







Agenda

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- Partners / Consortium
- Motivation for Body Structure Kit
- Methodology
- Application & Validation Projects
- Structural Validation Crash
- Material Concept
- Cost Calculations for Low Volume Cars
- Volume Dependent Manufacturing





Industry and Research Consortium



RESEARCH PARTNERS







Motivation for a Smart, Lightweight Body-Structure-Kit







- Satisfies the small series homologation needs (< 1.000 car/year)</p>
- Quick to market
- Low investment
- Limited engineering resources (high knowledge base)
- Dedicated and clear attributes management





Methodology - Geometrical and production-technological intelligence



AUTOMOTIVE ENGINEERING



Methodology – Development process





ThyssenKrupp System Engineering

ThyssenKrupp

Validation Vehicles

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"Central Pipe Integrated Frame"

Source: www.protoscar.com



ec2go (car sharing)



ego (Golf Caddy)





"Body Integrated Frame"

ThyssenKrupp





Structural intelligence – Example Crash

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FLEX BODY

Final Evaluation using FEM





Materialmix

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- Combinations of different materials are possible
- Focused on lightweight design and functional requirements
- Combination of various cross sections due to modular construction system
- Body integrated frame for maximum battery protection







Material Concept: Joints

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A = Aluminium B = Steel-Aluminium-Hybrid C = Titanium





Example of cost calculation for low volume cars







Example of manufacturing concept: Joining Technology





New process: Injection bonding

Motivation:

- tolerance friendly
- no welding distortion
- material combinations are possible







Example: Injection Bonding







Volume dependent manufacturing technology



Investment



jig / fixture technology

partly automated



jig / fixture technology

jig / fixture technology

burn-out-templates





Volume





Example: e-car project









- FlexBody concept is giving the chance to realize low volume niche vehicles projects.
- Body integrated frame for maximum battery protection
- Injection bonding for "cold" body manufacturing and possible use of different materials.
- Reduced engineering efforts due to high degree of standardization and parametric design
- Hybrid casting technology to combine different materials and reinforce critical areas
- Volume dependent manufacturing technology

















THANK YOU FOR YOUR ATTENTION

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ThyssenKrupp System Engineering



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