



Idea in motion

Vehicles for eMobility in Hungary



HVEC

Hungarian Vehicle Engineering Cluster

Idea in motion

5th Project day - Düsseldorf, April 18th / 2012

Content

1. Introduction and country presentation
2. Companies and expertises
3. eVehicle projects in Hungary
4. Future outlook



1. Hungarian vehicle industry

- Automotive
- Bus
- Truck
- Airplanes
- Trains
- Others (e.g. bikes, mopeds)



1. Automotive history Hungary

Once:

- Car:

- Csonka 1905
- Opel 1992-1999



- Truck until 1989

- Csepel
- RÁBA



- Busses until 1989

- Ikarus
- RÁBA



Today:

- Car:

- AUDI
- Suzuki
- Mercedes



- Truck:

- RÁBA



- Busses:

- Intertanker
- NABI
- Credo



1. Busses

CREDO



NABI



INTERTANKER



www.dehir.hu

1. Trains



Stadler

Bombardier





Apollo Fox '99 - Eger



UL certified in 6 countries

Corvus Phantom '08



2 seat full composite UL

BHX -03 '08 - Budapest



Electric powered UAV

Hydropteron '09 - Miskolc Avana Larus '09 - Tököl



2 seat compos. amphibian



5 seat full composite turbopr.

Corvus Racer 540 '10



1 seat acrobatic aircraft

The small aircraft manufacturing sector is growing across the country...

2. Members



Members

- AMB-Components Bt.
- ANTRO Nonprofit Kft.
- ArraboCAD Kft.
- Dension Audio Systems Kft.
- DSM Engineering Plastics
- ENTAL Kft.
- Fuel Cell Hungary Kft.
- Intermotor Kft.
- MESHINING Engineering Kft.
- Mondexdesign
- Moveo Zrt.
- RaabCAD Kft.
- SIMGRID Kft.
- Varinex Zrt.
- Willisits Engineering Kft.

Founded: 15th of January 2009.

Nr. engineers: 120



2. Expertise



DENSION



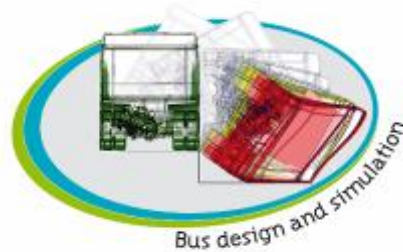
amb
COMPONENTS

WILLISITS
engineering

intermotor
intermotor engineering
FELKUTATÓ ÉS SZAKTANÁCSADÓ KFT.



Arrabo CAD
Műszaki Fejlesztő és Szolgáltató Kft.



MESHINING Engineering **M^e**



DSM



SIMGRID
Advanced Simulations

RaabCAD
Széchenyi István Egyetem



KF
ENTAL

KUTATÁSI,
FEJLESZTÉSI és
TANÁCSADÓ KFT.

TECHNOPLAST



VARINEX

Products of cluster members



eVehicles designed in Hungary

- Solo (2004-)
- Moveo (2009-)
- Hy-Go (2009-)
- Micron (2010-2011)
- M55-Bike (2001-)



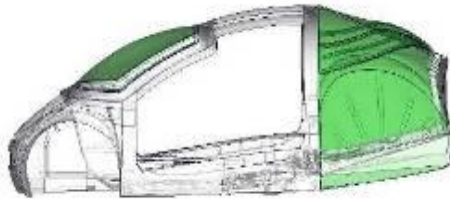
■ Konstruktion

- Rohbau
- Türen
- Fahrwerk, Aufhängung

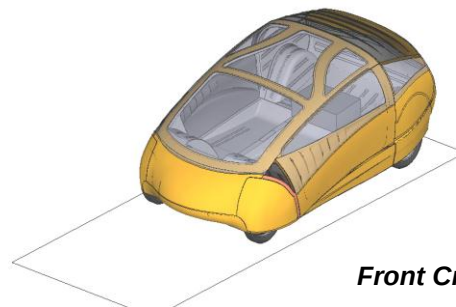
■ Berechnung

- FEM
- Crashberechnung (EURO/NCAP)
- Berechnung **Verbundwerkstoffe** (Thermoplastics)
- Optimierung
- Strömungsanalysen

