





THE NEW MERCEDES-BENZ V8 M177 EVO: CONCEPT AND ENGINEERING FEATURES OF A HIGH-PERFORMANCE V8

- Presenter: Frank Weinert
- Author: Project team M177Evo
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What makes the M177Evo to the V8 of the future?

One V8 platform for Mercedes-Benz, Maybach and AMG covering a broad power range and different car requirements

Covering future regulatory requirements (emissions, OBM, exterior noise) while **meeting customer expectations** (performance, fuel consumption, sound, NVH)

Some technical features presented at **launch in Vienna**

Miller cycle with early intake valve closing reduces knock tendency and pumping losses.

Flat-plane crankshaft provides more uniform cylinder filling and lower boost pressure.

350-bar injection with a central injector and spark plug between exhaust valves.

450 kW at $\lambda = 1$

Presentation of **further key technologies** today

Heat dissipation starting from combustion chamber

New cooling concept CHIPS

Component protection

Engine friction reduction measures

And more.... another day

Why heat dissipation instead of cooling?

The $\lambda = 1$ concept changes engine heat flows. The loss of internal combustion-chamber cooling requires revised heat-transfer paths and component protection. The choice of heat-transfer locations also provides scope to run higher compression end temperature and peak pressures

Cooling the head, valves and pistons protects components under high combustion temperature and loads.

Cylinder Head Integrated Performance System CHIPS

Partial insulation of the manifold and turbine housing

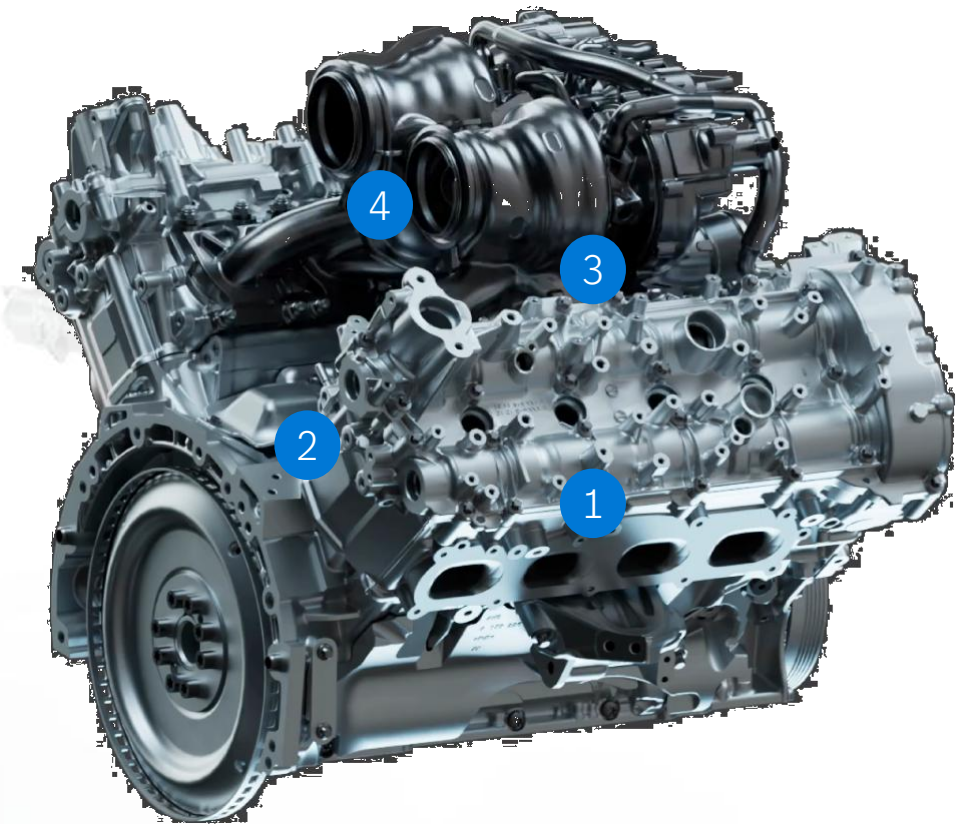
The hot inner V shortens the exhaust path to the catalyst but increases component-protection requirements.

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What changes were required to the water jacket?

