



TATRA HYDROGEN VEHICLE
PAVEL WERTHEIMER – Electronic System Engineer



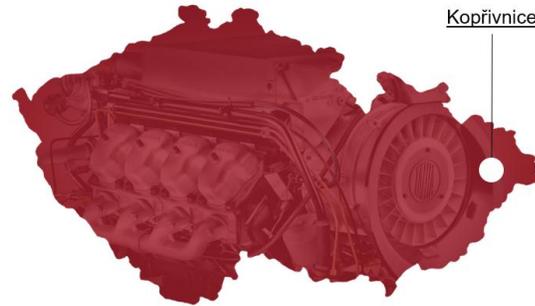
**TATRA TAKES
YOU FURTHER**



TATRA TRUCKS

WORLD'S 3rd OLDEST AUTOMAKER

- Daimler, Peugeot, TATRA



176 YEARS OF TRADITION

- Founded: 1850 by Ignác Šustala
- First car with engine: 1897
- First truck 1898

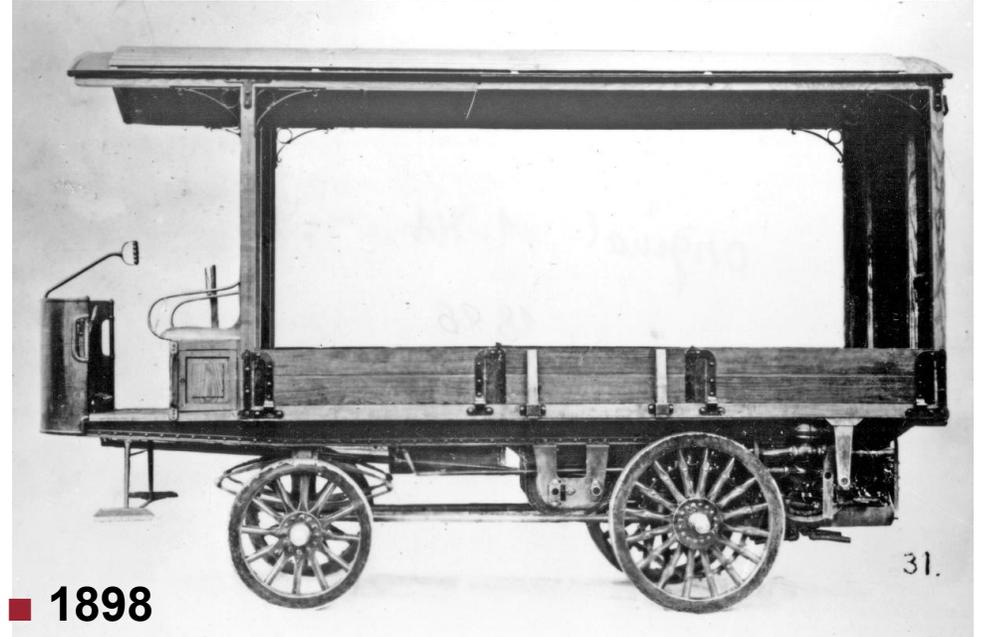
■ 1850



■ 1897



■ 1898





OWNERSHIP



■ **Czechoslovak Group (CSG)** is a dynamic international industrial and technology group headquartered in the heart of Europe, proudly building on the rich heritage of Czechoslovak engineering and innovation.

■ **Michal Strnad**



■ **Promet Group** is a Czech family-owned company founded in 1992. The group focuses on metallurgy, engineering, industrial technologies, and support services.

