VEHICLE 1: GASOLINE HEV
HIGH PERFORMANCE HYBRID
BATTERY DEVELOPMENT

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Advice – V1 gasoline HEV with high performance battery

VEHICLE TECHNICAL DATA

**Combustion Engine**
- 4 Cylinder Gasoline Engine, 2.0l Displacement
- turbocharged and supercharger
- max. Power: 235 kW, max. Torque: 400Nm

**Motor EM 1 (ERAD)**
- max. Power: 60 kW, max. Torque: 240 Nm → tuned to 90 kW

**Motor EM2 (ISG)**
- max. Power: 30 kW, max. Torque: 160 Nm

**High Performance Battery**
- max. power: 100 kW
- Energy Content: 2 kWh
High-performance battery with adjustable length and connection points for variable package volumes to fulfill key requirements of hybrid vehicle

FEV’S HIGH POWER HEV BATTERY DEVELOPED AND INTEGRATED IN VOLVO S90

HIGHLIGHTS

- LTO battery cells for high performance requirements
- Inverted T-beam as structural AND cooling component to reduce weight, complexity and optimize thermal management
- Extruded middle piece scalable module length
- Adjustable end pieces for different connection methods
- Integrated cell tabs and busbar cooling
- Air flow ducting to counteract temperature spread

100 kW, 2 kWh, air cooled busbars
Internal coolant channel design allows for homogenous cooling over the cell surface while reducing pressure drop and preventing air pockets.

INVERTED T-BEAM WITH EXTRUDED MIDDLE PIECE AND TWO END PIECES FOR COOLANT DUCTING

Most effective thermal concept → 2 side cooling

Central T-Profile: Structural and thermal key element

Based on thermal concept – design start
Internal coolant channel design allows for homogenous cooling over the cell surface while reducing pressure drop and preventing air pockets.

INVERTED T-BEAM WITH EXTRUDED MIDDLE PIECE AND TWO END PIECES FOR COOLANT DUCTING

End piece with internal coolant return

Extruded centrepiece

End piece with inlet and outlet for the coolant

Central T-Profile: Structural and thermal key element

Coolant ducting and CAE optimization
High-performance battery with adjustable length and connection points for variable package volumes

CENTRAL T-PROFIL COOLING/ STRUCTURAL ELEMENT

- End piece with internal coolant return
- Extruded centrepiece
- End piece with inlet and outlet for the coolant

Central T-Profile: Structural and thermal key element
High-performance battery with adjustable length and connection points for variable package volumes

CENTRAL T-PROFIL COOLING/ STRUCTURAL ELEMENT

Air cooled bus-bars

Air distributor – fan

Complete battery
High-performance battery module with adjustable length and connection points for variable package volumes

HIGH PERFORMANCE - HIGHLY INTEGRATED - BATTERY MODULE

Module dimension
- Length: 635 mm
- Width: 140 mm
- Height: 140 mm
- Weight: < 20 kg

Pack performance
- Capacity: 2 kWh
- Nominal Voltage: 400 V
- Discharge (10s): 100 kW
- Continuous: 60 kW
- Charge (10s): 60 kW
- Continuous: 100 kW
HEV Battery Specific Power Benchmark

25% improvement

High Performance Hybrid Battery