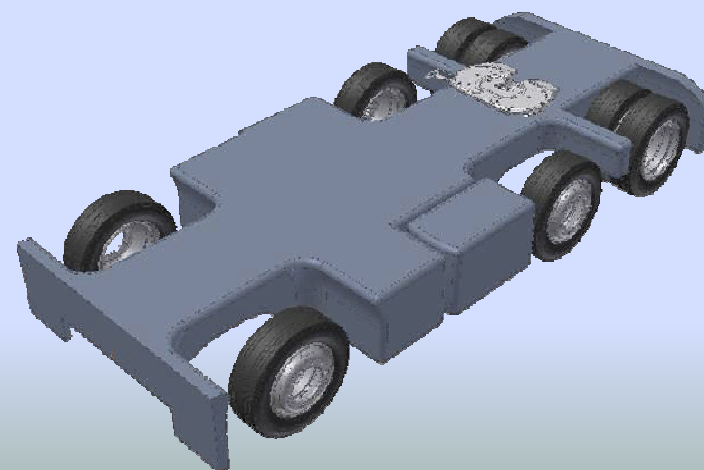




CFK VALLEY STADE  
**TECHNOLOGY**<sup>TM</sup>  
TTT The Team Composite AG



# A regional network with global importance

- TTT CFRP HGV Technology & Competence Leader
- Home of HGV & GEN CFRP competence embedded in a strong network environment



# Development of TTT The Team Composite

- 1997 founded in Hamburg
- since September 2007 Main Office in Stade  
in CFK- Valley CFRP- Competence Centre
- Honored with two Design Awards (2005 & 2006)
- Projects are supported by the EU and regional Government





CFK VALLEY STADE

The Team  
*The Art of Trailer Technology*

# Design Award Munich Expo 2005



- More payload, significant reduction of round trips
- Less wear and tear due to the integral Monocoque- construction
- Life cycle increased by reduced life cycle cost i.e. driving gear, tires, brakes etc.



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# Design Award Munich Expo 2006

- World wide first full CFRP MEGA Curtainsider
- Aerodynamically and light weight design
- 3.000 mm net inner height maintaining 4.000 mm outside
- Full integration of systems & functions



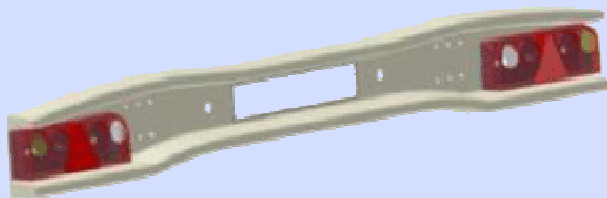


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# TTT's Involvement in LEAD- Projects

1. CFRP the new material for HGV
2. Ecological and economical importance
3. Road and Cargo Health & Safety developments
4. CFRP-zero emission reefer trailer





# CFRP the new material for HGV

- creates new products with a high added value
- leads to reduction of weight, emissions and costs
- is demanded and required in a fast growing general industrial market
- is the base for innovative light weight CFRP developments of all kinds

