Voith Turbo GmbH, St. Pölten

Requirements on modern electrical traction systems and its implementations by Voith

Ankara, 2012-03-28

Facts & Figures

Voith Group

- Founded in 1867
- 40 000 employees
- Sales: EUR 5.600 million*

* as of fiscal year 2010/11

Voith in Austria

- Founded in 1903
- 1500 employees
- Sales: EUR 550 million*

Our Markets

Voith in Austria

Energy | Mobility | Paper | Service

Voith Turbo GmbH

Voith in Austria - Mobility Divisions

Road | Rail | Marine | Industry

Voith Turbo GmbH

Rail Division - Products and Systems

Locomotive Technology	Diesel Driveline	Electro-Mechanical Drive Systems	Cooling Systems	Scharfenberg Couplers
• Development • Engineering • Prototype Construction • Locomotive production • Locomotive Service	• Turbo and Turbo reversing transmissions • System technology • Systems engineering and control • Automatic transmissions • Engine technology • Service	• Final drives • Complete wheelsets • Motor-gear units • Traction converter • Vehicle control technology • Service	• Complete cooling systems • Cooling networks • Fan technology • Accessories • Service	• Complete front-end modules • Front-end energy absorption • Automatic couplers • Articulations • Coupler service

Projects in Turkey

Final drives,
Turbo Transmissions
Cooling Systems
Cardan Shafts

DH 9500
for TCDD
Tülomsas

DH 10000
Turkish Ind.
Tülomsas

DH 7000B
Irakish Ind.,
Tülomsas

DH 7000, TCDD
Tülomsas

Railcar, TCDD
Tüvasas / Rotem

LRV B80D, Bursa
Siemens

HST, TCDD
CAF

Railcar MT5700, TCDD
Fiat Ferroviaria

Railcar “Sakarya”, TCDD
Tüvasas

Local presence:
Voith Turbo Güç Aktarma Tekniği Ltd. Şti.
Birlik Mah. 415.Cad. 9/5
06610 Çankaya / ANKARA

Worldwide center of competence for electrical traction systems

- Voith Turbo in Austria is well known as most preferred partner for hydrodynamic transmissions in Turkey. Numerous vehicles have been equipped and serviced by our professionals from St. Pölten.
- Over the time, Voith Turbo has evolved from a component manufacturer to a system supplier for final drives, couplings, cooling systems or power packs.
- As a logical consequence, a new stage has been entered by foundation of Voith Turbo “Electrical Traction Systems” in 2006. Since that days, the entire R&D activities including the traction converter production are centered in St. Pölten.

Design aspects for optimized electric propulsion systems

Requirements

- Acceleration (max, mean, ...)
- Run time (v_{max}, duty cycle, line operation, ...)
- Braking (max, min, distance, ...)

Traction / Braking effort

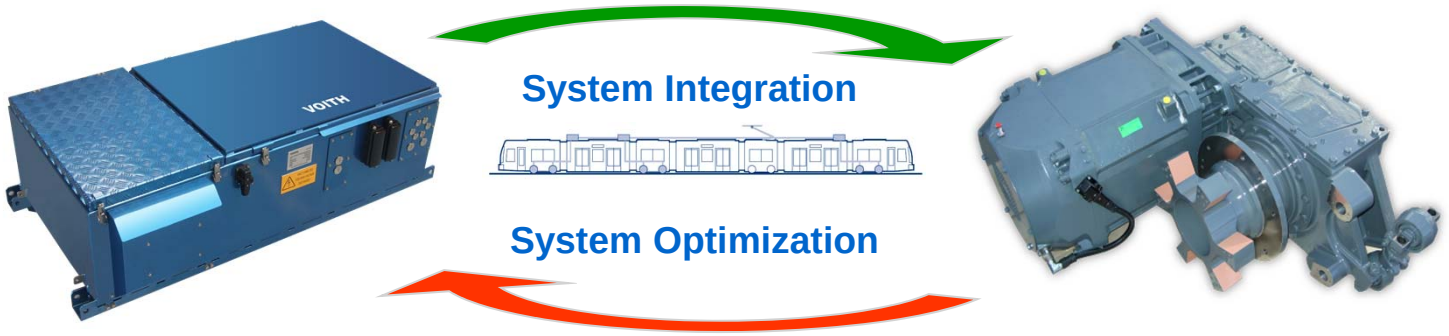
- Drive configuration
  - Line parameter
  - Gear ratio
  - Motor performance
  - Traction converter performance
- Vehicle mass (empty, AW1, AW2, ...)
- Vehicle resistance

