Hungarian Bus Manufacturing Cluster
Agenda

- Introduction and objectives of the Hungarian bus manufacturing cluster
- History of the bus manufacturing in Hungary (1909 – 2012)
- Potential cooperation forms with the Hungarian bus manufacturing industry
  - New buses
  - Bus modernization program
  - Manufacturing cooperation possibilities
- Back-up: Introduction of Hungarian Bus Producers and main parts suppliers
Strategic objectives of the Bus Manufacturing Cluster

1. Build on the history and available industry and development knowledge of the Hungarian bus manufacturing industry
2. Actively participate in the modernization of the Hungarian public transportation sector
3. Increase competitiveness of the Hungarian bus manufacturing industry
4. Bringing intellectual capital onto one common platform in Hungary
   - Unified Hungarian technological patents to enhance efficiency
   - Development, manufacturing and logistical cooperation agreements
   - Fast implementation of EU directives
5. Proactive development of export markets by establishing cooperation agreements and acquiring new export markets for parts suppliers.
Long history of bus manufacturing in Hungary

MARTA – 1909 Arad

Rába started to build complete buses – 1927

First serial monocoque bus type of the world – IKARUS Tr3,5 - 1948

IKARUS 55 - 1954
Ikarus brand is known worldwide

First IKARUS articulated bus. 2/3 of world production of articulated buses built the 1970’s – 1980’s were IKARUS Ikarus 180 – 1961

Ikarus 250 – 1967
Nizza (Nice) – 1969 – Golden Cup
Monaco – 1971 – Award of the Prince

Ikarus 417 – 1994
First fully low floor articulated bus
Other brands also stem from the Ikarus brand and traditions

RÁBA Premier 291
2000 - 2001

NABI Compobus
Kaposvár 2002-2005, since 2008

Kravtex BC 18  since 2006
Why to buy Hungarian buses?

- Technical skills and unprecedented experience (probably the highest ratio of bus specialists per capita in the world) in the bus manufacturing industries
- Excellent scientific background for R&D activities, cooperation with vehicle manufacturing departments of Technical Universities
- Full 3D Computer Aided Design
- Reliable international references – Ikarus 200 series has the largest amount of buses ever operated worldwide, NABI has sold a total of ~ 8500 buses until 2012 in the US
- Production capacity of ca. 1100 buses per year, not counting cooperation agreements
- Strong supplier chain, all suppliers have been supplying Ikarus and other brands for decades
- Proven track record: intense interest is seen by those, who has used Ikarus buses in the past, and a strong track record in the US. Not mentioning the Hungarian market where Hungarian manufacturers have a clear market leadership
- All models are EU regulatory compliant, knowledge and usage of international standards
Current Ikarus models (Ikarus 127, 134, 187)
Competitive edge of Ikarus series

- Ikarus is the only bus manufacturer in the world, who is capable of manufacturing new bus models, bus modernization and manufacturing cooperation agreements.
- Bus modernization (i.e. re-building old buses with new elements at a very favourable value for money ratio).
- The buses after reconstruction look like new buses, with an extended life cycle of 10+ years.
- The brand has facelifted models for the old Ikarus series.
- Ikarus has new models that comply with the highest technological, travel comfort and driver comfort expectations.
- Ikarus has the only bus models that:
  - Has proven also among harsh environmental conditions (Moscow, Siberia, Tunisia, Egypt).
  - Bears cold, warm, humidity, bad road conditions much better than Western European and Northern American brands, that are designed for good road infrastructure.
- Ikarus has a good price to value ratio: it is suitable for countries, cities and municipalities where value for money and low operating costs has a high priority.
New Ikarus models