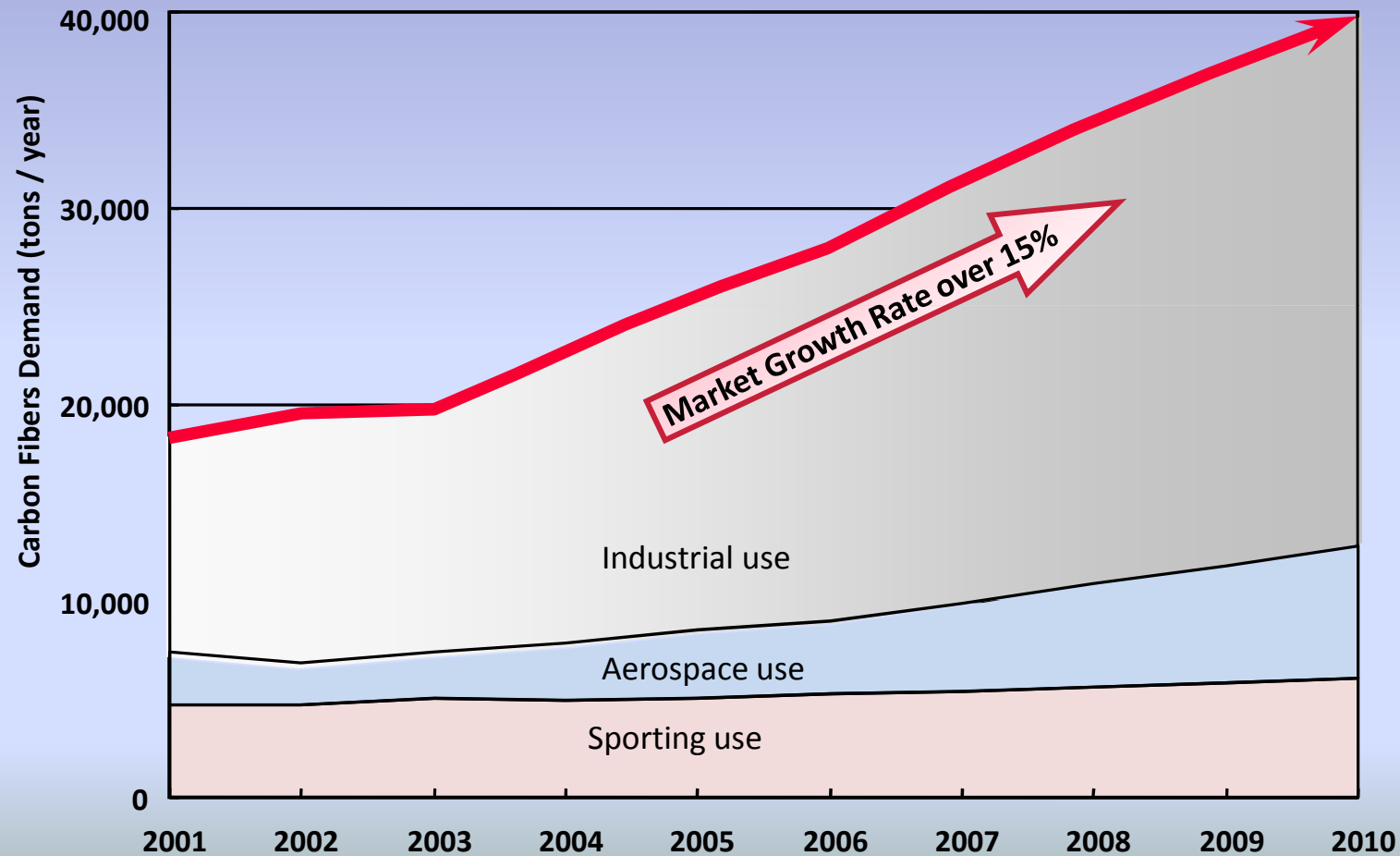




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# Ecological and economical importance







# TECHNICAL COMPARISON

	Aluminum	CFRP
▪ Total length:	11.700 mm	11.700 mm
▪ Tara:	6.500 kg	4.035 kg
▪ GVW:	34.000 kg	34.000 kg
▪ Volume:	63,0 m <sup>3</sup>	64,0 m <sup>3</sup>
▪ Usable Volume:	47,4 m <sup>3</sup>	51,66 m <sup>3</sup>

## Advantage CFRP

+ Volume:	4,25 m <sup>3</sup>
+ Payload:	2.465 kg



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# Leading economic indicators favoring CFRP-HGV Technology

- Cost reduction in road maintenance
- Less necessity to refurbish existing roads
- Avoiding future costing in CO<sub>2</sub>-Emission Trade
- Significant savings for winter road services