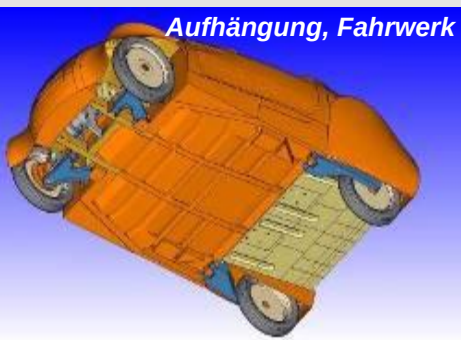
■ Geschäftsplan



Eigenfrequenz



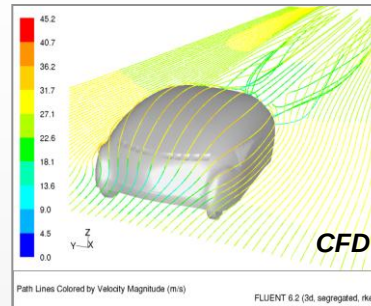
Front Crash



Aufhängung, Fahrwerk



Berechnung Verbundwerkstoffe



Prototyp



Foldable electric moped

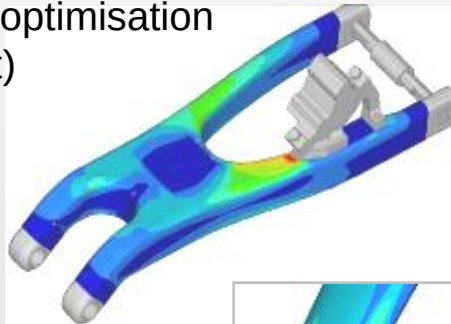
■ Industrial study

■ Simulation

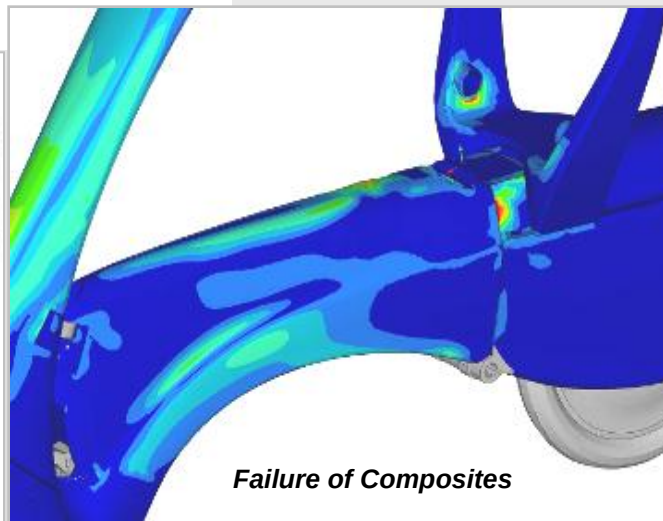
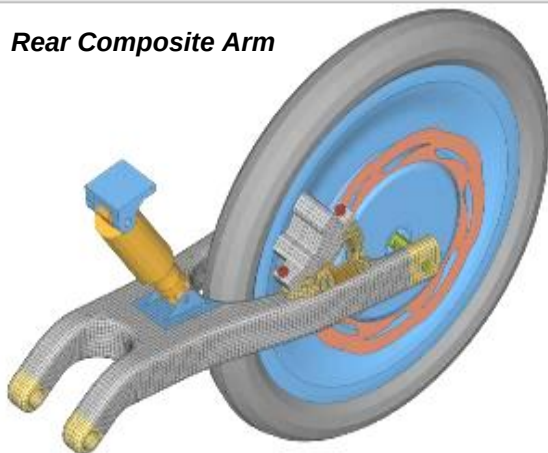
- Static
- Dynamic
- Eigenfrequency
- Composite optimisation (Thermoset)



