

AVL Future Hybrid 7 and 8 Mode

HYBRID SOLUTIONS – DHT (DEDICATED HYBRID TRANSMISSION)

INNOVATION DRIVING CO₂ REDUCTION

The AVL 7 and 8 mode Future Hybrid technologies are the cost-efficient answers to CO₂ reduction in passenger cars and the increasing demand for dedicated hybrid transmission solutions.

The main questions in this regard for AVL were:

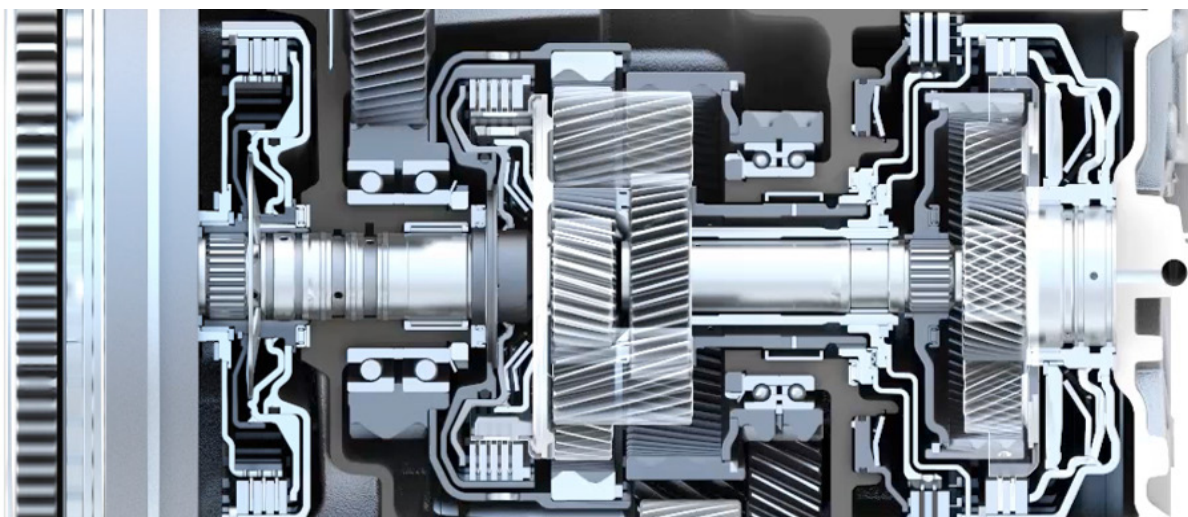
- How can increasing hybrid volumes be handled in a cost efficient way?
- Which hybrid transmission system fulfills the needs best in terms of efficiency, cost and time-to-market?
- How to solve emission, driveability, NVH or comfort challenges?

THE AVL SOLUTION

The two „Future Hybrid“ DHTs are the result of AVL's holistic hybrid development process.

Based on AVL's comprehensive and long-term experience, customers benefit from:

- Tailored solutions based on leading DHT technology and unique AVL methods and tools
- Efficient and comprehensive solutions due to total system capability in all key areas of the powertrain – engine, transmission, e-motor, battery, controls
- Fuel-efficient and low-CO₂ DHT thanks to AVL's expertise



AVL's holistic hybrid development process

AVL'S PHILOSOPHY

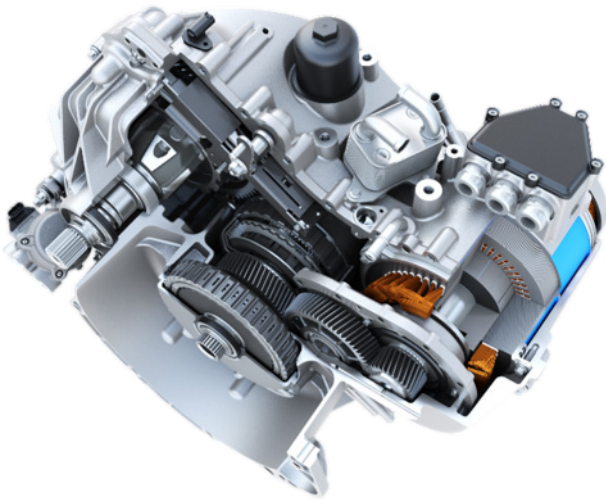
- "Best in Class" CO₂ Emission (certified in NEDC)
- "Best in Class" CO₂ Emission (customer-oriented)
- "Best in Class" Costs for PHEV Powertrain
- "Best in Class" Comfort & Drivability

