TOP RAIL
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TRS Hybrid Approach

TRS Hybrid Approach

- Our Target:
  - Reducing emissions and fuel effective

- Our Approach:
  - We are tracking series- hybrid techniques
  - In our point of view series- hybrid technique do have it qualification

    - Benefits depend on traffic situation and case of operation:
    Series Hybrid – Specialist
  - Series- hybrid technique are linked to our core competences

    - Knowledge about conditions in bus operation

    - Driveline optimisation

Facts about the TRS Series - Hybrid Drive System

Features:

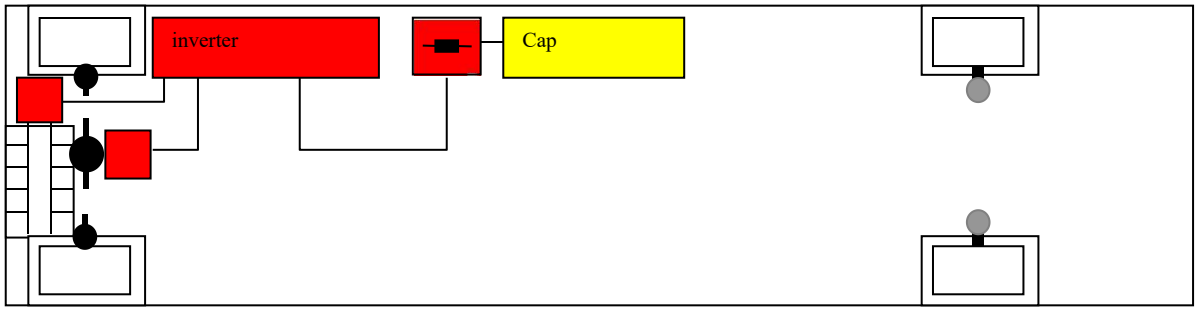
- low speed, high torque electric motor: 2600 rpm max,3300 Nm
- traction motor and generator identical
- high system effiency competing against mechanical drive train

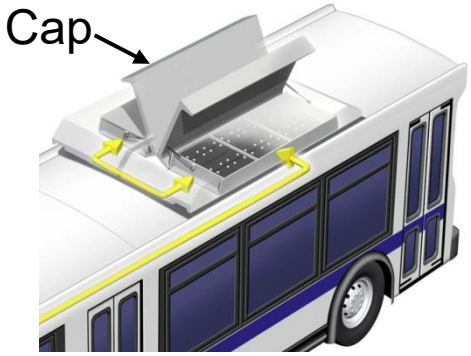
Background:

- Transverse flux machine, the magnetic flux in the back iron is running transversely to the direction of rotor movement, not to be mistaken for the axial flux type machines
- permanent-magnet excited, synchronous motor
- 2 electrical phases instead of three, well adapted control structure necessary to exploit the full potential

TRS Serial Hybrid

- Drive train (Transverse flux machine, permanent magnet synchronous machine)
- SuperCap storage
- Inverter designed for automotive application