■ **The Matera Family**



PRESENT DAY



■ ~2000
EMPLOYEES



■ 3 PRODUCT LINES

**TATRA
PHOENIX**

**TATRA
FORCE**

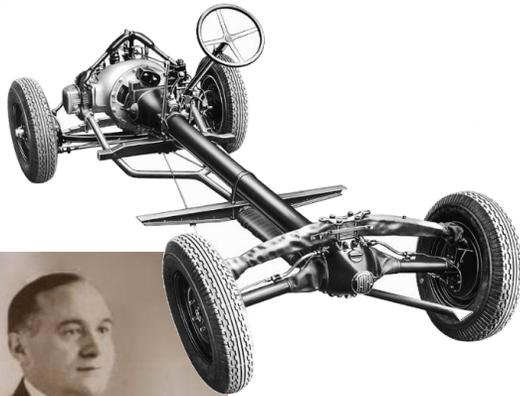
**TATRA
TACTIC**

■ > CZK 9 BILLION
TURNOVER

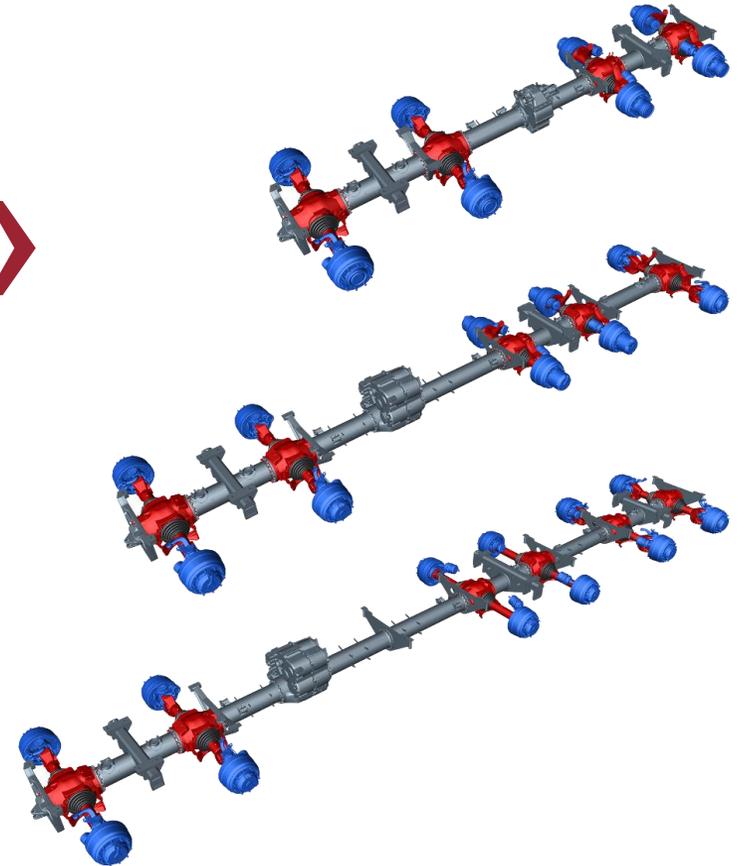
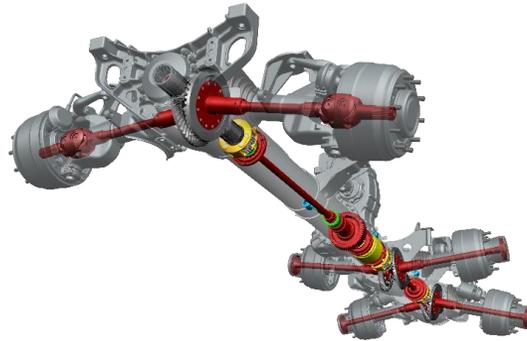




TATRA CHASSIS CONCEPT



■ **TATRA 11 1923**
Hans Ledwinka introduced a chassis concept based on a central backbone tube and independent swinging half-axes



■ Refined for over a century, the concept underpins all TATRA vehicles – with the exception of the TACTIC model)

Tatra Force e-Drive FCEV

- Fuel cell 2 x 100 kW
- Traction motor 480 / 580 kW
- Battery 171 kWh



**TATRA
FORCE**
e-DRIVE



Tatra Force e-Drive FCEV

Project funded under the TAČR grant program, consortium of organizations:

- Tatra Trucks a.s., Kopřivnice
- Devinn, Jablonec nad Nisou
- ÚJV Řež
- Řež Research Centre
- University of Chemistry and Technology, Prague