FUNCTIONAL REQUIREMENTS

- E-Drive up to medium speeds in all conventional operational areas
- Torque-split launch, drive recuperation with ability to charge the battery with min. 3,5 kW at low speeds
- Min. 3 parallel hybrid modes with load point management
- Boost & recuperation
- Impulse start

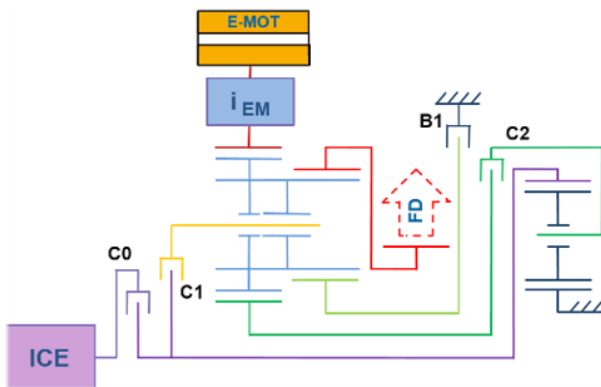
	Requirement	Unit	Status
Vehicle class	C segment	[-]	✓
ICE	1.6 l, IL3, TGDI	[-]	
CO ₂ Emission (sustainable mode, cold start in NEDC)	≤ 79	[g/km]	✓
CO ₂ Emission (sustainable mode, hot start in NEDC)	≤ 75	[g/km]	✓
CO ₂ Emission (certified in NEDC)	< 35	[g/km]	✓
Electric Range Demo Vehicle	> 30	[km]	✓
Acceleration 0-60 km/h (combined ICE + E Drive)	< 6,5	[s]	✓
Acceleration 0-100 km/h (combined ICE + E Drive)	< 10	[s]	✓
Elasticity 60-120 km/h (combined ICE + E Drive)	< 8	[s]	✓
Maximum Speed (ICE)	≥ 180	[km/h]	✓
Maximum Speed (E Drive)	≥ 130	[km/h]	✓
Stationary climbing ability	30	[%]	✓

FUTURE HYBRID 7 MODE



The AVL "Future Hybrid 7 Mode", a state of the art transmission, consists of only 4 shift elements (3 clutches, 1 brake), 1 EM (electric motor) and planetary gear sets.

It's a compact and light transverse transmission with low product costs and it has a unique shift strategy.

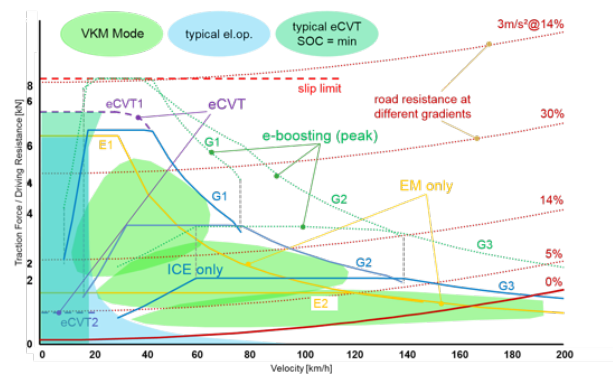


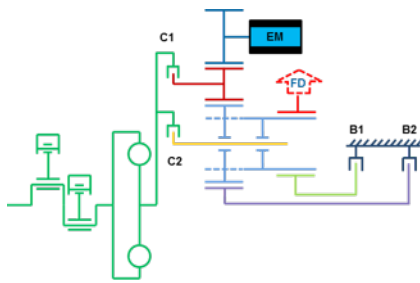
MAIN CHARACTERISTICS

- 3 parallel hybrid modes (shiftable)
- 2 pure electric modes
- 2 torque-split modes for ICE vehicle launch at low battery SOC (no launch clutch needed); generates min 3.5 kW power for battery charging while driving
- Electric boost and recuperation
- Charge at standstill
- Detaching the ICE during recuperation for better efficiency