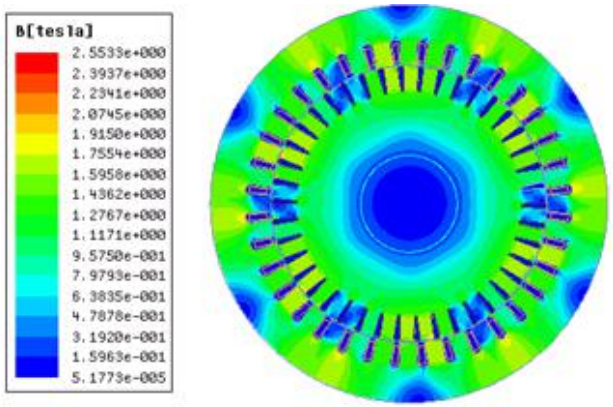


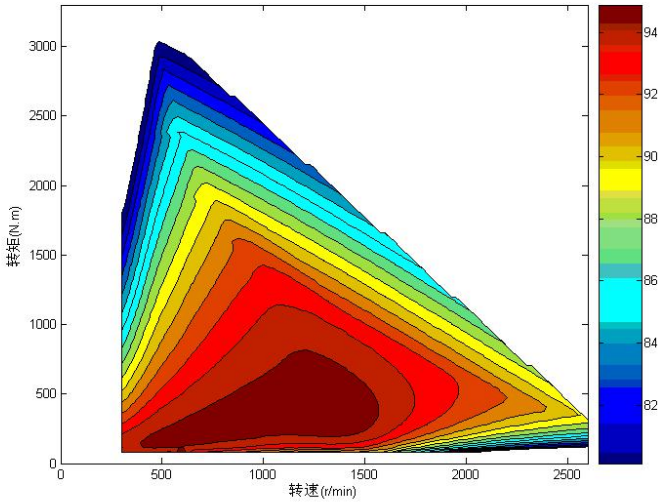


- Engine only drives generator to work while the start of vehicle depends on the motor. The system can recycle vehicles energy as large as possible.
- For the coupling of engine and vehicles' transmission shaft, the design condition of engine gets its optimized control, achieving the reduce of fuel consuming of engine and omission, and the efficiency of the system.

TRS Serial Hybrid: Traction Motor JD189

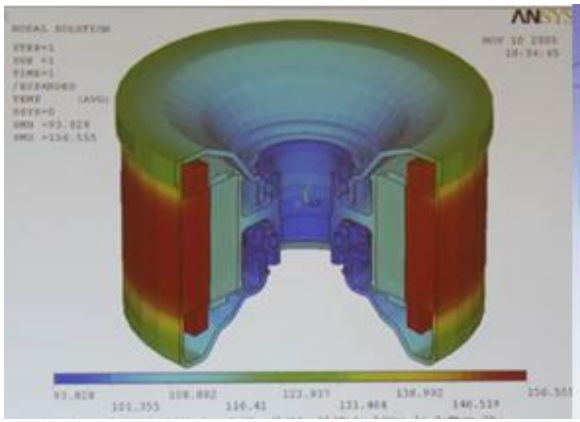
- **maximum torque:**
- 3300 Nm
- **continuous torque:**
- 1300 Nm
- **continuous mechanical power:**
- 150 kW
- **maximum speed:**
- 2600 rpm

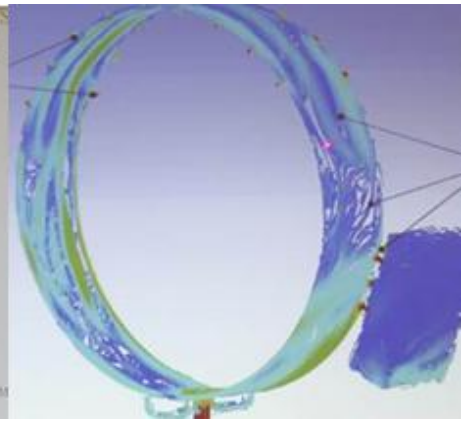


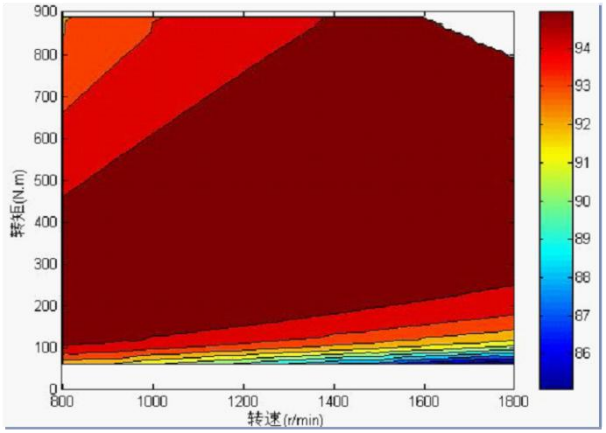


TRS Serial Hybrid: Generator JF234

- **continous torque:**
- Tn = 900 Nm
- **continous mechanical power:**
- Pn = 150 kW
- **maximum speed:**
- nmax = 2500 rpm