Line operation

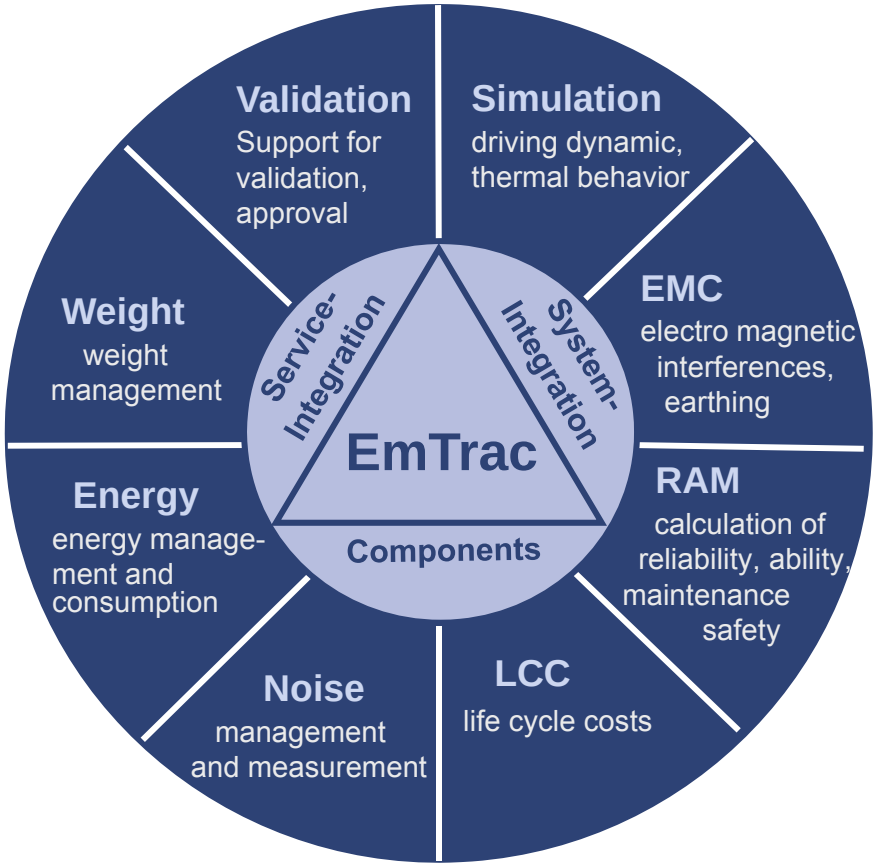
- Run time
- Energy efficiency
- Life cycle cost
- Noise
- EMC
- etc.

Key requirements

- Driving performance is really adapted to operation demands
- Performance of traction converter, motor and gearbox are well balanced; component losses are minimized for typical duty cycles
- Energy recuperation is maximized acc. to operation profile and line conditions
- Using or storage of losses and braking energy for other sub-systems



Further aspects concerning system and service integration



Optimized traction means more than just putting parts together:

Integration of all components to a technically and economically optimized service-friendly system!