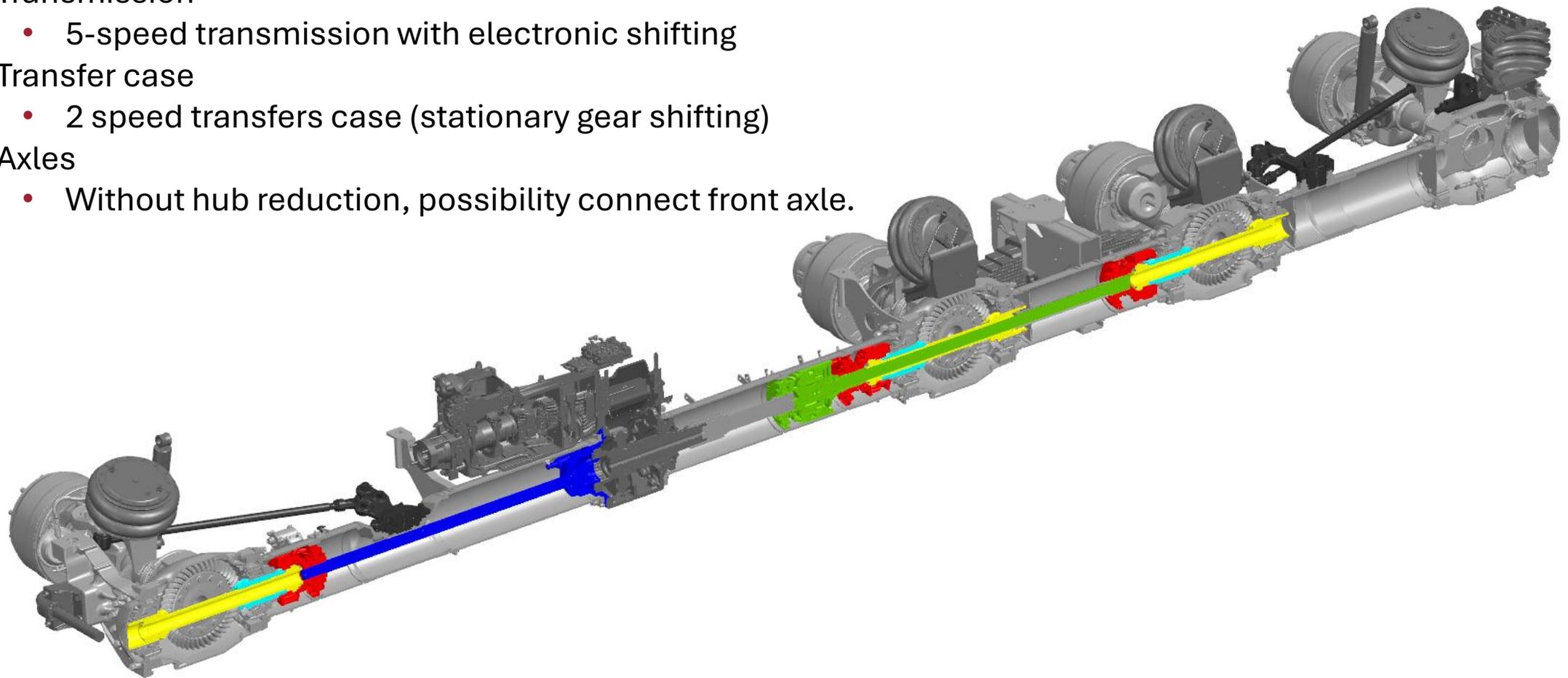
Tatra Force 8x6 (1+3), S3 tipper:

- Gross vehicle weight = 44 t
- Axle load capacities = 9 + 13 + 13 + 9 t
- Air suspension on all axles
- Lifiable rear axle
- Maximum speed = 85 km/h (at 32 t)
- Gradeability > 60% (at 44 t)
- Range = min. 400 km