- **Driveline**: Cummins diesel engines, with a life of more than 1,000,000 kilometers
- **Low fuel consumption**
  - two-axle city bus fuel consumption **38.7 litres/100km**
  - three-axle articulated bus fuel consumption 45.7 litres/100km
  - **intercity bus** with two axle is not more than **29.5 litres/100km**
- Distances can be done up to 600km in the city, with the articulated version the driving distance can be up to 700km. The intercity bus driving distance can be be up to 780km.
- The **bus frame structure is 100% stainless steel** which ensures that the bus life of corrosion will not occur and avoid the need for periodic review and costly repairs. The inner and outer plating is made of stainless materials, too.
- The **windscreen is made of single piece of glass**. The side glasses size and numbers in both directions sliding side windows helps airing the bus, air conditioning use is not necessary. This contributes to saving fuel.
- **In-vehicle Wi-Fi network**: The router connects to the Internet and vehicle used in PDAs and laptop computers, wireless networks, IP addresses via DHCP to distribute.
- **Camera System**: The vehicle 4pcs CCTV camera monitors the entire interior, pictures of which the driver can watch a 7 inch monitor through.
## New Ikarus models – technical parameters 1

<table>
<thead>
<tr>
<th>Model</th>
<th>Type approval certificate</th>
<th>Category</th>
<th>Length</th>
<th>Wheelbase</th>
<th>Step Height</th>
<th>Ramp</th>
<th>Arrival angle</th>
<th>Departure angle</th>
<th>Height</th>
<th>Room height</th>
<th>Front overhang</th>
<th>Rear overhang</th>
<th>Max Axle Load Front</th>
<th>Max Axle Load Rear</th>
<th>Doors Arrangement</th>
<th>Seats</th>
<th>Passengers</th>
<th>Wheelchair Place</th>
<th>Disabled People Seats</th>
<th>Engine</th>
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<td>M3/I class</td>
<td>12 725mm</td>
<td>6 455mm</td>
<td>340mm</td>
<td></td>
<td>7º</td>
<td>7º</td>
<td>2 550mm</td>
<td>3 180mm</td>
<td>2 390mm</td>
<td>3 590mm</td>
<td>7 250kg</td>
<td>11 500kg</td>
<td>2-2-2</td>
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<td>370mm</td>
<td></td>
<td>7º</td>
<td>7º</td>
<td>2 550mm</td>
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<td>2 680mm</td>
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<td>6 900kg</td>
<td>11 500kg</td>
<td>2-2-0</td>
<td>40</td>
<td>90</td>
<td>1</td>
<td>2</td>
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<td>5 450/7 030mm</td>
<td>340mm</td>
<td>340mm</td>
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<td></td>
<td>7 250kg</td>
<td>11 500kg</td>
<td>2-2-2</td>
<td>29 - 31</td>
<td>111 - 114</td>
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<td>4</td>
<td>Cummins ISL 8,9E5 320B - 235kW</td>
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<tr>
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<td>M3/II class</td>
<td>18 750mm</td>
<td>5 450/7 030mm</td>
<td>340mm</td>
<td>340mm</td>
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<td>7 250kg</td>
<td>11 500kg</td>
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<td>96</td>
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<td>2</td>
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<td>5 450/7 030mm</td>
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<td>7 250kg</td>
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## New Ikarus models – technical parameters 2