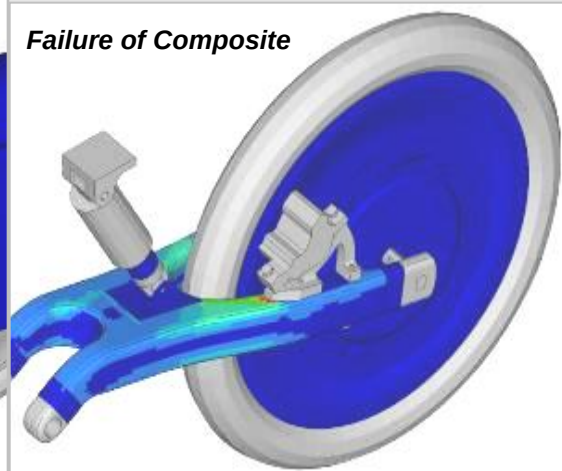
www.solo-duo.hu



Rear Composite Arm



Failure of Composites



Failure of Composite

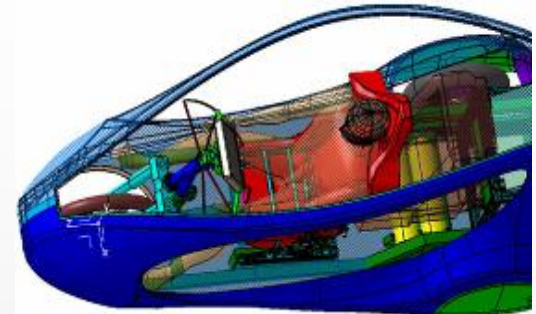
■ Turn key solution

- CAD Design
- Composite calculation (Thermoset)
- Realisation
 - Manufacturing
 - Assembly
 - Testing

<http://hy-go.fcell.hu/>



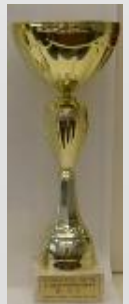
Open innovation platform



5th Széchenyi Race
25th April 2010



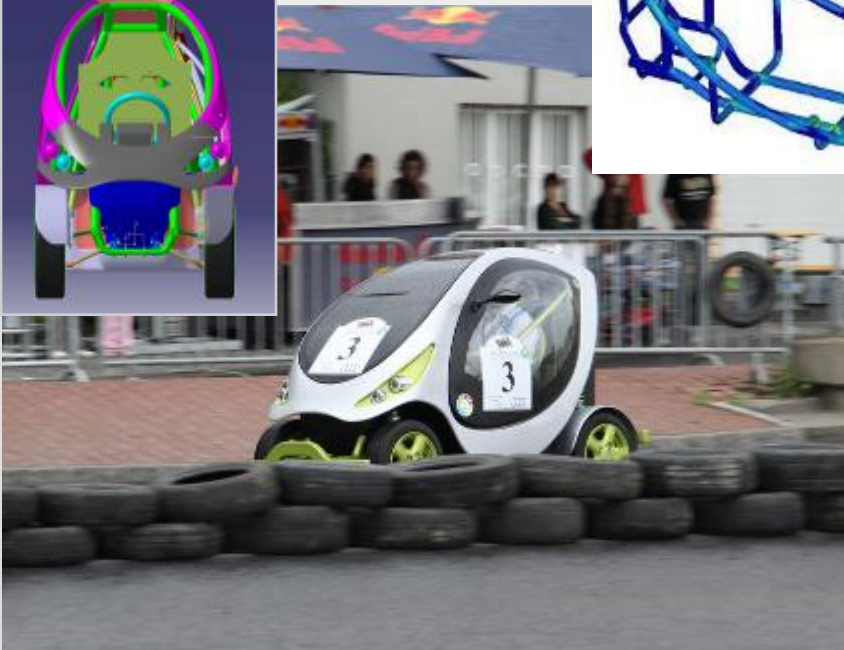
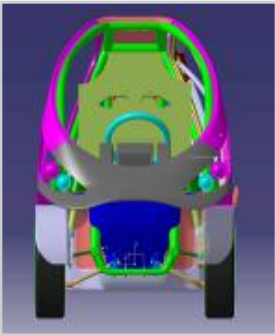
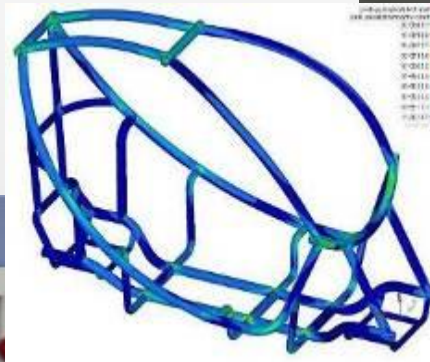
Category Winner