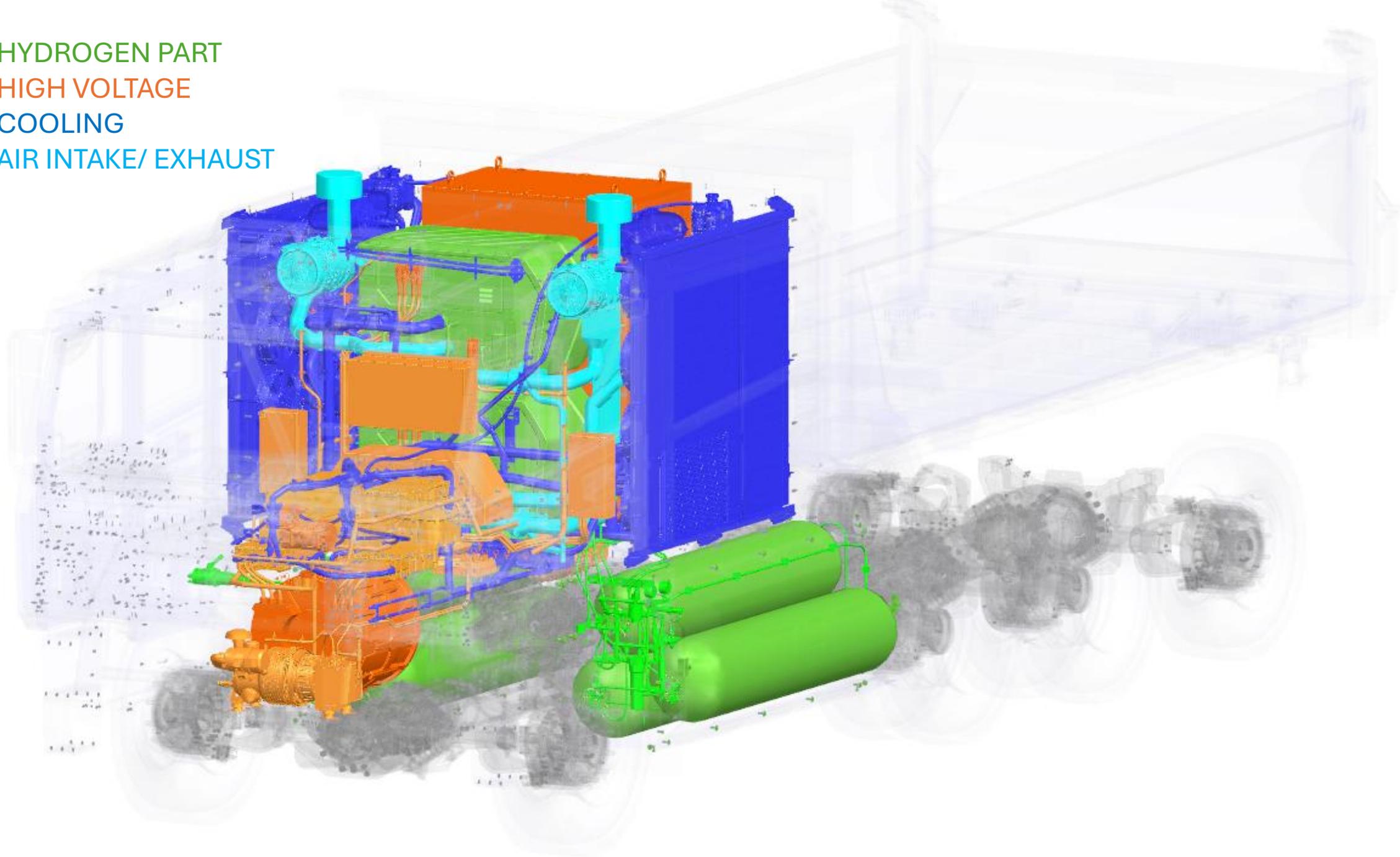


Powertrain

- Transmission
 - 5-speed transmission with electronic shifting
- Transfer case
 - 2 speed transfers case (stationary gear shifting)
- Axles
 - Without hub reduction, possibility connect front axle.



HYDROGEN PART
HIGH VOLTAGE
COOLING
AIR INTAKE/ EXHAUST



Hydrogen part

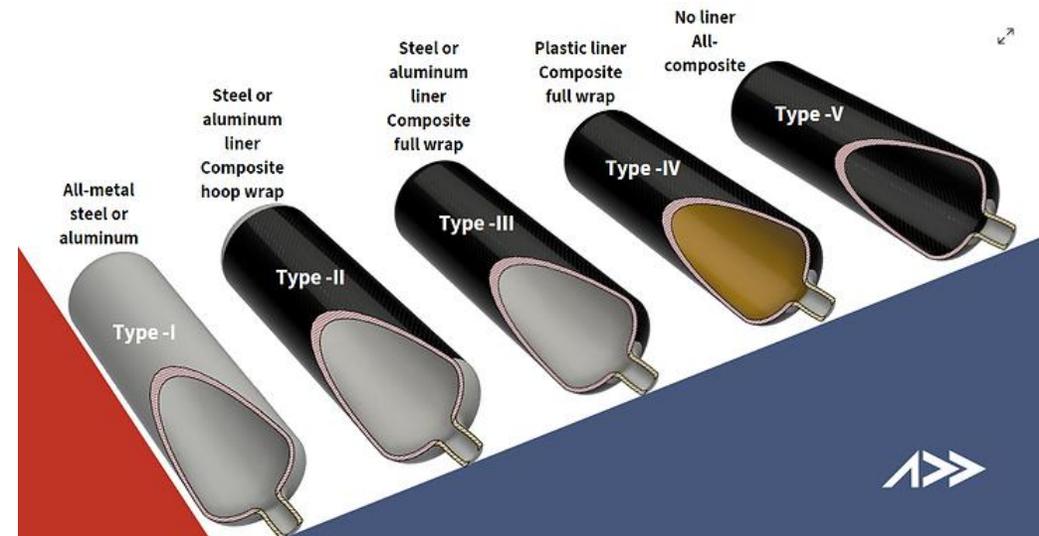
Fuel Cells

- Ballard
- Cell power output = 100 kW
- Weight = 260 kg
- Voltage range = 280 – 560 V
- Operating temperature range = -30 °C až + 50 °C
- “Start-up temperature” = -25 °C
- Max. cooling temperature = 70°C