Benefits

System Know How ensures optimally coordinated components

Recuperation of braking energy

High dynamic slip-slide control

Line friendly traction control

Light-weight roof, under frame or cabinet housing

Modular design

Safety

Energy Efficiency

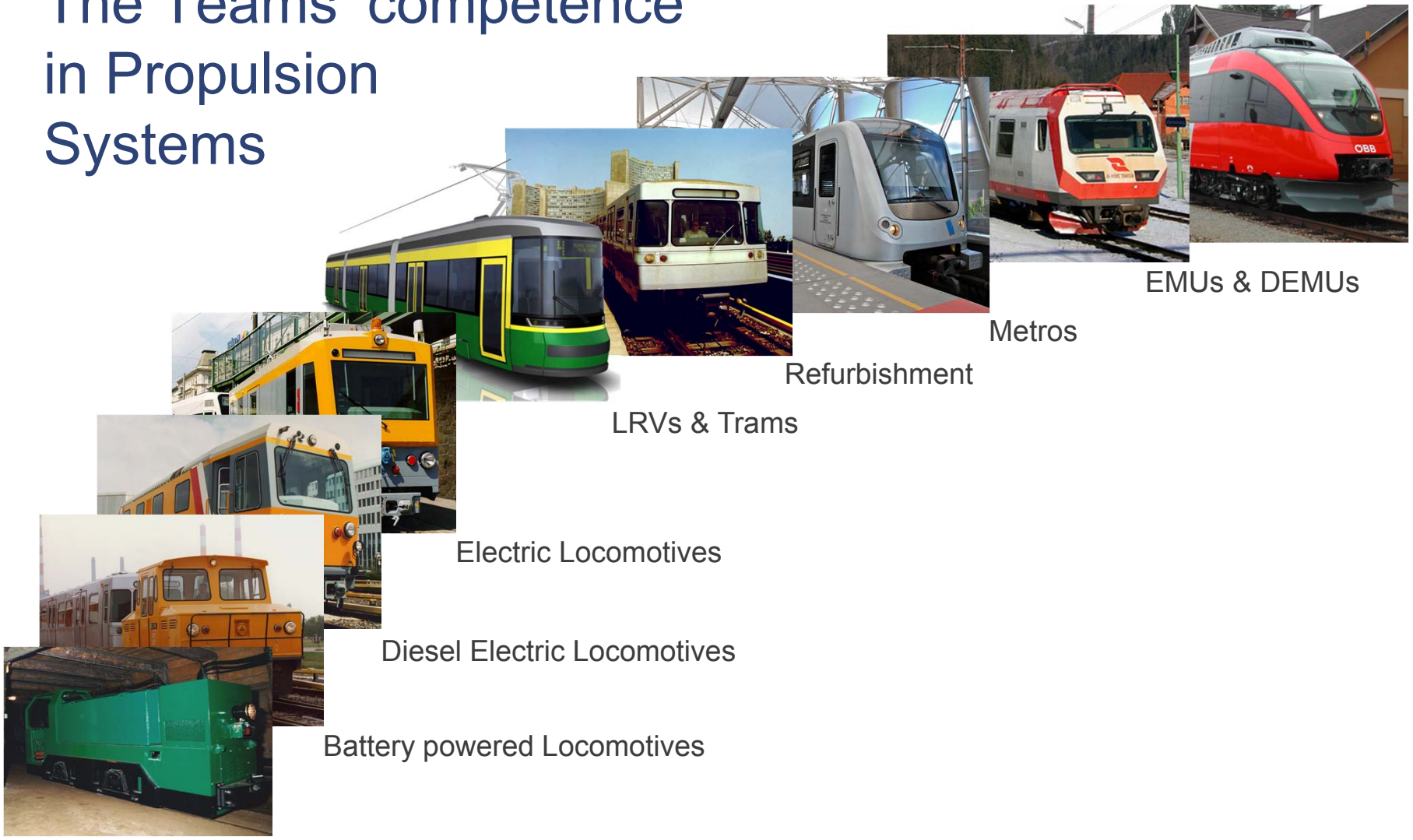
Availability

Maintainability

Reliability

EMC Interference

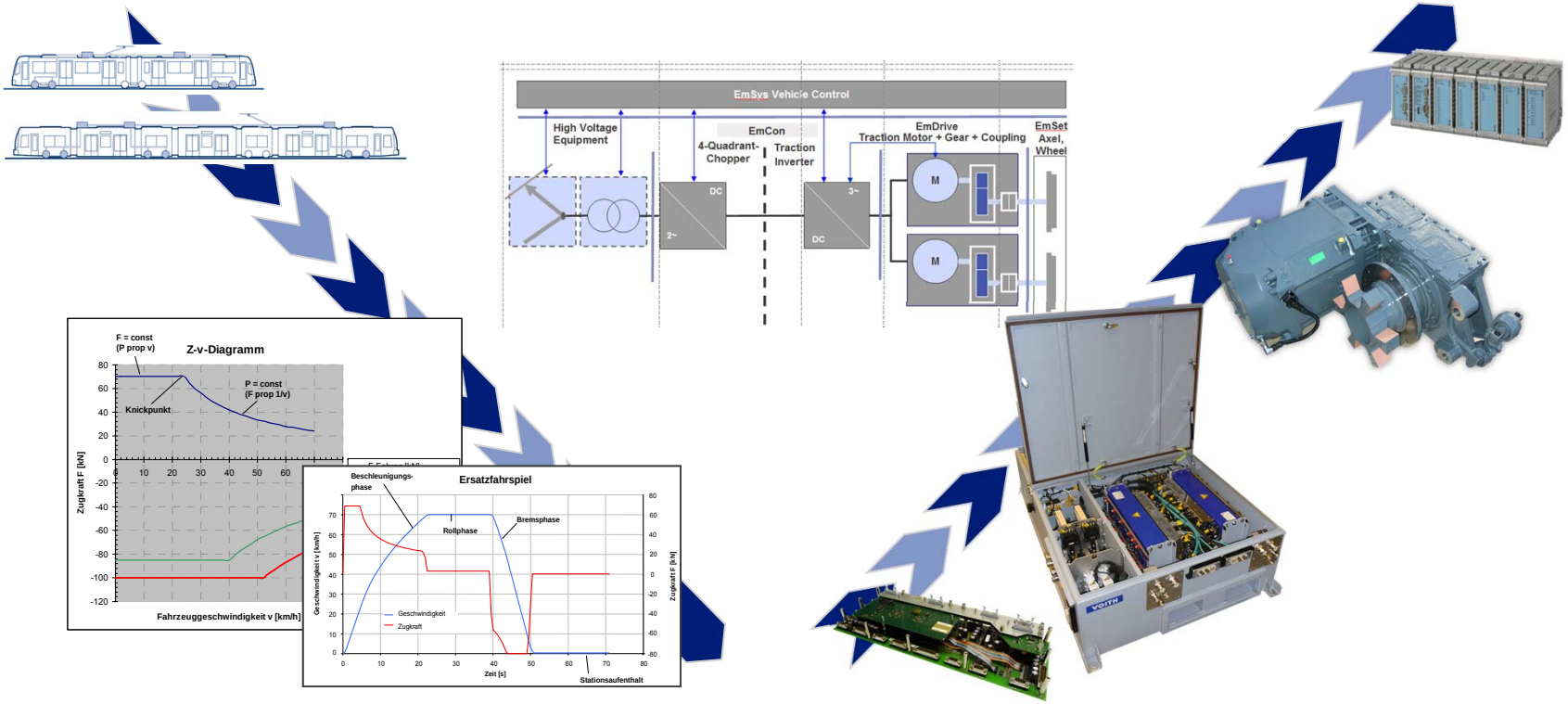
The Teams‘ competence in Propulsion Systems



EmTrac –

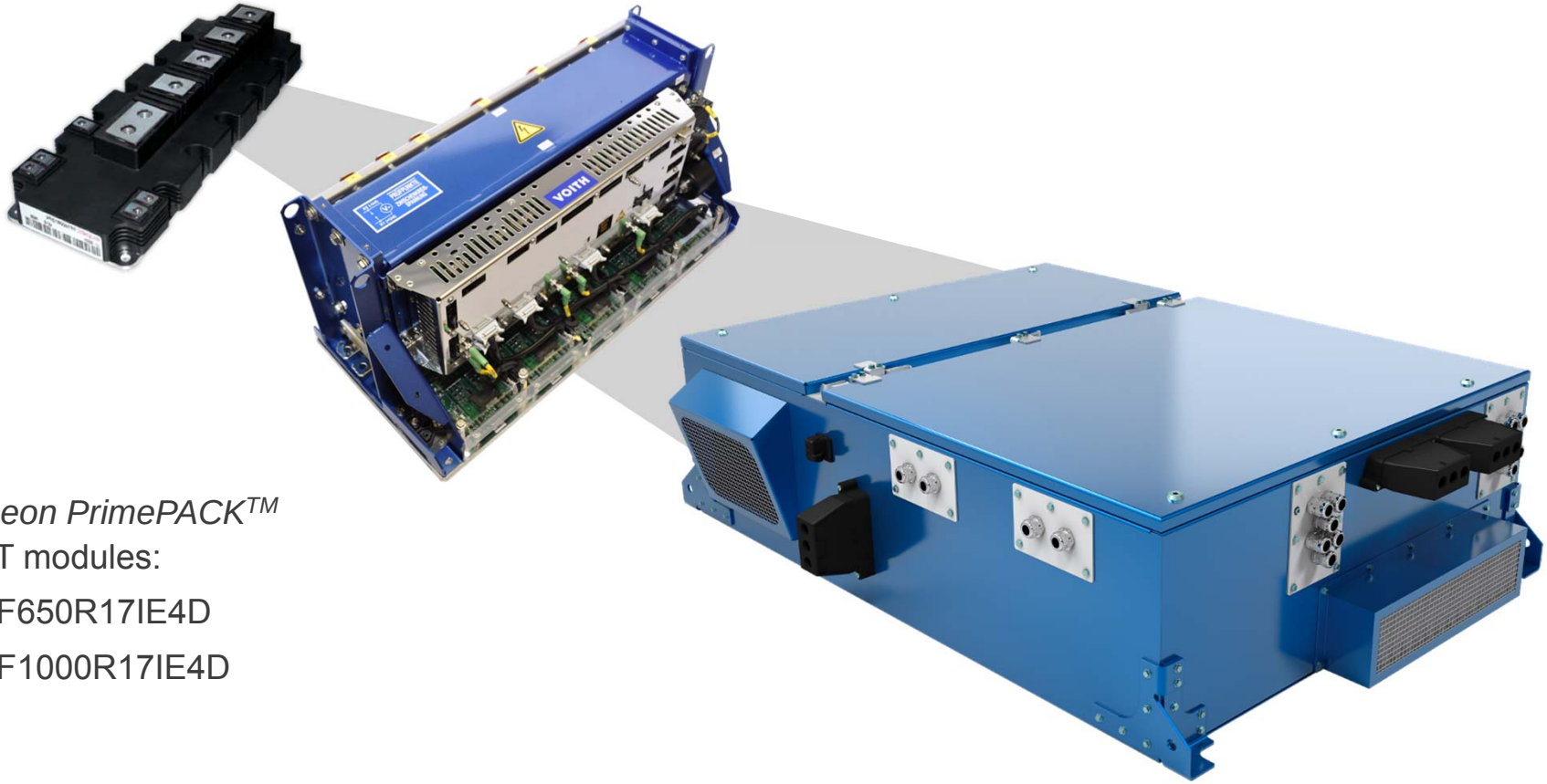
Safety and Efficiency through system competence