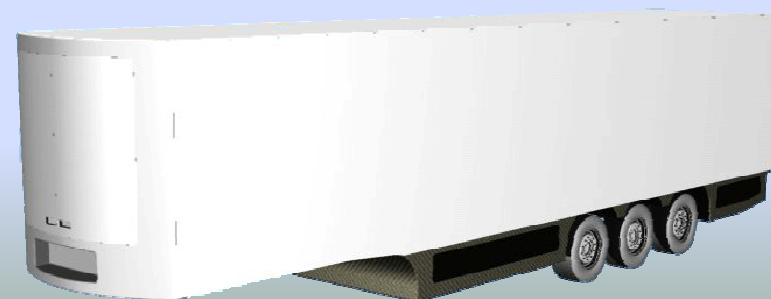


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# Economical facts as advantages

- Weight saving – fuel saving
- Increased volume capacity
- Improved aerodynamics, reduction of noise emission
- Reduction of life cycle cost
- Marginal increase of annual investment of assets
- Integration of functions
- Reputation and environmental benefits
- Integrated life saving functions, driving safety, load security





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# Road and Cargo Safety developments

- CFRP rear under run active / passive
- CFRP- side guards
- CFRP- anti spray
- Optimized driving stability and reduction of aquaplaning
- Improved winter road services by the aerodynamic design of CFRP- Truck- Trailer combination





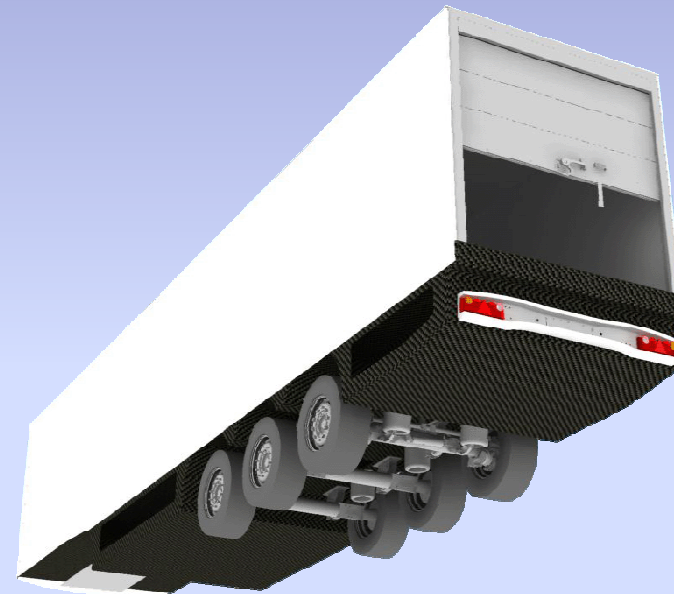
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# CFRP-Zero Emission Reefer Trailer

Advantages:

- Light construction
- Aerodynamic shape
- Optimized insulation
- Natural refrigerant CO<sub>2</sub> in closed cycle
- Emission-free drive of the refrigerator
- High Cap Li Ion Battery Technology



We trade with responsibility ALDI SÜD



# TTT Barskamp-Bleckede home of Witte



## Witte Gerätebau KG

Hightech in Aluminium

[www.horst-witte.de](http://www.horst-witte.de)