Hydrogen Cylinders

- Wortington
- Cylinder type = typ 3
- Operating pressure = 350 bar
- Cylinder capacity = 5 kg H₂
- Total capacity = 30 kg H₂



High voltage part

Electric Motor

- Danfoss EM-PMI540 – 1 unit
- Permanent magnet synchronous motor
- Max. motor power = 580 kW (700 A)
- Continuous motor power = 480 kW (700 A)
- Max. torque = 2300 Nm
- Speed range = 0 – 4000 min⁻¹



High voltage part

Traction Battery

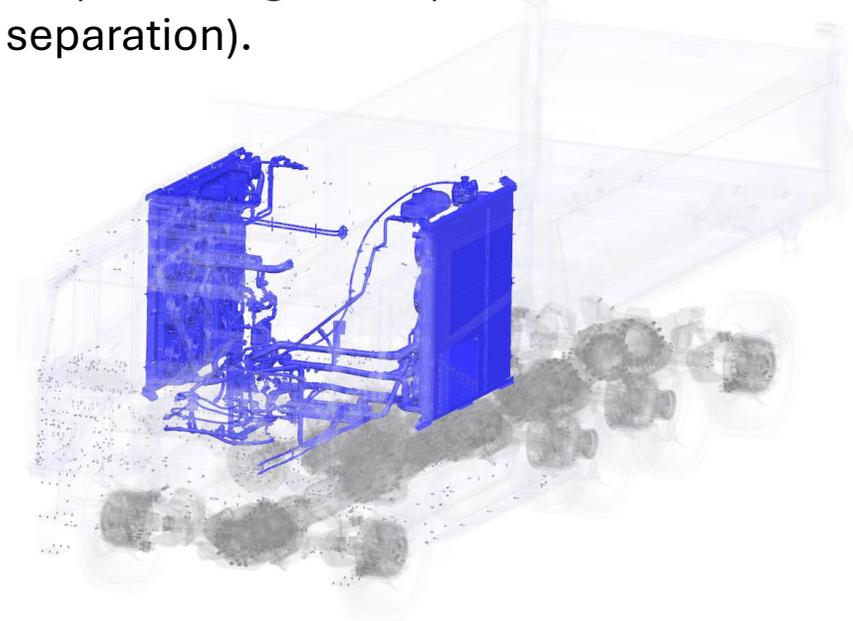
- Li-NMC technology (lithium–nickel–manganese–cobalt oxide)
- Kokam 53 Ah cells
- Active cooling / preheating
- External charging capability (plug-in)
- Total battery capacity = 171 kWh
- Dimensions (H × W × L) = 1570 x 1100 x 690 mm
- Weight = 1650 kg