Conception | Simulation | Realization | Integration



EmCon Power Electronics Technologies (I)

Compact Power Unit with *Infineon PrimePack™* Modules for LRV/Metro



Infineon PrimePACK™
IGBT modules:

- FF650R17IE4D
- FF1000R17IE4D

EmCon Power Electronics Technologies (II)

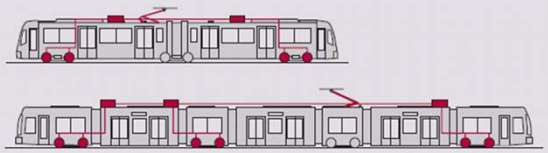
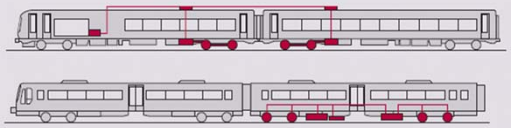
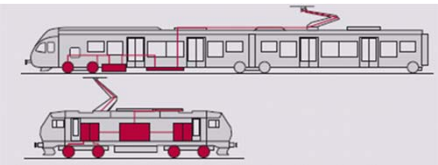
Power Stack Core for Metro/EMU/Loco with Standard Modules

Infineon IHM-B modules[1)]:

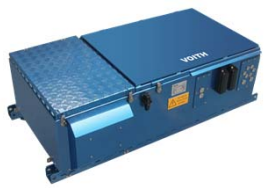
- FZ1000R33HE3
- FZ1500R33HE3

[1)] Second source available from other IGBT supplier

EmCon Traction Converter - Product Range

LRV Tram 	180 - 300 kW [1)]	DC 600 / 750 V	- Air Cooled - Roof Mounting - Single or Double Inverter
Metro DEMU 	300 - 900 kW	DC 750 - 1500 V	- Air/Water Cooled - Roof Mounting - Under Frame Mounting
EMU Loco 	600 - 1200 kW	DC 1500 V AC 15 / 25 kV	- Water Cooled - Cabinet Mounting - Under Frame Mounting




