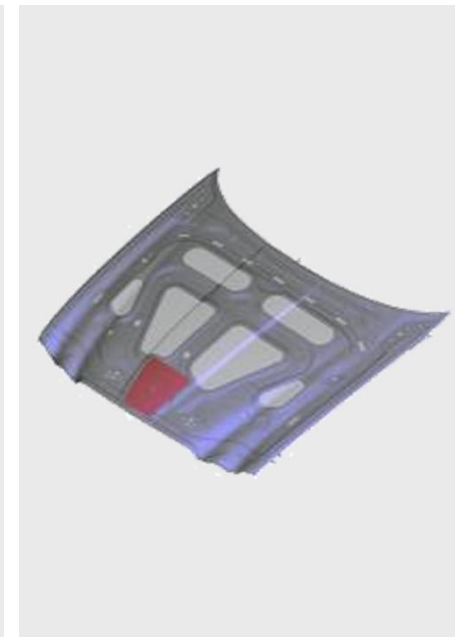
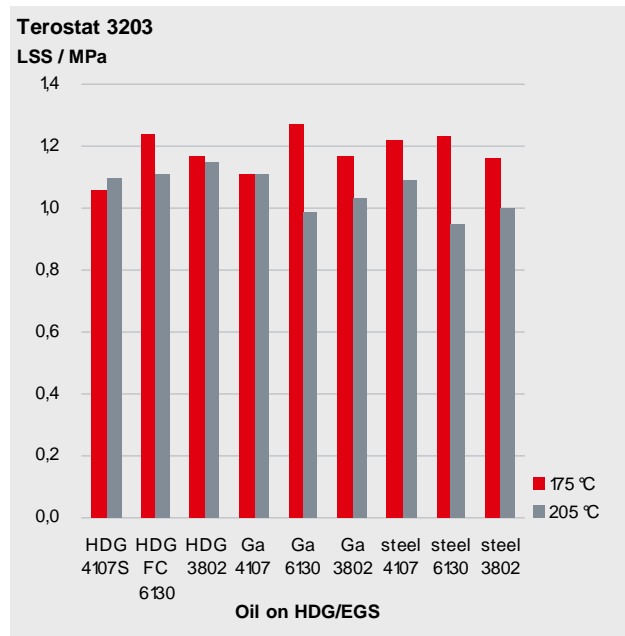
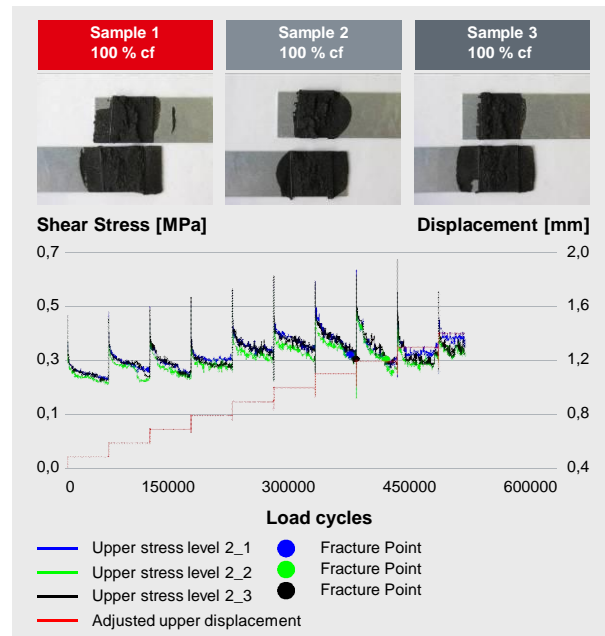
- All range of densities available
- Full compatibility with modern Paint Process
- 3 wet process

Sustainable Body Shop and Paint Shop Solutions

High performance antflutter adhesives

Screening greener raw materials with potential technical benefits

- better adhesion on CRS after overbaking at higher temperatures
- higher resistance against flammability in spot weld applications (excess material areas)
- increased fatigue resistance



Sustainability and Lightweight

LASD with high efficiency – with renewable oils



Key Criteria for LASD Application

- **Weight reduction: 20 – 25 %**
(vs. melt pads – based on same acoustic performance)
- **Automatic application**
- **Reduced shop complexity**
- **Technology carry over**



Sustainability Roadmap Body and Paint Shop

Overall technology overview



	Technology	Bio-based (renewable) raw materials	Weight Reduction	Low temperature cure	SHE
Body Shop	Composite Bonding (focus CFRP)		■		
	Hemflange Adhesive	■			■
	Antiflutter / Sealing	■	■	■	
Paint Shop	Ultra light Sealer Systems		■		
	Phthalate-free PVC	■	■	■	■
	Non-PVC Sealing Systems	■			
	Elastomeric LASD	■	■	■	■
	Water-borne Acrylic LASD		■	■	■
Trim Shop	Direct Glazing		■		■

OEM projects started
 OEM approval testing
 Technology ready

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Integration of composites

Knowledge needs



Engineering, Design & Simulation

- › **Joining method selection** Adhesive bonding is the favorable method since fiber-matrix system stays unaffected
- › **Joint design & FE analysis** for prediction of probable points of failure and failure modes

Process Conditions & Substrate Properties

- › **Thermal sensitivity of composites** prevents standard oven processes & drives bonding processes into the assembly line
- › **Surface preparation for composite part integration** is a process challenge due to remaining mold release chemicals

Adhesive Design & Selection

- › **Stiffness of composites in combination with larger bondline thicknesses** change mechanical requirements for the respective adhesive systems
- › **Multimaterial design concepts** need to consider different thermal expansion properties of substrates