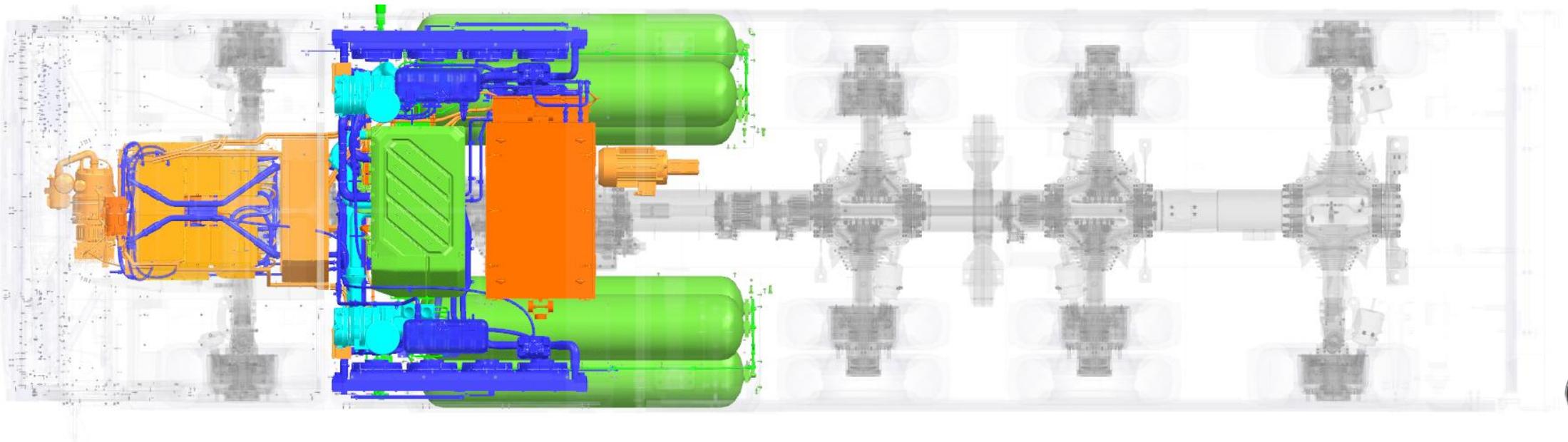
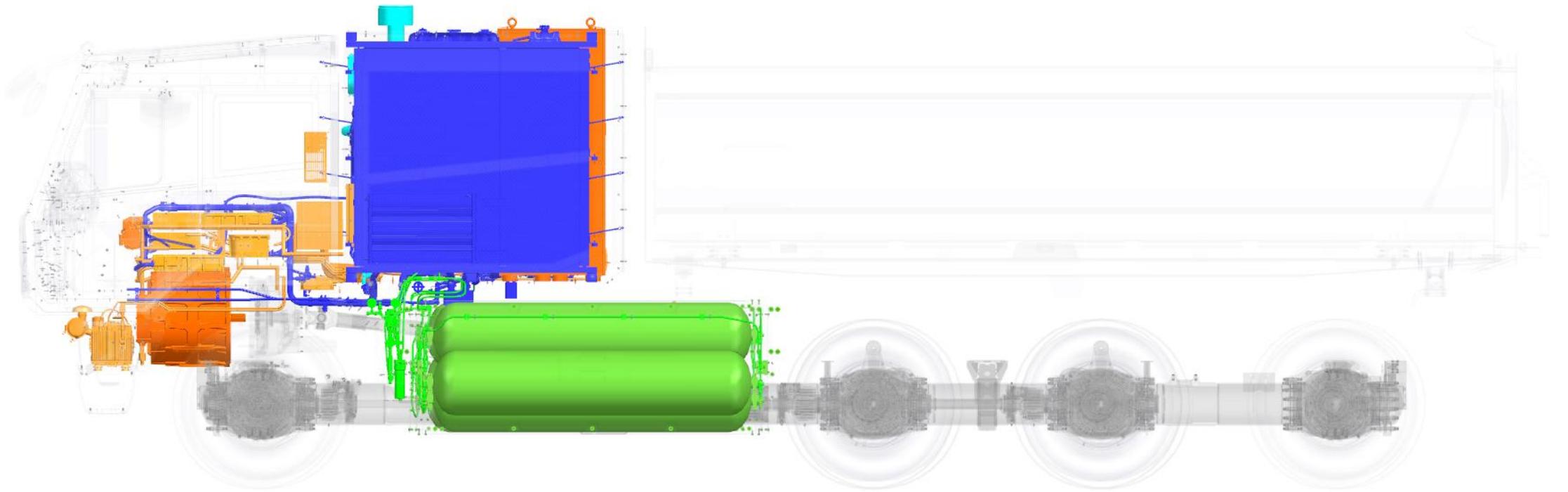


Cooling

Radiators

- Radiators – 2 units
- Number of fans – 16 units
- Air flow = 2500 m³/ h (at a pressure drop of 500 Pa)
- Total air flow = 40000 m³/ h
- Cooling capacity = 190 kW
- Small circuit flow rate = 160 l/ min (fuel cell)
- Large circuit flow rate = 20 l/ min (power electronic)
- The fuel cells are connected directly to the main radiators (1:1 configuration); the other components are cooled via a heat exchanger (DI water separation).







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TATRA FORCE e-DRIVE



■ Range of vehicles with alternative propulsion systems:

- » Hydrogen (8x6, 6x4)
- » Fully electric (8x8)
- » Hybrid (8x8)





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TATRA FORCE e-DRIVE Hydrogen 6x4



MINISTERSTVO
PRŮMYSLU A OBCHODU

Operational Programme Technologies
and Applications for Competitiveness
(OP TAC)

under Ministry of Industry and Trade

■ **Partners:**

- » Tatra
- » Devinn
- » VŠB



DEVINN

VŠB TECHNICKÁ
UNIVERZITA
OSTRAVA



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