[1)] Continuous output power

VOITH

An example for the implementation – Helsinki City Transport Tram

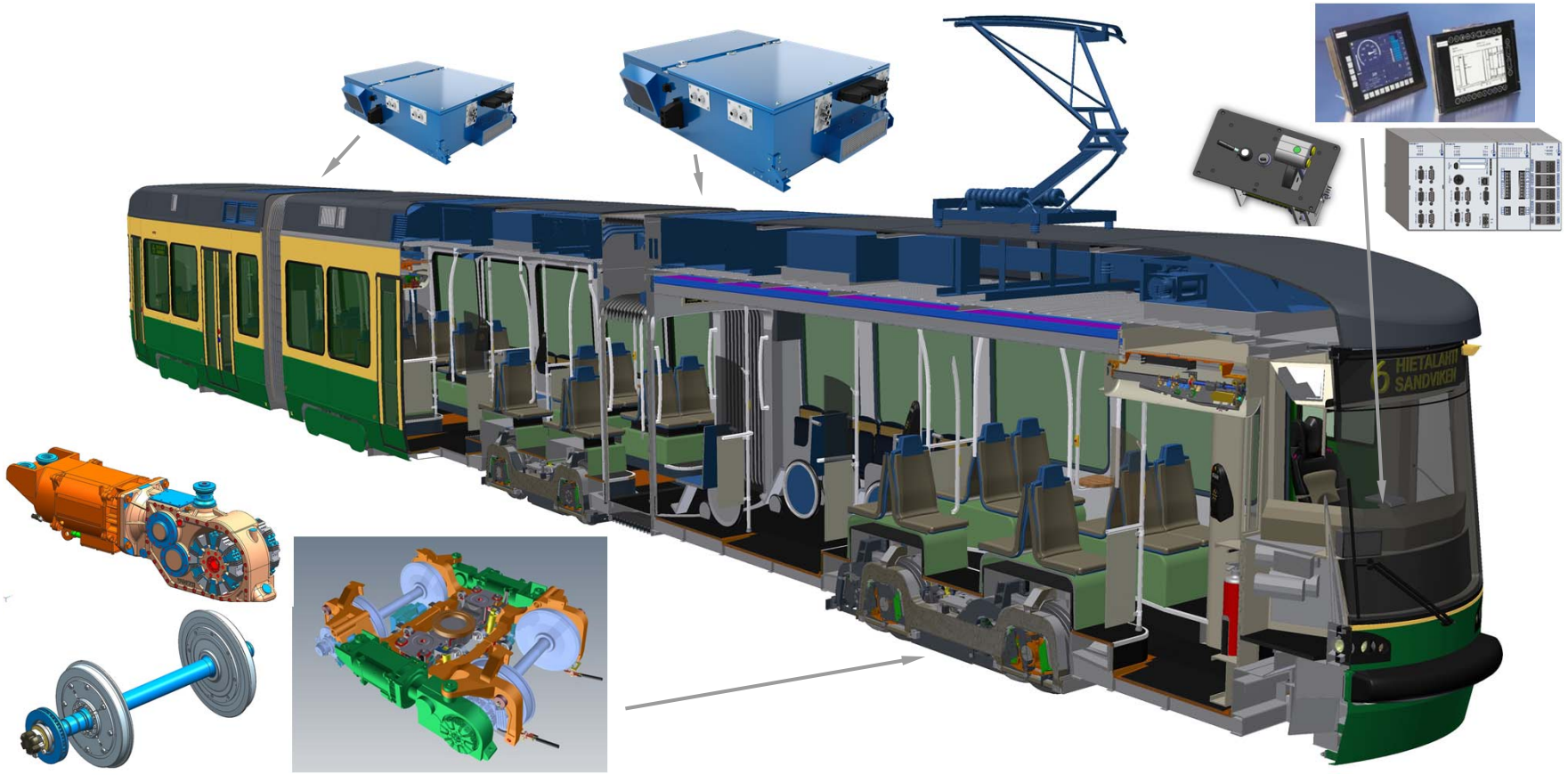
Helsinki City Transport Tram

- Pantograph, HV equipment
- Traction Inverter
- Motor-Gear Unit
- Axles, Wheels, Bearings
- Master Controller, Vehicle Control
- Diagnostic System

Technical Data Vehicle	
Length	26,5 - 30 m
Total height	3,46 m
Maximum width	2,4 m
Track gauge	1000 mm
Number of seats	88
Number of standing spaces	125 (5 pers./m²)
Tara weight	41,0 t
Maximum speed	80 km/h
Max. power on wheel (driving)	520 kW

Electric Traction Design

Example LRV Helsinki - System Arrangement



Thank you for your attention!

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VOITH
Engineered Reliability