Integration of Composites into Automotive Processes

Considerations for Process Conditions

Body & Paint Shop



- **Composite Body**
- Composite & adhesives:
High requirements on thermal resistance
- **Substrate Mix:** Metal-CFRP
- Adhesives: **1c/2c Epoxy**

Trim Shop

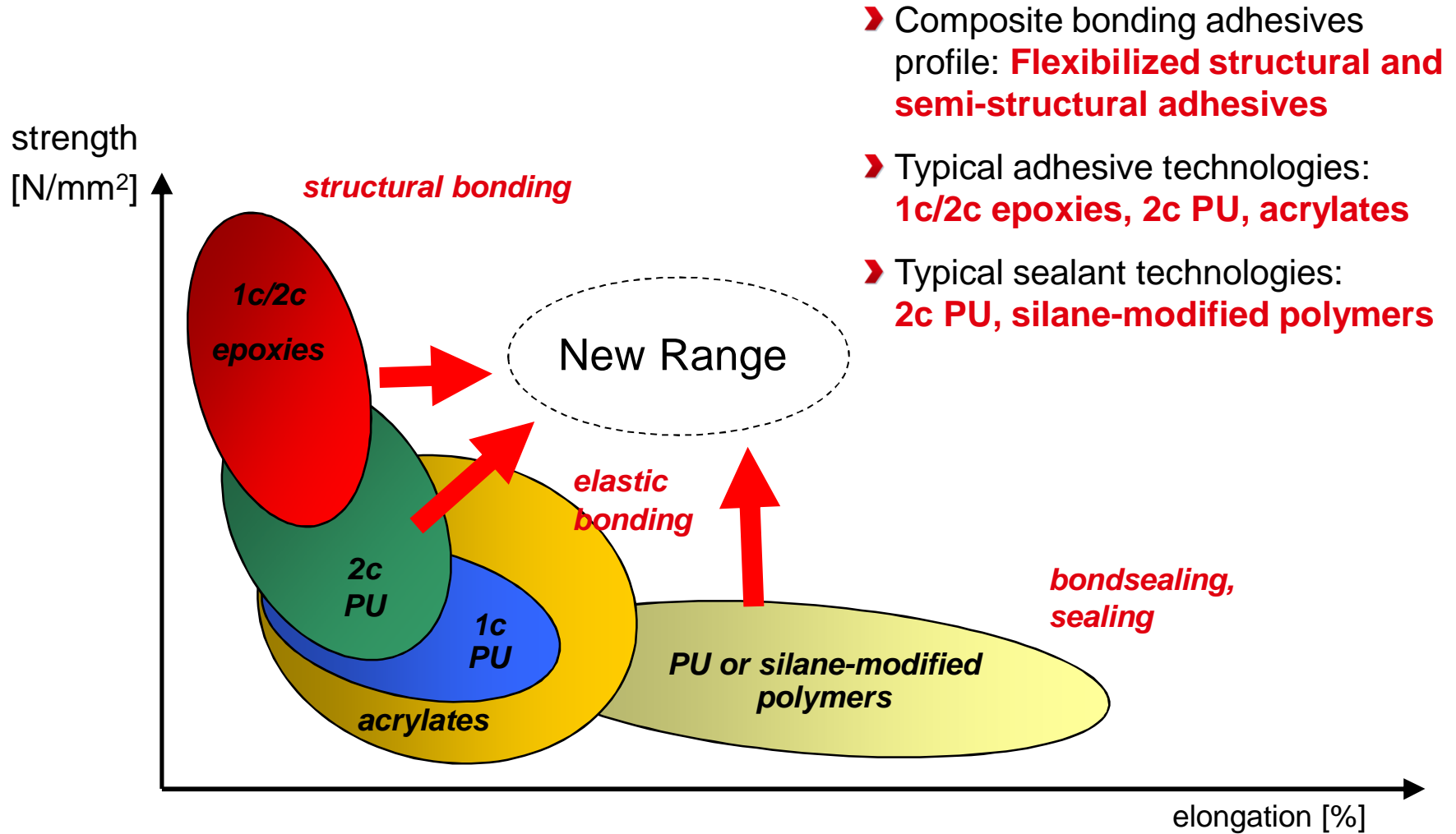


- **Modules, Roof, Tailgate, Chassis**
- Composite & adhesives:
Medium thermal resistance
- Focus on: **Cycle time**
- Adhesives: **2c Epoxy/PU, 1c PU**

Repair

Integration of composites

Adhesive technologies - mechanical property profile



Bonding solutions for modern plastic assemblies

Broad technology portfolio

Adhesive	Curing time [min]	System / Curing temperature	Application	Shear Strength [MPa]	Elongation [%]
Teroson EP 5055	240	2P Epoxy / RT	Structural bonding	18-22	3
Teroson PU 6700 DME	120	2P PUR / RT	Structural bonding	13	< 10
Loctite 3038	60	2P Acrylate / RT	Polyolefin bonding, GFR-PP bonding	10	25
Teroson PU 1510	1	1P PUR / > 85 °C	Structural bonding, Composite bonding	10-14	100-150
Teroson PU 1103	2	1P PUR / > 95 °C	Flange sealing	4	200
Teroson MS 9399	90 - 180	2P Silane-MP / RT	Elastic bonding	2	150


 Increasing shear strength



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Conclusions

- Market moving in a constant evolution looking for a much more efficient design and manufacturing targets
- Dynamic portfolio to cover the requirements : high capacity of innovation and flexibility needed
- Composites integration concepts on-going
- Henkel provides innovative available solutions (products in the market) to the constant challenges accordingly the megatrends and new design / manufacturing concepts



Thank You!

Henkel

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