TRS Serial Hybrid: Inverter TVN7

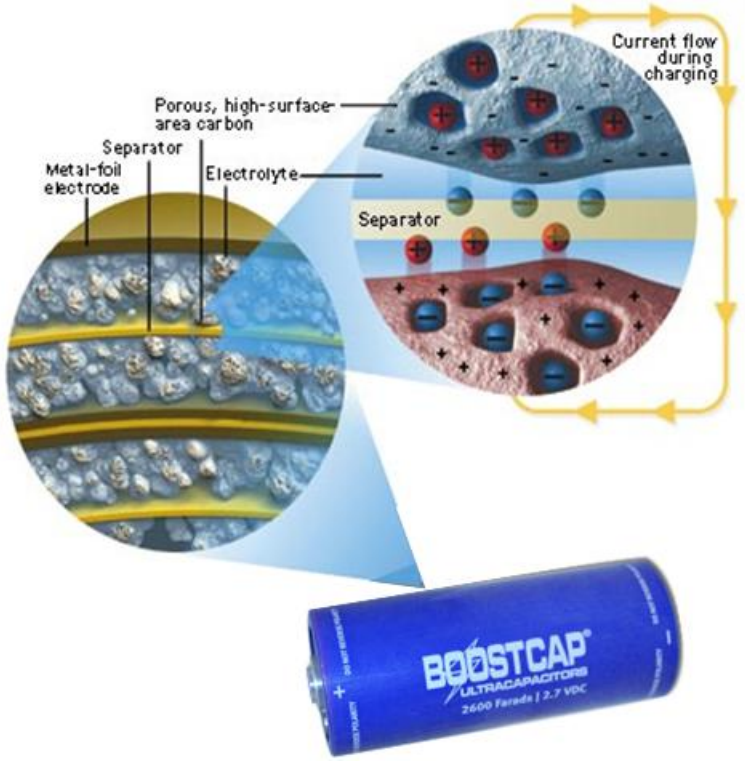
- **continous current:**
- In = 300 A
- **max. current:**
- Imax = 500 A
- **DC link voltage:**
- UDC = 576 V

- **Watercooled**

TRS Serial Hybrid: Energy Storage

High-Voltage Capacitors

- **Capacitance :**
- C = 27.5 F
- **Voltage:**
- V = DC576V
- **Stored Energy:**
- E = 1267.2 Whr



Advantages and Customer Benefits :

• High efficiency, over 95%

• Long operating life, over 1 million times of charging and discharging, with 25 years application