Proven M177 cooling concept with a one-piece water jacket

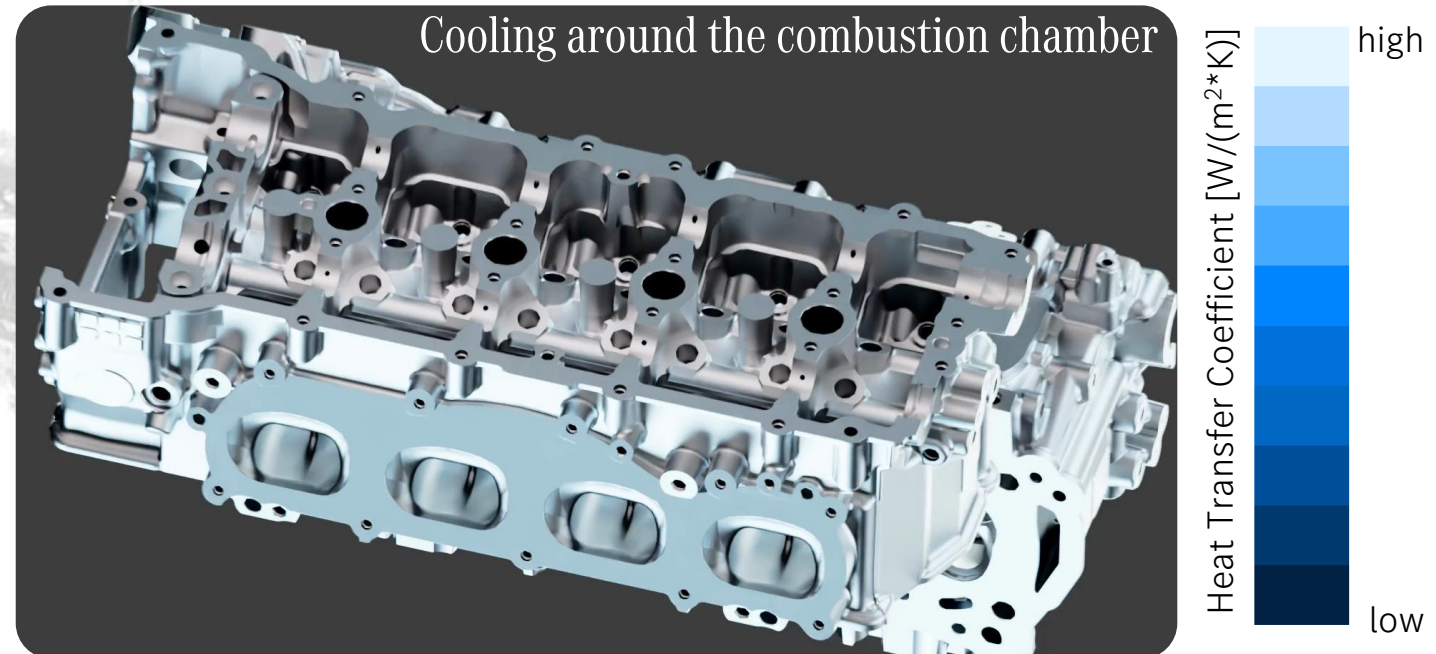
Reduced distance between the combustion chamber and coolant passages

Cooling close to the smaller valve seat rings

Coordinated valve and seat-ring design and materials

Advanced casting technology

Highly optimized water jacket for performance and manufacturing



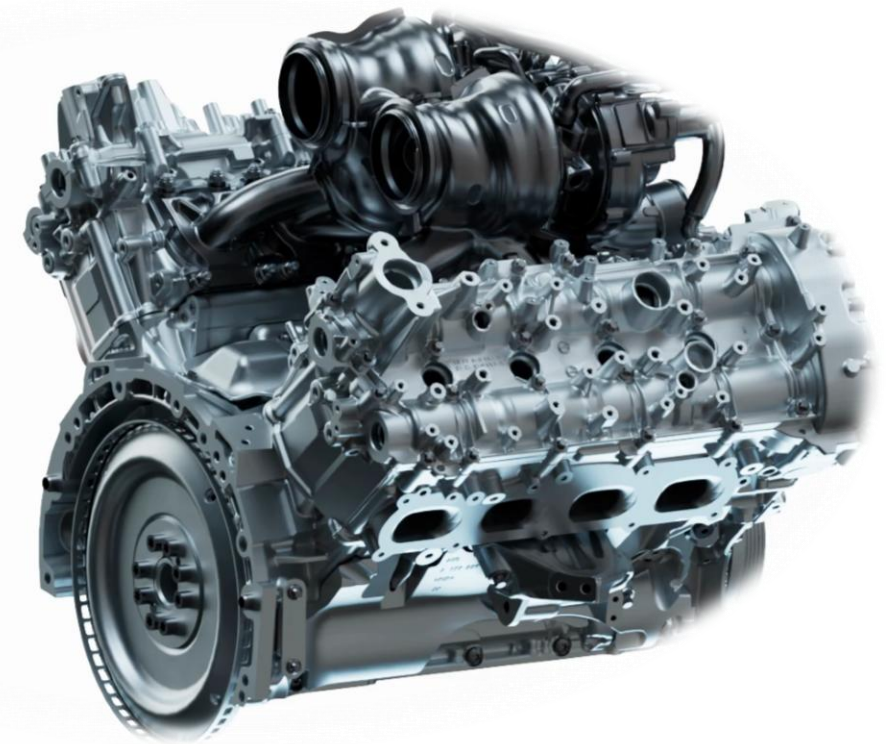
What is CHIPS?