CEO: Horst Witte  
Established: 1969  
Employees: world wide over 200

Subsidiaries: - USA (Atlanta, Indianapolis)  
- Mexico (Chihuahua)  
- Singapore

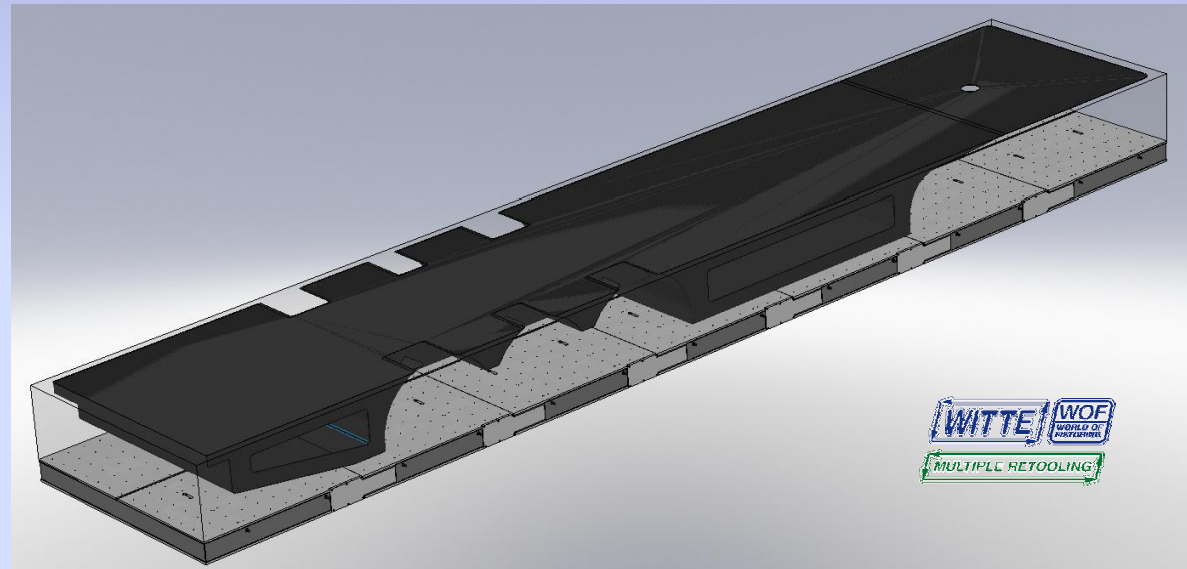


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# CFRP Development Cooperation TTT/Witte

- **MODULAR CONSTRUCTION**
  - as a complex system
  - individual single plates
  - homogenous grid drill
- **RESUSABLE for SERIES**
- **HIGHLY COST EFFECTIVE**
- **HIGH SHOP FLOOR MOBILITY**
- **CONSIDERATION of THERMAL INFLUENCES**