Special Award –
Most innovative vehicle

■ Turn key solution

- Projektkoordination
- Einkauf
- CAD Design
- Berechnung Statik, Dynamik, Eigenfrequenz
- Prototypenbau inkl. Werkzeugbau
 - Exterior
 - Fahrwerk
 - Montage



Projektstart: 15. September 2010

Übergabe Proto: 26. Februar 2011

Offizielle Vorführung: **Genf Motorshow 1. März 2011**

Testfahrt:

6th Széchenyi Race, Győr 1. Mai 2011

47,3 km in 92 Min. ~ Durchschnittsgeschw. 31 km/h

- Berechnung CFK
- Ersetzung Aluteile mit CFK
- Protobau
 - Werkzeug
 - Bauteile



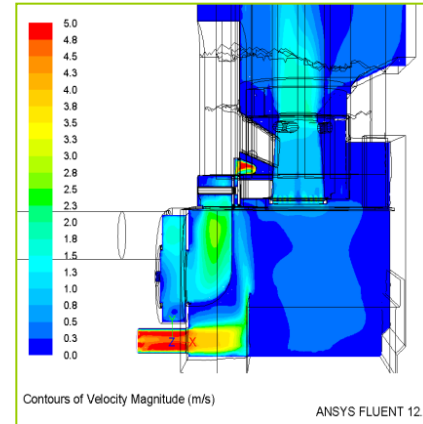
www.m55-bike.com



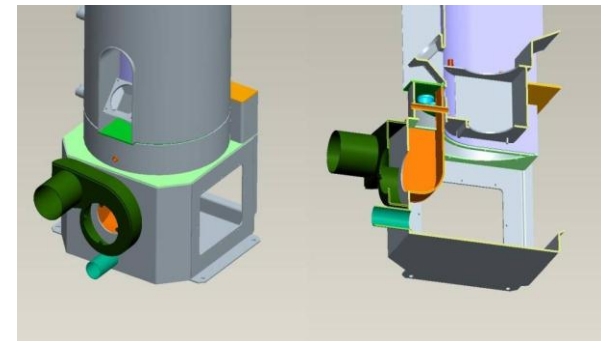
Other products



Environmental friendly energetic products



Intelligent goal (sport and games)



VIROLL (leisure and recreational)



4. Future plans

- New cluster products to the market
- Participation in EU R&D projects
- Extend of services
- English webpage

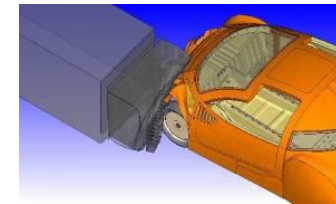


4. Research areas

- New vehicle concepts
- Materials
 - EAP (electro active polymers)
 - Biocomposites
- Occupant safety
- Open innovation platform



Skateboard from natural fibre composite



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