Integrated into the cylinder head and the crankcase

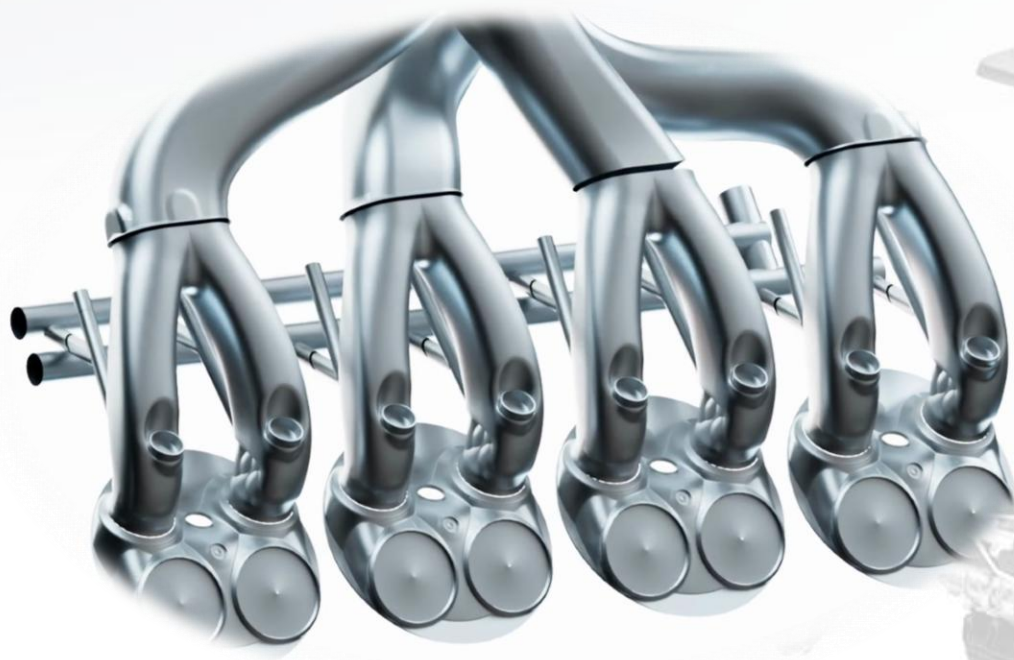
Passage system connecting the exhaust ports of one cylinder bank

Scroll interconnection open or closed according to engine specification

Component regions downstream of the combustion chamber reduce exhaust temperature upstream of the turbine and catalyst



How does CHIPS work?

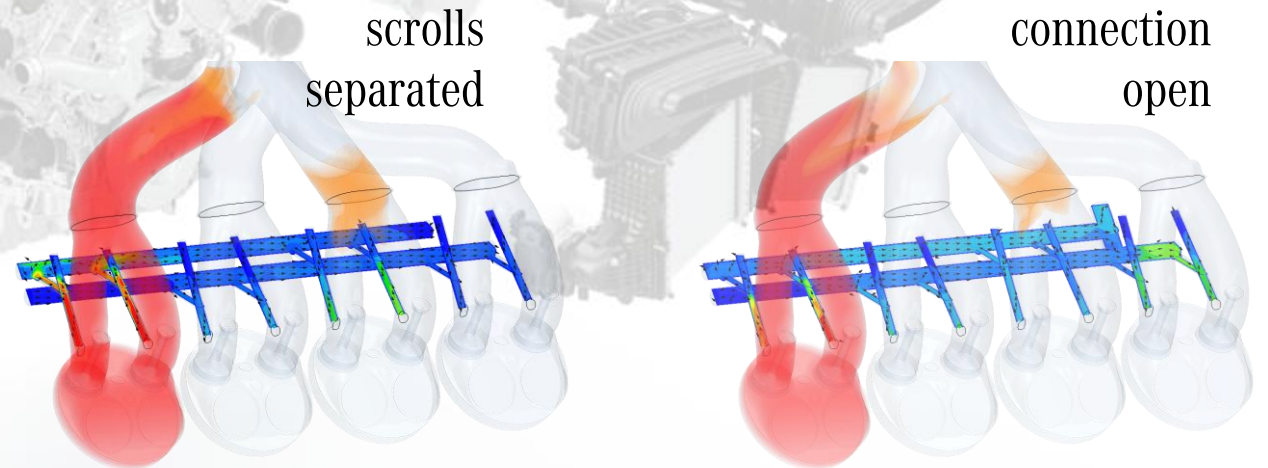


Closed scroll interconnection improves flow distribution throughout the passage system, as the comparison shows.

Exhaust gas flows to the turbine when the exhaust valves open.

Pressure differences between cylinders divert part of the flow into the passage system.

This gas transfers heat to the cylinder head and longitudinal crankcase passages, reducing the temperature upstream of the turbine housing.



Why is the manifold not fully insulated?