# TTT α Project Aldi Süd



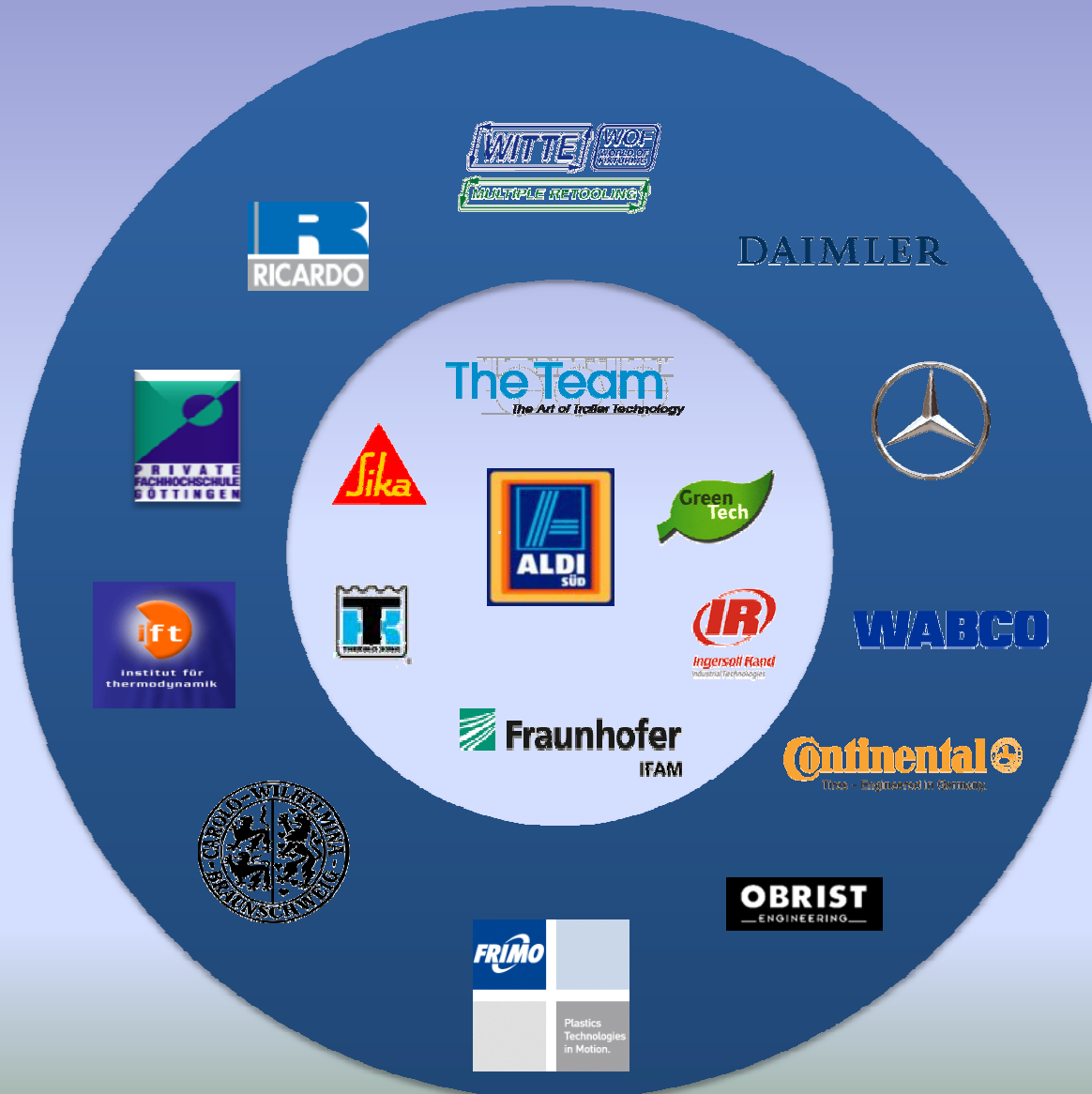
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This project is subsidized by the EU Community, for the regional development of the state of Lower-Saxony Germany



# TTT $\alpha$ Project Partner





# Refrigerants

		R134a	HFO-1234yf	R744 (CO <sub>2</sub> )
		ban from 2011 (EU)		
Safety	Known substance / Complexity	😊	😡	😊
	Flammability with oil	😊	😡	😊
	Flammable substances	😊	😡	😊
	Toxically safe	😊	❓	😊
	Stability	😊	😡	😊
	Production charge equipment	😊	❓	😊
Environment	Ozone depletion	😊	😊	😊
	Global warming 100 years	😡	😊	😊
	Global warming 20 years	😡	😊	😊
	Fuel consumption / life-cycle emissions	😊	😊	😊
	Decomposition products	😊	😡	😊
	Possible misuse (re-fill with R134a)		😡	😊
Costs	Initial costs for carmakers	😊	😡	😡
	Refrigerant costs	😊	😡	😊
	Operation costs	😊	😊	😊
	End-of-life costs	😊	❓	😊
	Invested research / Production readiness	😊	❓	😊
	Long term investment security	😡	😡	😊
Performance	Cool down performance	😊	😊	😊
	Cooling capacity	😊	😊	😊
	Heat pump capability	😡	😡	😊
	EV: direct Li-Ion battery cooling / heating	😊	😡	😊



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**TECHNOLOGY**<sup>TM</sup>  
**TTT The Team Composite AG**

**thank you very much for your valuable Attention !**

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