

# Polestar 2

The latest model features safety-related adaptations that protect the electric powertrain and introduces next-gen airbag technology, which will be assessed under new Euro NCAP/ANCAP tests later in 2020

WORDS BY ALEX GRANT



When engineers at the Volvo Car Group crash lab near Gothenburg put the Polestar 2 through its paces recently, it marked an important milestone for Volvo. This was the facility's first test program for a fully electric vehicle and, with a widely used platform underneath, the results could have far-reaching influence for parent company Geely.

The Polestar 2 is based on the Common Modular Architecture (CMA), developed by Volvo and already found in the XC40 SUV, but also shared with sister brands Geely and Lynk & Co. Polestar's head of research and development, Hans Pehrson, says this enabled a much faster overall development program

than starting from scratch – it's just over three years since the concept version was shown as the Volvo 40.2, at which point Polestar wasn't a separate brand.

However, the conversion to electric drive wasn't entirely straightforward. The powertrain comprises front and rear drive units at either end of a 78kWh battery pack under the cabin, and Pehrson says this altered the weight distribution, introduced new rigid areas into the structure and downsized the solid components under the hood, all of which change its deformation characteristics in a collision. Meeting the OEM's tough safety benchmarks required significant structural changes.

The EV is the first vehicle to feature Volvo's inner-side airbags for the front seat, which add an extra layer of safety for occupants



## Airbags at the ready

**►** New features aren't only related to the drivetrain. Depending on the market where it's sold, the fastback features up to nine airbags, including Volvo Group's first front-inner-side airbags. Housed within the front seats, these are deployed during a side impact to reduce lateral occupant movement, and will be among the first such preventive measures to be assessed under the new Euro NCAP/ANCAP far-side impact test later this year.

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ABOVE: Polestar 2 after its first crash test, a frontal offset/ small overlap crash

INSET: Specially designed blocks of aluminum protect the battery structure and passengers during heavily offset frontal collisions

BELLOW: By using Volvo's CMA platform the team was able to develop the vehicle much faster than usual

"The CMA platform wasn't originally designed to offer a battery electric vehicle solution, so we needed to take a very holistic view of the project right from the beginning," explains Pehrson. "This means that everything from the front end to the floor is unique for the BEV version, while many other areas have been revised to meet the requirements of a modern BEV, and remain true to Polestar's unique character."

#### INHERENT SAFETY

Its battery layout plays a pivotal role. The pack is made up of 27 modules, which are shaped to fill the transmission tunnel and areas under both rows of seats, lowering the center of gravity while preserving foot space for rear occupants. Modules are encased within an aluminum base and steel lid to protect the cells from damage, which makes the pack an integral part of the body structure and helps damp noise and vibrations in the cabin.

"With this rigid part between the wheels we need to look at deformation zones and weight distribution in a new way, but the [safety] target will

be the same," continues Pehrson. "We need to protect the battery and footwell area for the driver. The aluminum wheel and the wheel hub can be very stiff, and they need to be deflected so they don't go into the cabin and battery."

Polestar's solution is a pair of solid aluminum blocks, fitted just above the leading edge of the sills at each end of the front bulkhead. These SPOC (severe partial offset crash) blocks are designed to guide non-deformable items down the side of the car, away from the passenger compartment and battery pack, during heavily offset collisions.

An additional deformable structure between the bulkhead and front panel, referred to as the front lower load path, helps make up for the lack of an engine during frontal or pole collisions. On impact, the battery pack is disconnected from the rest of the vehicle as a precaution, removing the live electrical supply.

Onboard safety equipment is also ahead of other Volvo Car Group products. One front and two rear-mounted radar units, augmented by a windshield-mounted camera,

enable it to detect pedestrians, animals, cyclists and other vehicles,

warn the driver and make evasive braking or steering maneuvers if necessary, while pre-emptively tightening the seatbelts in case of a collision. The company has also added a forward and reverse pedestrian warning system, a soft sound and a pulse respectively, as required by law in its largest markets.

Early adoption of electric drive means Polestar is spearheading innovations earmarked for use elsewhere. Volvo Cars is aiming for a 50% BEV sales share globally by 2025, beginning with an XC40 due later this year, and this will share its powertrain, front lower load path and SPOC blocks with the Polestar 2. For Pehrson, the common focus on safety is an important attribute for both brands.

"Being part of such an established automotive group is one of our biggest strengths," he says. "From across the group we have incredible competency and knowledge, often specialized, that we always look to maximize the use of. It's something we at Polestar appreciate very much." ▲