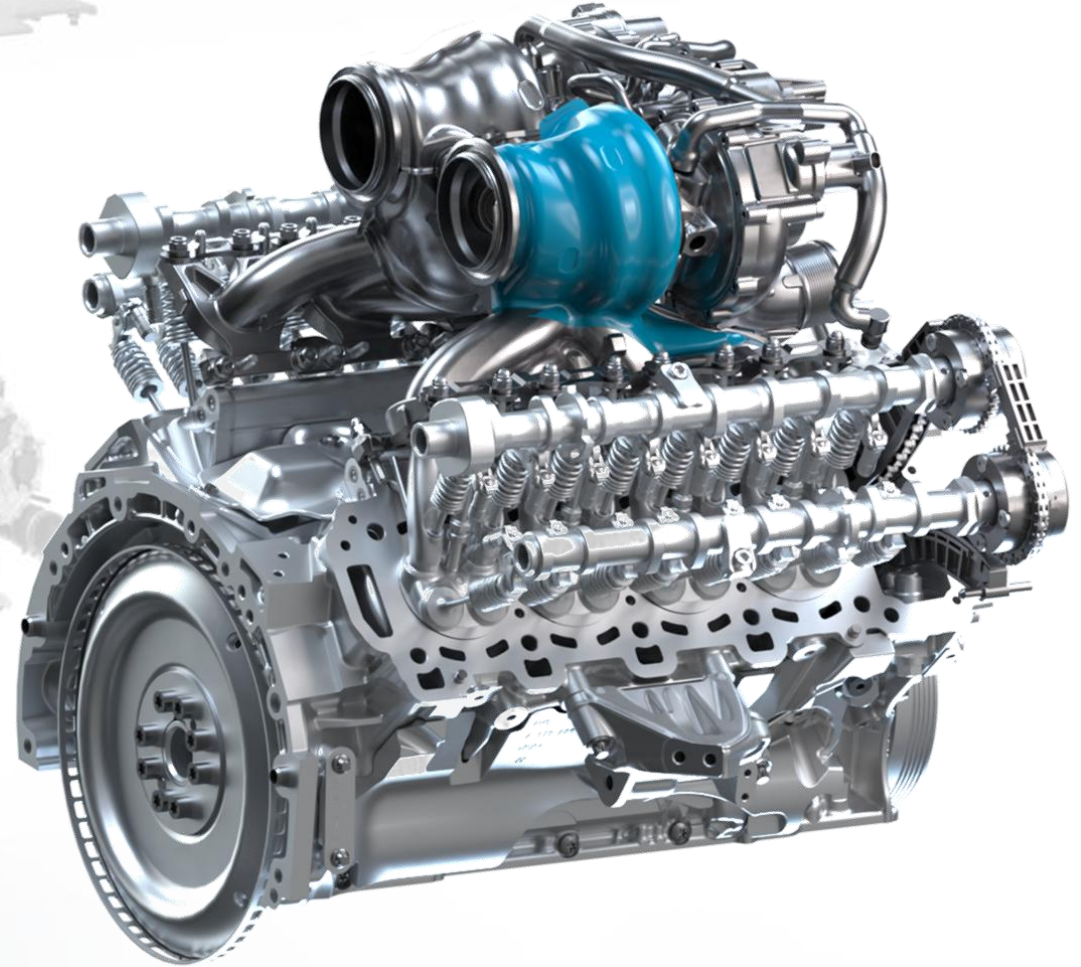
Insulating the manifold and turbine housing reduces heat input into the engine bay and inner V.

Exposed manifold surfaces dissipate heat and lead to lower exhaust temperatures to protect the turbocharger and catalyst.

The effect of omitted insulation during warm-up is negligible.

Insulation coverage depends on adjacent components, airflow, heat soak and performance targets.

Simulation and testing determine the optimum coverage.



How does engine-bay airflow contribute?

