

Warmth Where It Matters: How a Seat Belt Enhances Comfort and Range

- ZF LIFETEC's Heat Belt 2.0 is an advanced seat belt solution with surface heating
- A quick warm-up time allows the belt to reach 40°C from -5°C in less than two minutes for optimal comfort
- The system may increase range of electric vehicles by up to 6 percent by reducing the energy required to heat the interior
- "The Heat Belt 2.0 sets new standards for winter comfort in vehicles across all segments, from small cars to luxury models." – Harald Lutz, Head of Research & Development at ZF LIFETEC

ZF LIFETEC, a global leader in passive safety systems, has refined its heated seat belt, which was first introduced in 2023. The company will unveil the next generation, Heat Belt 2.0, at the IAA Mobility in Munich (Hall A1, Stand D30), from September 9 to 12, 2025. A newly developed algorithm and an optional in-house Electronic Control Unit (ECU) make the Heat Belt 2.0 a comfortable surface heating system that adapts its heat output quickly and pleasantly. The Heat Belt 2.0's low energy consumption positively affects the range of battery-powered vehicles by up to 6 percent, especially in the heat-up phase of the passenger compartment.

Anyone who gets into a vehicle on a frosty morning knows the scenario: the interior is uncomfortably cold, it warms up only slowly despite the vehicle heating being turned up high, and it takes a long time to reach a comfortable temperature. With the new Heat Belt 2.0, ZF LIFETEC now offers a further developed belt solution that specifically addresses this winter issue. "With the Heat Belt 2.0, we have engineered a forward-thinking solution for winter operation that is comfortable, safe and energy-efficient," explains Harald Lutz, ZF LIFETEC. "The integration into existing vehicle architectures makes the system attractive for manufacturers who put an emphasis on efficient thermal management solutions."

Adaptive thermal comfort – close to the body

The Heat Belt 2.0 enhances existing surface heating systems, such as seat or steering wheel heating, and provides a comfortable temperature in the upper body area without drafts or fan noise. Thanks to the low mass of the belt, the feeling of warmth sets in within moments. After it heats up, the occupant can enjoy a continuous cozy feeling thanks to the automatic adaption of the belt's heating power. Despite its integrated technology, the belt itself is only 1.3 millimeters thick and contains four finely woven heating wires over a heating field length covering the pelvis and chest of the occupant. The maximum heating output is 60 watts, with an average output of around 20 watts. This allows the belt to reach a temperature of 40°C from -5°C in less than two minutes.

Intelligent control thanks to patented thermal model

At the heart of the system is a patented algorithm based on a thermal model. This calculates the optimum heating output, considering the occupant's core body temperature of around 37 °C, skin temperature (32–34 °C), the outside and cabin temperature, and the amount of sunlight detected by vehicle sensors. The data from the automatic climate control (HVAC) is also included in the temperature calculation – so, unlike the previous version, a temperature sensor is no longer required in the belt webbing. A major advantage for vehicle occupants is that the heating output is regulated automatically, eliminating the need for frequent manual adjustment. The belt adapts discreetly and intelligently to the situation at hand, ensuring maximum comfort with minimal effort.

Energy efficiency for vehicle system

Using the Heat Belt 2.0 in the cold season with other close-contact heating devices allows new thermal management concepts to address the need for energy saving, especially for battery-powered vehicles. By targeting the body with warmth directly, the interior temperature in vehicles can be reduced by approx. 3 °C. While providing the same comfort experience for the occupant, energy savings result from a reduced heat loss to the environment and reduced energy to heat up the interior.

In a short trip scenario, e.g. when shop hopping, heating up the interior of a vehicle can dominate and require the maximum heating power of the HVAC to reach a comfortable cabin temperature within 10 to 20 minutes. With close contact heating, the occupant achieves quick comfort while the heating power of the HVAC can be reduced by up to 1000 W for typical vehicles. Considering the effects of the previously mentioned surface heating systems, the Heat Belt 2.0 can increase the range of electric vehicles by up to 6 percent. It also enables the use of smaller HVAC systems. Even for longer trips exceeding one hour, savings of around 200 W can be achieved, because the HVAC only needs to compensate for the reduced heat-loss to the environment.

ZF LIFETEC

ZF Automotive Germany GmbH
Industriestrasse 20 · 73553 Alfdorf · Germany

More safety through comfort

The Heat Belt 2.0 is designed to seamlessly integrate into a variety of vehicle models, spanning all segments from small cars to luxury models. For vehicles with a proximity sensor, the system can be combined with a function that activates preheating as soon as the vehicle is approached, providing a real wow factor for users. The pleasant warmth can also motivate occupants to fasten their seat belts correctly and dispense with thick winter clothing – which can improve crash safety, thus also making an active contribution to more safety in the vehicle.

Caption 1: Warmth where it's needed most – the Heat Belt 2.0 saves energy, increases EV range, and delivers warmth precisely to the body. Credit: ZF LIFETEC

Press contact:

Knut Zimmer, Spokesperson Product & Technology, ZF LIFETEC

Phone: +49 171 1506727, e-mail: knut.zimmer@zf-lifetec.com

About ZF LIFETEC

ZF LIFETEC is a leading passive safety technology provider for the enhanced protection of vehicle occupants. Employing approximately 36,000 employees dedicated to the mission of saving lives with a technology driven approach, the company develops, manufactures and distributes a comprehensive product portfolio including airbag, seat belt and steering wheel systems, covering a wide range from small vehicles in the volume segment up to sophisticated luxury vehicles. Featuring a market share exceeding 20 percent in its core product categories, ZF LIFETEC has a worldwide presence at 51 locations across 22 countries. In the fiscal year 2024, the Group generated sales of EUR 4.8 billion. Based on its strong relationships with a diversified customer base of global OEMs, driven by outstanding quality, long-standing R&D collaborations besides a strong global innovation platform, ZF LIFETEC is well positioned for future growth opportunities arising from the automotive megatrends electrification, (semi-) automated driving, smart interior, as well as increasing safety demands and stepped-up safety regulations worldwide.

Learn more at www.zf-lifetec.com

ZF LIFETEC

ZF Automotive Germany GmbH

Industriestrasse 20 · 73553 Alfdorf · Germany