• Low weight, high reliability, easy to manage

• Good Low-High temperature performance, work at -40 ℃ to 65 ℃

• Environment-friendly, Easy to recycle

Serial Electric Drives

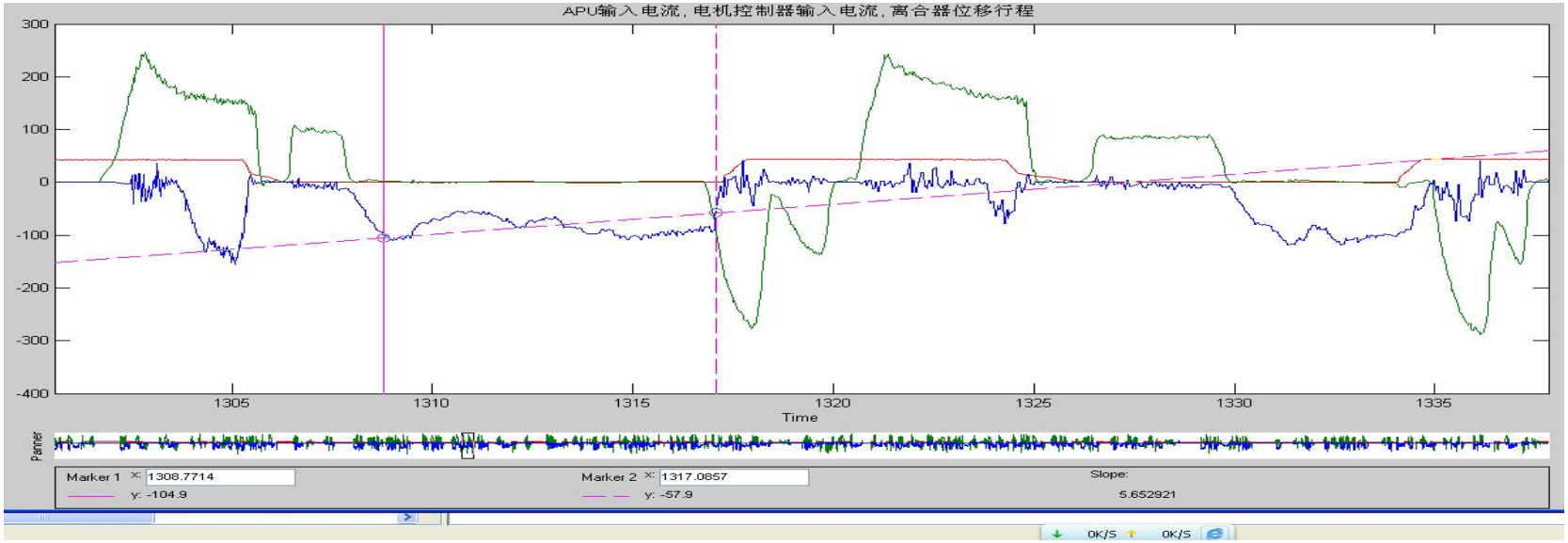
Technical Parameters

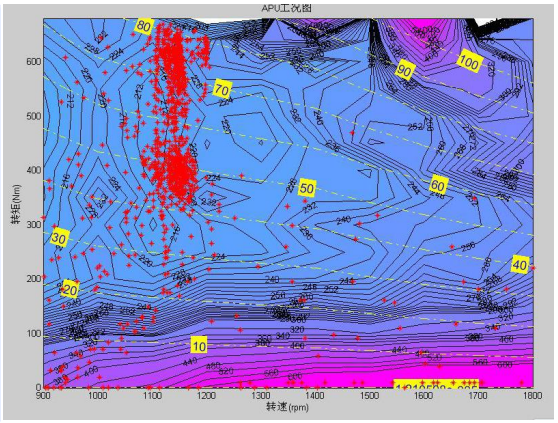
Input power:	150 kW
Input torque:	900 Nm
Drive Motor:	150 kW
Weight of System	approx. 900 kg