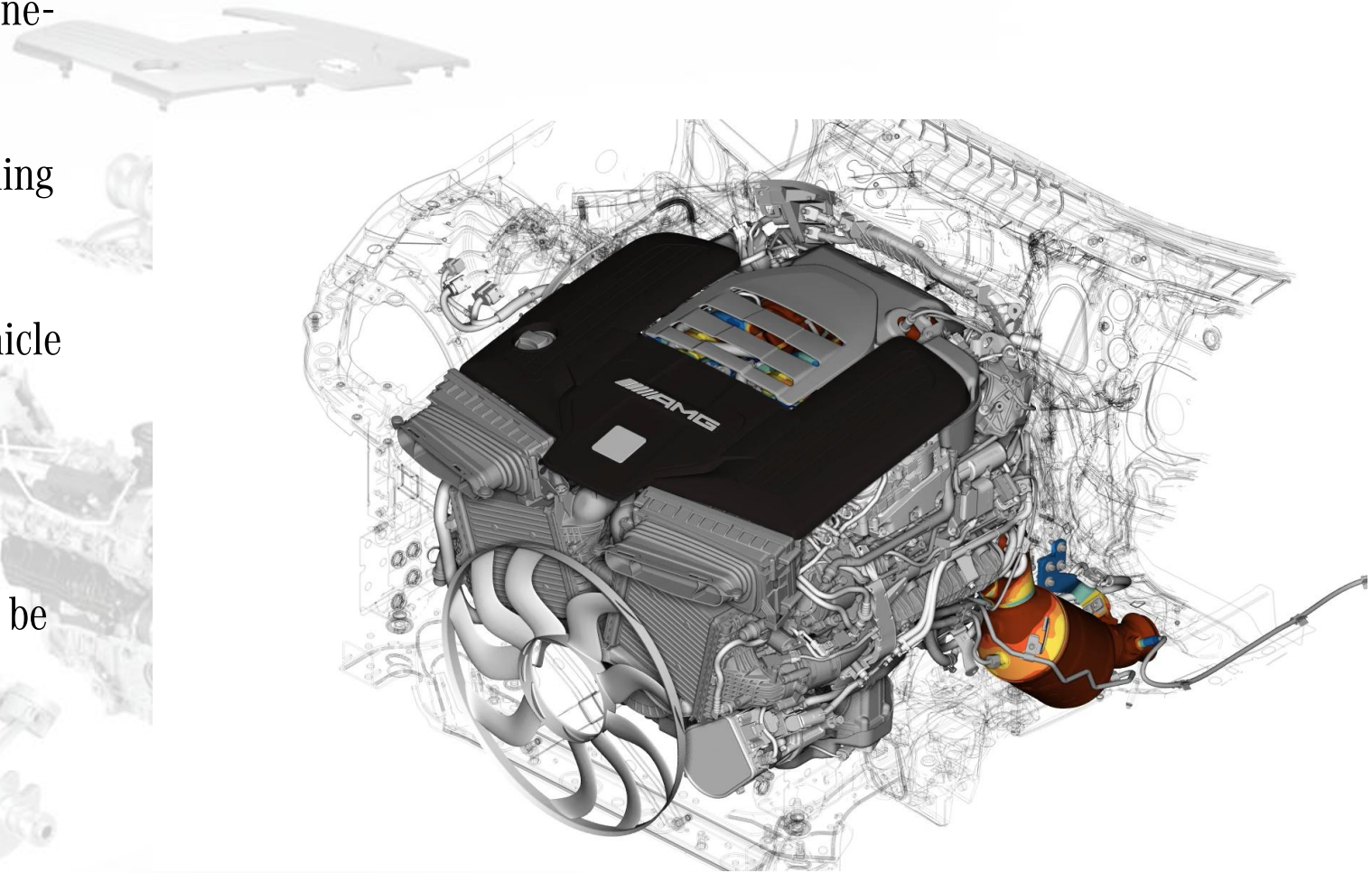
Air leaving the radiator provides most of the engine-bay airflow.

Additional front openings make use of the oncoming airflow.

The fan provides airflow at standstill and low vehicle speeds.

Underbody outlets help direct the airflow.

Any resulting increase in aerodynamic drag must be minimized.



When does concept development begin?

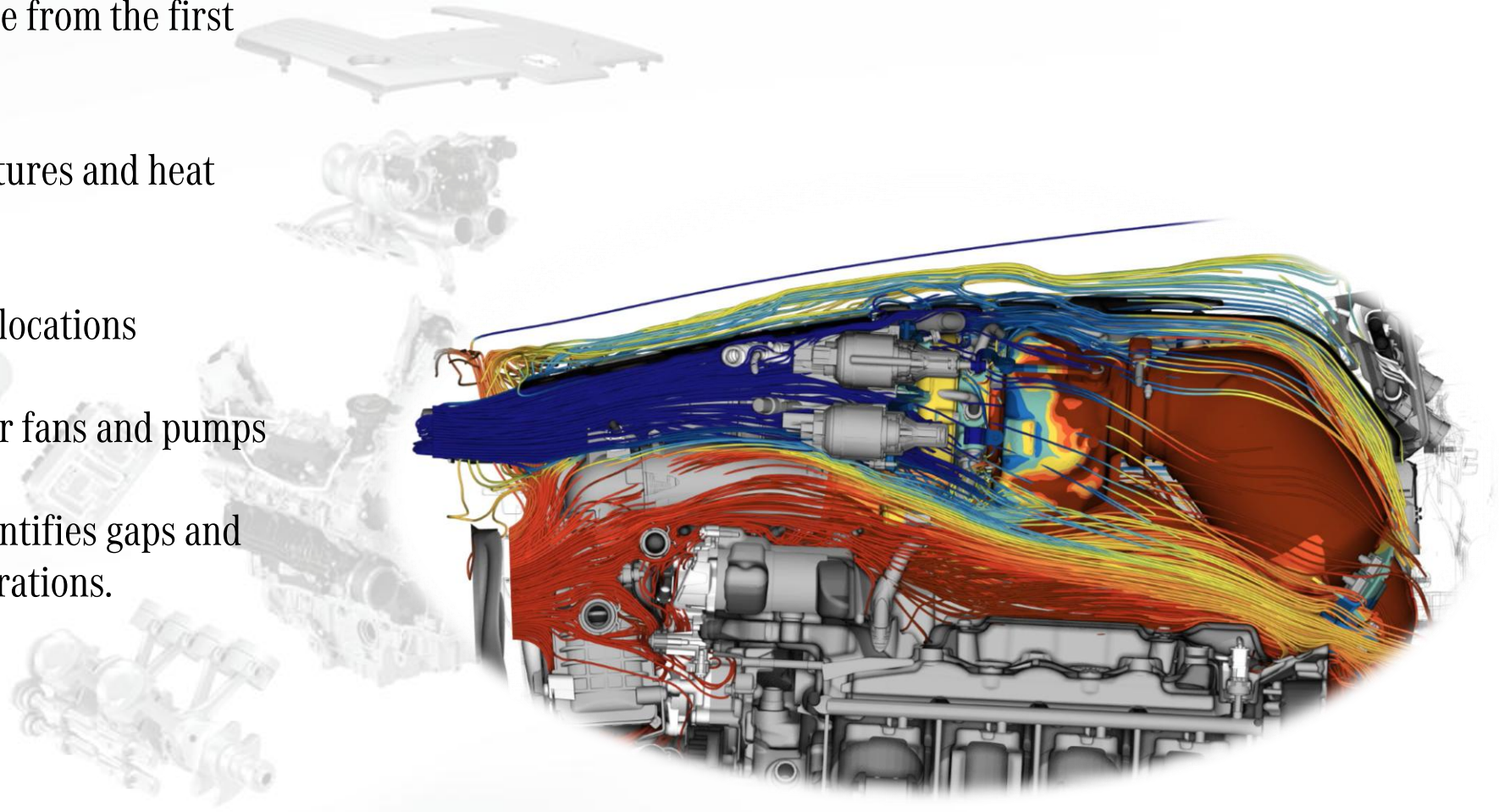
Engine and vehicle teams cooperate from the first design concepts.