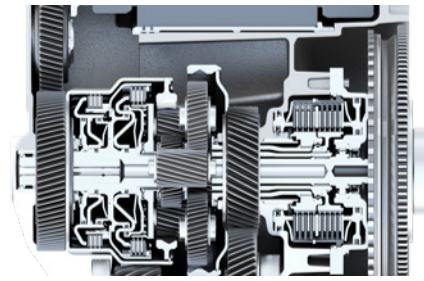
SYSTEM

- ICE Torque: 220 Nm
- EM peak Toque: 147 Nm
- EM cont. Torque: 95 Nm
- EM max. Speed: 13.500 rpm
- EM peak Power: 63 kW
- EM cont. Power: 41 kW





Transmission Structure Future Hybrid 8 Mode



Concept Layout Future Hybrid 8 Mode

FUTURE HYBRID 8 MODE

AVL's 2nd generation DHT „Future Hybrid 8 Mode“ is the next step towards more features and flexibility and less complexity comparing to its predecessor.

It was developed with AVL's holistic hybrid development process.

The „Future Hybrid 8 Mode“ consists of only 4 shift elements (2 clutches, 2 brakes), 1 EM and a simpler arrangement of planetary gear sets than the „Future Hybrid 7 Mode“.

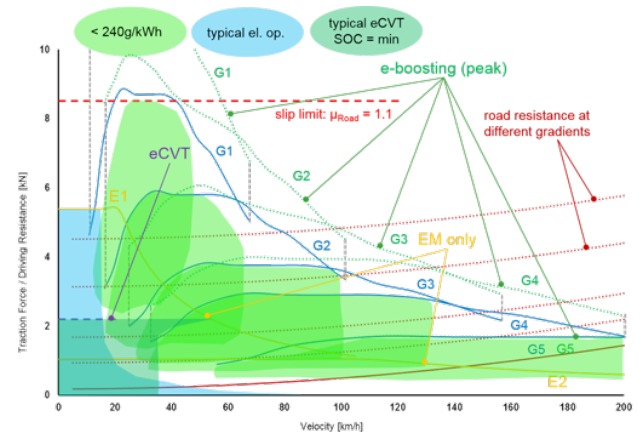
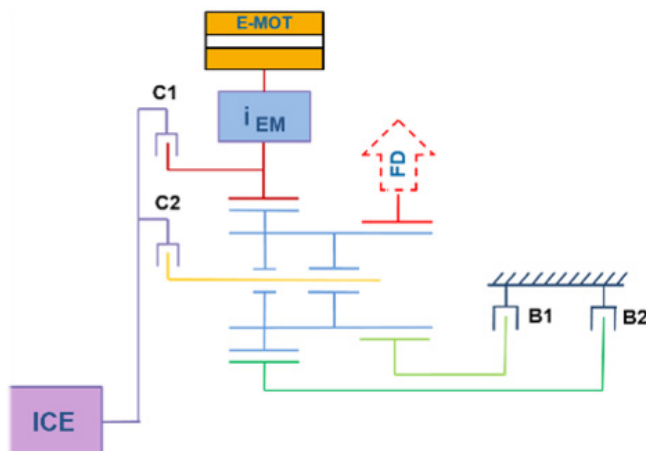
This small and light transverse transmission has a refined shift strategy to achieve more comfort and robustness. As an alternative longitudinal or AWD variants are also available.

MAIN CHARACTERISTICS

- 5 parallel hybrid modes (shiftable)
- 2 pure electric modes
- 1 torque-split mode for ICE vehicle launch at low battery SOC (no launch clutch needed); generate min. 5 kW power for battery charging while driving
- Acceleration < 8 sec. (0-100 km/h)
- Electric boost and recuperation
- Charge at standstill with P2-characteristic

SYSTEM

- ICE Torque: 250 Nm
- EM peak Torque: 170 Nm
- EM cont. Torque: 110 Nm
- EM max. Speed: 15.000 rpm
- EM peak Power: 75 kW
- EM cont. Power: 50 kW



FOR FURTHER INFORMATION PLEASE CONTACT:

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