<table>
<thead>
<tr>
<th>Model</th>
<th>Fuel consumption</th>
<th>Tank volume</th>
<th>Gearbox</th>
<th>Tyres</th>
<th>Break</th>
<th>Steering</th>
<th>Suspension</th>
<th>Body</th>
<th>Plated</th>
<th>Heating</th>
<th>Glazing</th>
<th>Driver’s seat</th>
<th>Passanger’s seat</th>
<th>Rear view mirror</th>
<th>Electric system</th>
<th>Battery</th>
<th>Generator</th>
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<tbody>
<tr>
<td>IKARUS127V</td>
<td>38.7 liter/100km</td>
<td>230 liter</td>
<td>6 speed-automata with integrated retarder Allison or ZF</td>
<td>275/70 R 22.5</td>
<td>Two-circuit brake, disc brakes on all axle, ABS és ASR</td>
<td>Hydraulic power steering with variable ratio</td>
<td>Full air suspension with ELC</td>
<td>100% stainless steel</td>
<td>100% stainless steel + GRP elements</td>
<td>Webasto Thermo 300</td>
<td>Thermo-King X900</td>
<td>ISRINGHAUSEN 6860/875</td>
<td>STER 6MS</td>
<td>Heated and electrically adjustable</td>
<td>24V negative ground</td>
<td>2pcs 205Ah</td>
<td>28V 155A</td>
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<td>IKARUS127E</td>
<td>29.2 liter/100km</td>
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<td>6 speed-automata with integrated retarder Allison or ZF</td>
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<td>Two-circuit brake, disc brakes on all axle, ABS és ASR</td>
<td>Hydraulic power steering with variable ratio</td>
<td>Full air suspension with ELC</td>
<td>100% stainless steel</td>
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<td>24V negative ground</td>
<td>2pcs 205Ah</td>
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<td>Two-circuit brake, disc brakes on all axle, ABS és ASR</td>
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<td>Full air suspension with ELC</td>
<td>100% stainless steel</td>
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<td>ISRINGHAUSEN 6860/875</td>
<td>STER 6MS</td>
<td>Heated and electrically adjustable</td>
<td>24V negative ground</td>
<td>2pcs 205Ah</td>
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<tr>
<td>IKARUS187V</td>
<td>47.1 liter/100km</td>
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<td>6 speed-automata with integrated retarder Allison or ZF</td>
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<td>Two-circuit brake, disc brakes on all axle, ABS és ASR</td>
<td>Hydraulic power steering with variable ratio</td>
<td>Full air suspension with ELC</td>
<td>100% stainless steel</td>
<td>100% stainless steel + GRP elements</td>
<td>Webasto Thermo 300</td>
<td>Thermo-King X900</td>
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</tr>
</tbody>
</table>
References for the new Ikarus 2011 bus series in Hungary

- Szombathely Vasi Transportation Company Solo/Articulated
- Budapest Transportation Company Test
- Eger Transportation Company Solo/Suburban
- Miskolc Transportation Company Test
- Miskolc, Borsod Transportation Company Solo/Suburban
- Debrecen, Hajdú Transportation Company Articulated/Suburban
- Szeged Transportation Company Articulated/Trolleybus
- Pécs Transportation Company Test
Ikarus - Manufacturing cooperation case study - Tunisia

- IKARUS delivers C83 chassis for the purchaser
- The purchaser builds the frame for the bus. The purchaser may choose whether it would like to use the Ikarus-designed frame, or uses a localized frame
- When using Ikarus frames, Ikarus
  - provides all necessary frame parts,
  - makes available manufacturing documentation
  - and local technical assistance and technical management for building the frames
- When using localized frames Ikarus undertakes to manage the frame homologization. Provides advice on parts to be built-in and overlooks the manufacturing process if required by the local partner.
- In Tunisia tens of IKARUS C83 were purchased by the local transportation company. After a while they started to developed a localized bus frame. At the end of the process Tunisia only bought chassis for the buses.
- C83 is the most widely used bus type in Tunisia, currently hundreds of C83 buses run on Tunisian roads.
Ikarus - Bus modernization

- Bus modernization does not only mean reconstruction of the original technical parameters of the bus, but significant changes to the buses:
  - Building in new driveline (e.g. EURO 5 compliant engine)
  - Complete change of the chassis
  - Building in air conditioning
- The modernization process results in a vehicle which does not significantly differ from a new bus considering technical qualities, performance, emission and comfort parameters.
- Modernization costs range between 50-70% of a new model.
- The modernized buses have a further useful life of 10+ years.
NABI has strong relationships with customers in the USA

50% of Buses are in 30 Markets

NABI has buses installed at 17 of 30 largest customers in US with Aftermarket Parts Sales to all of Top 30
NABI Products and customers on the Hungarian market

Optare designed products
The New NABI Sirius City
The New NABI Sirius Suburban
Csaba Metál Co. manufactures:
- proprietary developed low-floor midi-buses from 2009
- bus components
- bus chassis and frames
**Rába Automotive Holding Plc.**

- **Established**: 1896
- **Key figures (IFRS, audited)**:
  - **2010**: Net sales: EUR 130 m, EBITDA: EUR 11,3 m, Headcount: 2045
  - **2011**: Net sales: EUR 140 m, EBITDA: EUR 13,6 m, Headcount: 1962

**Business Units**

- **Rába Axle Ltd.**: Focus on mid-series complete axles, and high series axle components for commercial vehicles.
- **Rába Components Ltd.**: Produce metal parts to passenger cars for the regional market.
- **Rába Vehicle Ltd.**: Production of special vehicles.
- **Real Estate**: Utilize unproductive real estate assets.