Simulation of component temperatures and heat dissipation

Digital definition of measurement locations

Virtual calibration development for fans and pumps

Vehicle testing verifies results, identifies gaps and refines control functions and calibrations.



What were the engine design priorities?

Retaining the predecessor's displacement reduces inertia forces and packaging space.

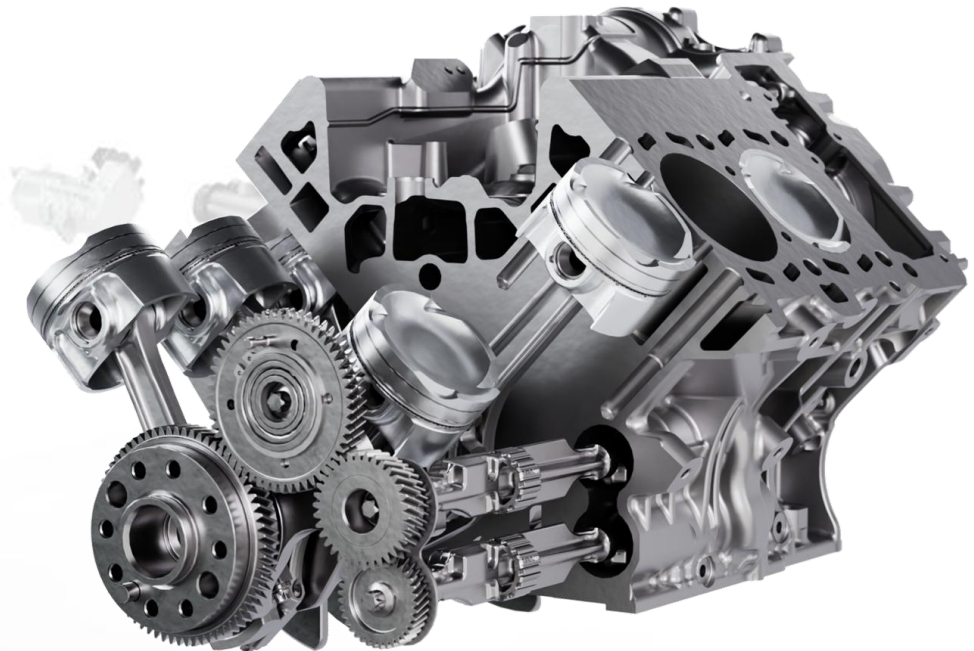
Optimized flow requirements and engine pressure losses to limit coolant- and oil-pump size

Elimination of the belt drive

Balance shafts are necessary to counteract the resulting secondary inertial forces of the flat plane crankshaft.

Balance shafts integrated into the crankcase for compact packaging

Advanced casting technology provides high local material performance.