Advantages and Customer Benefits

- High systems efficiency
- Compact dimensions
- Low weight of system

System Testing





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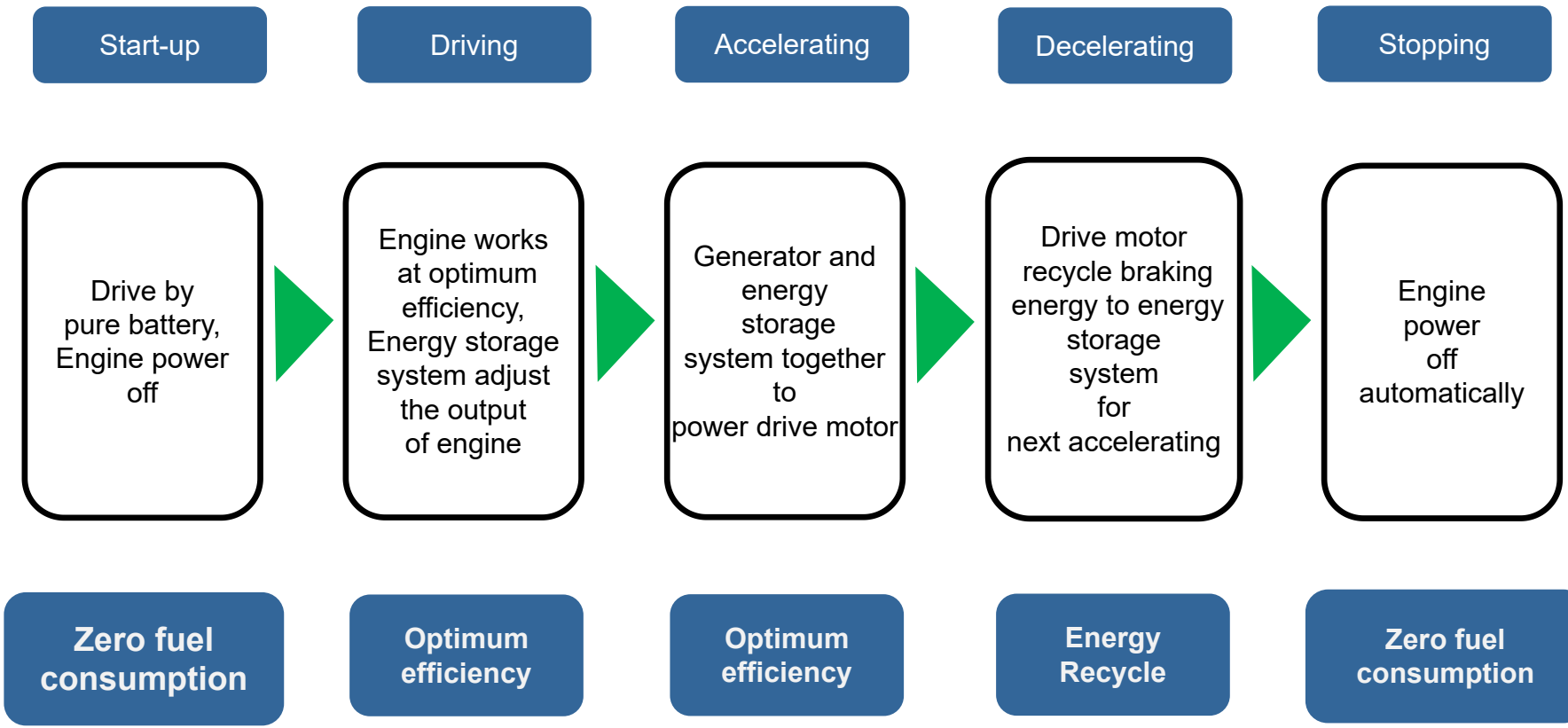
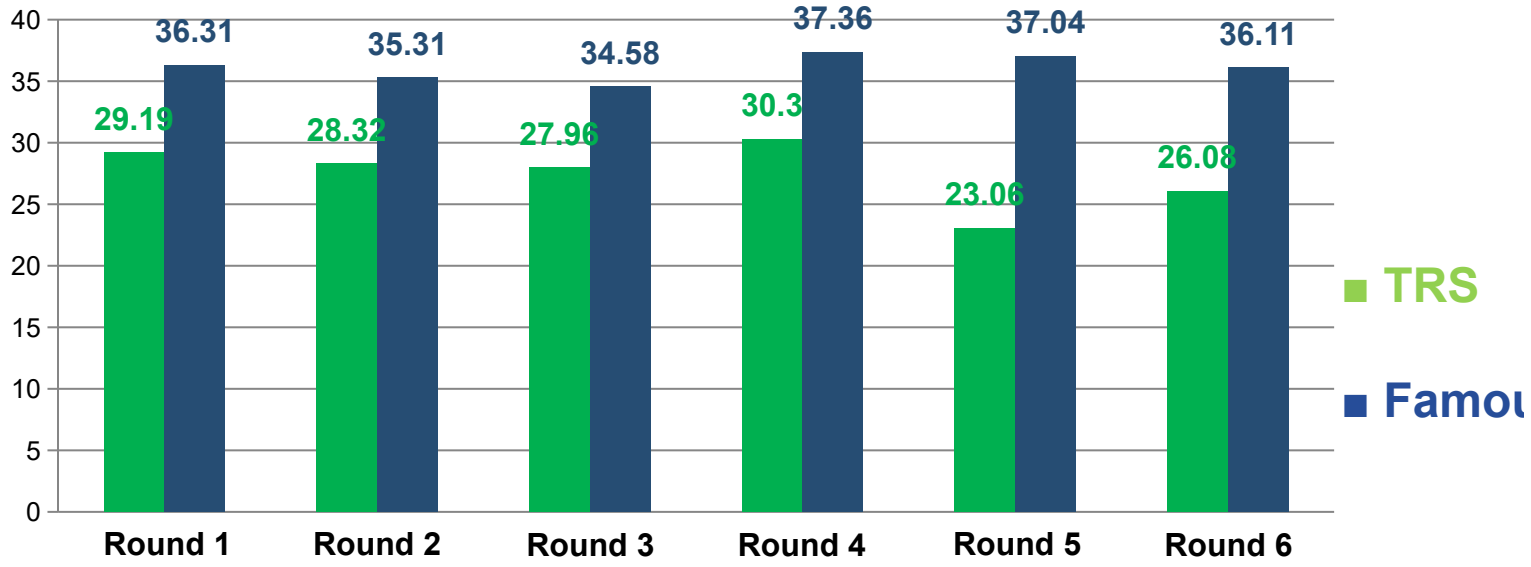


Fuel consumption test results compared to buses (One Famous Bus Brand) powered by diesel engines



Bus Type	TRS, 12m, Hybrid bus	12m, diesel engine bus, Famous Bus Brand
Type	Low Floor	Three Steps
Engine Type	ISB6.5E5 250B	
Engine Capacity	6.7L	4.8L, 6 Speed Transmission
Total Weight	13630kg	10650kg

Max Fuel Saving Rate: 28.8%

Ave Fuel Saving Rate: 23.8%

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Thanks