**Joint Venture**

- **Fehrer Automotive - Rába Ltd.**: Fehrer 70% - 30% Rába

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* Listed on the Budapest Stock Exchange

21
Rába - Sales by region

Total sales in 2010: 130 m EUR
Total sales in 2011: 140 m EUR

USA
- John Deere
- Marmon-Herrington
- Dana
- Meritor

EU
- Suzuki
- Ministry of Defence
- Scania
- Claas
- Dana

CIS + non EU
- GAZ
- Kamaz

Asia
- 3

Domestic

Total sales in 2011: 140 m EUR
Economical
Due to the fact that exact passenger numbers are known for each of the travel destinations, vehicle route planning & scheduling is made easier. Thanks to this the setting of vehicle agendas can be in line with real travel demands and needs. For example in those lines where travel demand is limited, vehicle space capacity can be adjusted accordingly.

Cost effective
The consideration of economical aspects automatically leads to cost savings with the rendering intent to being in line with actual travel demands. Ticket & pass control effectiveness is also increases due to enhanced inspection. For further cost minimalization advanced data mining tools are also available.

Environmentally friendly
If services are in line with actual travel demands then environmental aspects are also taken into consideration due to the prevention of undue emission. Decreased costs of operation of vehicle fleets and increased revenue makes possible purchase of better environmental class of vehicles.

Increases turnover
in one hand vie the increase of effectiveness of ticket & pass sales (in parallel with increased state subsidies) and with the reduction of fraud at the same time and on the other hand with the increase of service level due to the introduction of new service lines or more frequent services.

- **PassCount** is a reliable, accurate, and economic automatic passenger counting system, which helps through travel needs and customs charting the optimization of the performance of routes.
- PassCount assists Public Transport Operators (PTO-s) to increase efficiency of ticket sales and consequently service level, while minimizing losses.
<table>
<thead>
<tr>
<th>Company</th>
<th>Contact</th>
<th>Title</th>
<th>E-mail address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ikarus</td>
<td>Mr. Ferenc Princz</td>
<td>CEO</td>
<td><a href="mailto:princz@mtholding.hu">princz@mtholding.hu</a></td>
</tr>
<tr>
<td>NABI</td>
<td>Mr. Ferenc Baranyai</td>
<td>CEO</td>
<td><a href="mailto:baranyai@nabi.hu">baranyai@nabi.hu</a></td>
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<tr>
<td>Rába Automotive Holding Plc</td>
<td>Mr. Istvan Pinter</td>
<td>CEO</td>
<td><a href="mailto:raba@raba.hu">raba@raba.hu</a></td>
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<tr>
<td>Csaba Metal Holding Co.</td>
<td>Mr. Bela Majoros</td>
<td>CEO</td>
<td><a href="mailto:csabametal@csaba-metal.hu">csabametal@csaba-metal.hu</a></td>
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<tr>
<td>Intechsys Co.</td>
<td>Mr. Tibor Gajdar</td>
<td>CEO</td>
<td><a href="mailto:gajdar@intechsys.eu">gajdar@intechsys.eu</a></td>
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<tr>
<td>Hungarian Bus Cluster</td>
<td>Dr. Istvan Forian</td>
<td>President</td>
<td><a href="mailto:forian.istvan@t-online.hu">forian.istvan@t-online.hu</a></td>
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<tr>
<td></td>
<td>Ms. Katalin Kauzli</td>
<td>Cluster Manager</td>
<td><a href="mailto:kauzli@gmail.com">kauzli@gmail.com</a></td>
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