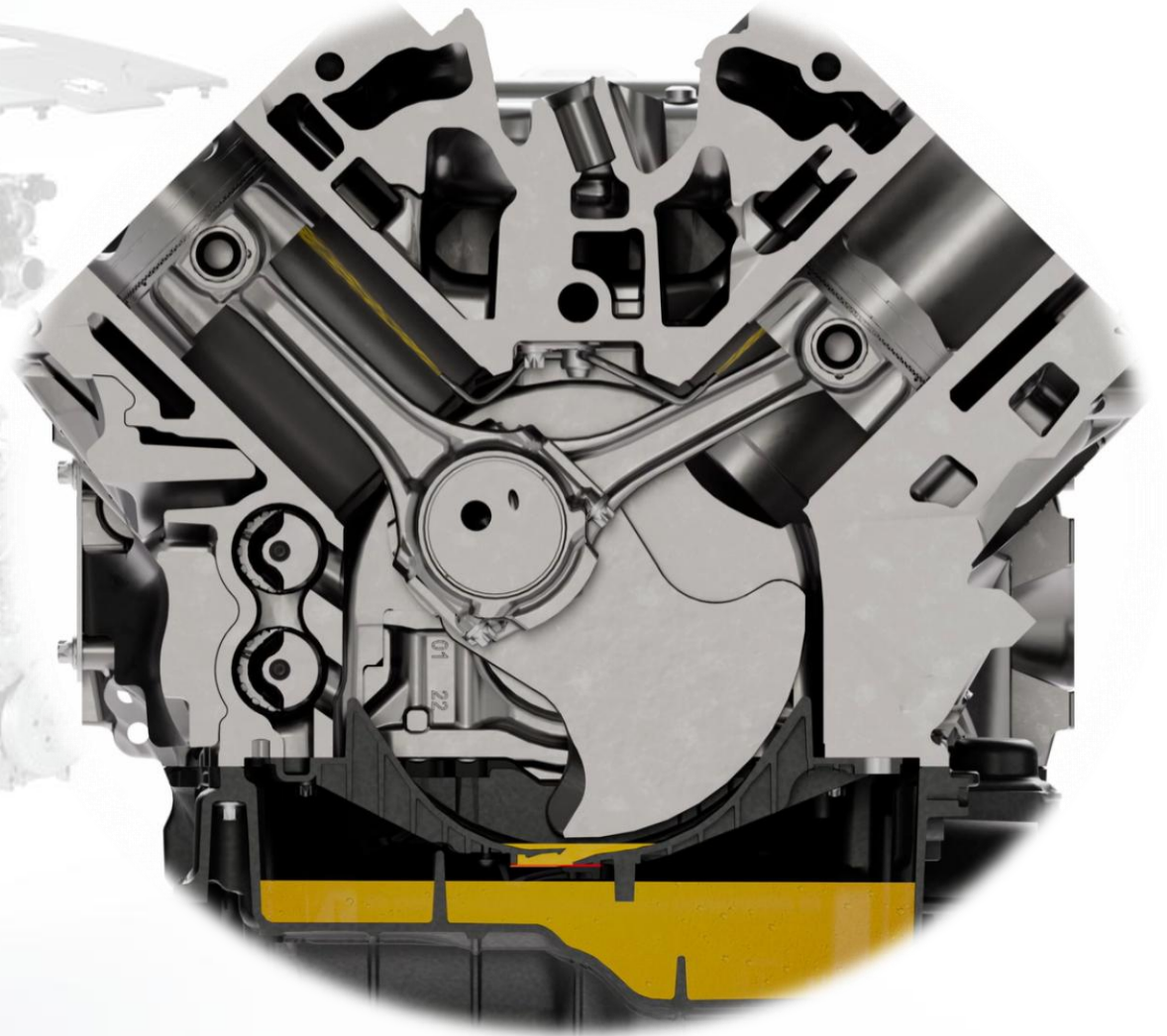
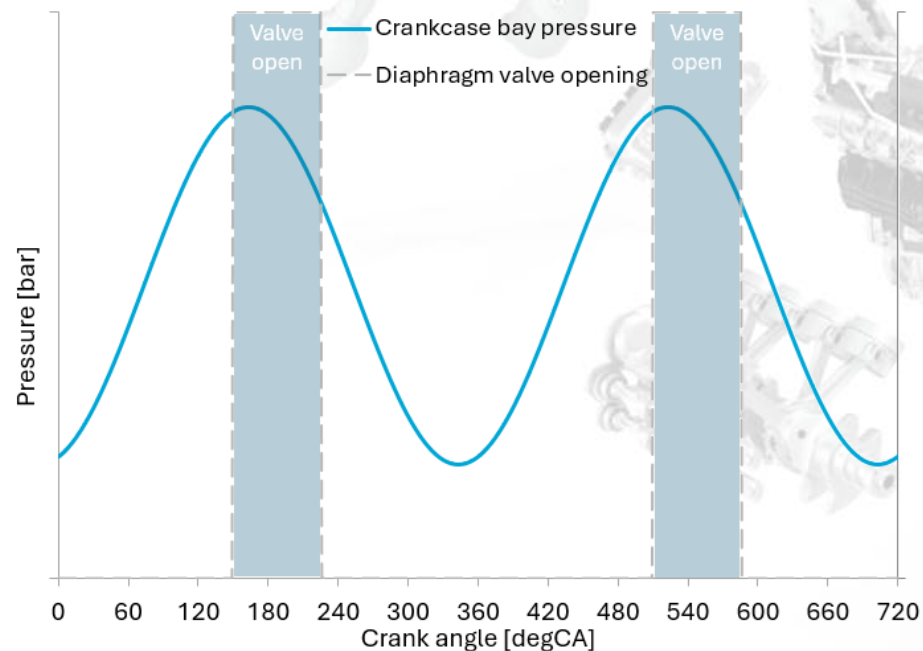


What is an active oil deflector?

Oil churning is one of the sources of friction loss in the engine.

The plastic oil deflector is specifically adapted solution with diaphragm valves to the crankcase design of M177Evo.

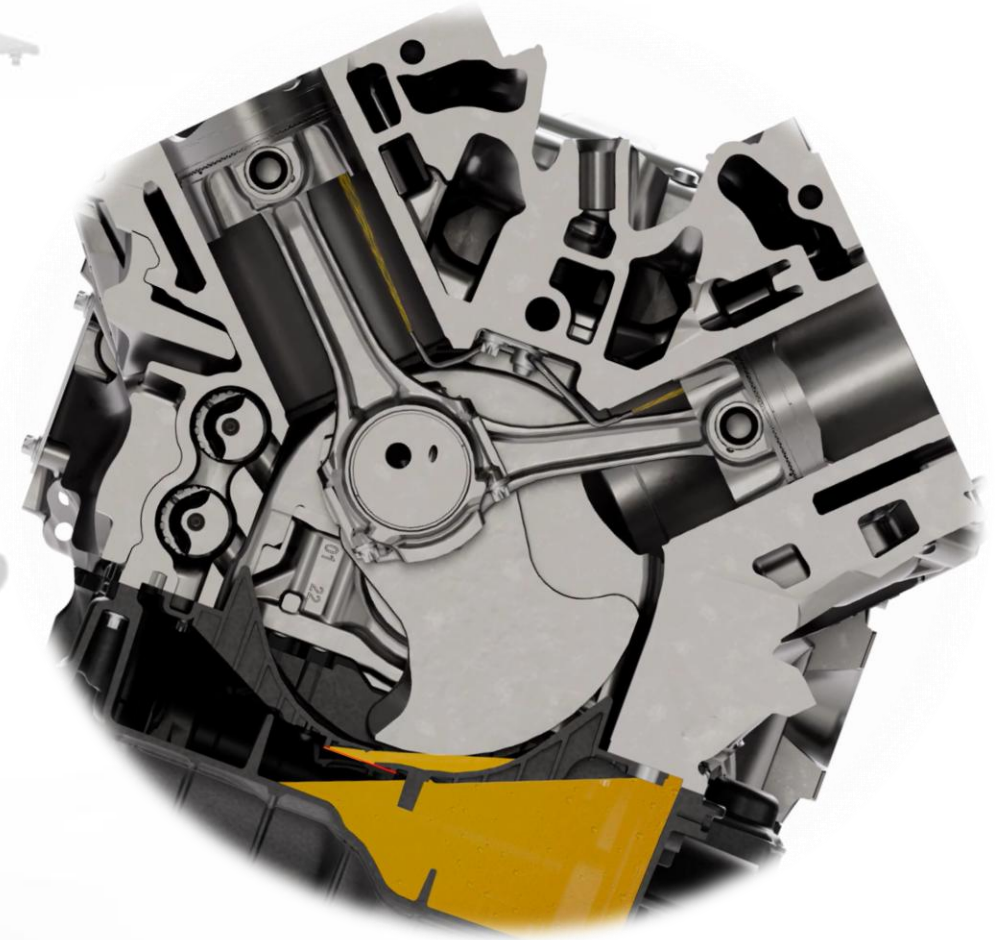
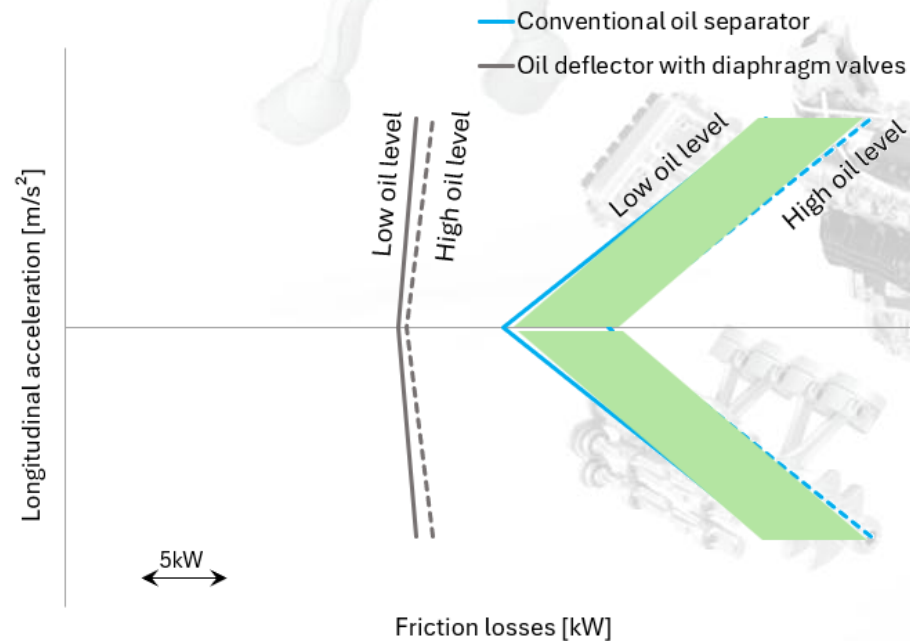
The four crankcase bays are separated, oil draining through diaphragm valves is activated by the bay pressure.



How does the oil deflector perform during driving?

Friction-loss reductions in the normal position also apply under dynamic driving conditions.

The oil deflector also eliminates the effect of different oil fill levels on friction losses.





NEW CHAPTER

The architecture of the M177Evo is now unveiled

Future-proof, powerful, compact

Stay curious!

Questions?