

## **Ergonomics and comfort of Grammer seats: “Humans are still our best measuring device”**

- *In the ErgoLab at Grammer's headquarters, the focus is on users*
- *Ongoing optimization of ergonomics, operating comfort, and user-friendliness for best possible sitting and health*
- *From subjective feedback to motion capture in the test cube - ideal combination of conventional testing and high-end technology*

**Grammer AG, June 23, 2022.** Last year alone, Grammer delivered around 1.9 million seats worldwide, and around ten million people come in close contact with these products every day – most of them as professional drivers of trucks, buses, agricultural machinery, construction vehicles, forklifts and many other types of commercial vehicles. Striking a successful balance between highly industrialized series production seats and individual ergonomic and comfort requirements is the job of Grammer's Design, Usability and Ergonomics team.

Ten million users every day – ten million individuals: This reveals the scale of the range of applications for Grammer commercial vehicle seats. The products are held in high regard for their ergonomic quality and seating comfort and are frequently rated best-in-class. To systematically improve these characteristics, the company has set up an **ErgoLab** at its headquarters in Ursensollen, Germany, accommodating a design studio, various mockups, measuring tools and analysis spaces plus a test cube on an area measuring roughly 300 square meters. The team members work on research and pre-development projects and perform extensive comfort and ergonomic testing on prototype and series production seats and components.

Purely ergonomic parameters such as adjustment travel and angles or reach envelopes can mostly be calculated and implemented with human manikins. “Comfort, on the other hand, is highly subjective. In this respect, we're working with humans – since they are and remain our best measuring device,” explains Dr. Susanne Frohriep, R&D Senior Manager Global Ergonomics, Usability & Design at Grammer. The team have assembled an extensive **pool of test persons** over many years. This includes colleagues from other parts of the Grammer Campus, seat experts from various departments and a large external user group consisting of long-distance test drivers at OEM customers, farmers, or construction machine

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operators. Depending on product maturity and use case, test persons complete (partly) standardized test and survey programs. "We distinguish between lay subjects, seating experts, and regular users and collect different parameters from each group," explains Frohriep. In the **cabin mockups** for various commercial vehicle types such as trucks, excavators, forklifts or tractors, seat prototypes are integrated and then evaluated by the test subjects for seating and operating comfort, haptics, and posture among other things.

From mockup to dark room: Developed especially for Grammer, the **test cube** can simulate complete darkness as well as bright sunshine. Testing in the test cube focuses on how well controls can be identified in a wide range of different lighting conditions, whether their haptics are pleasant and whether they are legible without glare. In addition, the data collected is being used to create a **Grammer database** on product use. Eight cameras fitted to the motion capture system use markers on seats and test subjects to record sitting positions and body posture for different applications. The data can then be utilized to create valuable user profiles for each seat model.

The findings from ergonomics and comfort testing are not only continuously integrated into the product development process, but they also achieve further milestones by contributing to **innovative Grammer product solutions**. To give two examples:

- **Dualmotion** adaptive back support for tractor seats: To accommodate a backward facing driving posture, Dualmotion can be rotated to the left on a defined trajectory. In this way, it provides support to the spine in rotated position, thus reducing muscle load, improving visibility of attachments and enhancing safety.
- The **Haptic Warning** system for forklift seats: Vibration signals in different configurations are used to alert drivers to e.g. obstacles and dangerous situations.

"Our seats go all over the world into OEM products and retrofit markets - with the goal of providing users with the **best possible body support** and contributing to **health and prevention** by our product features," says Frohriep.



*Comfort and ergonomics testing in the Grammer ErgoLab: Dr. Susanne Frohriep, R&D Senior Manager Global Ergonomics, Usability & Design talking to a test person in the cabin mockup of a forklift.*

*Source: Grammer AG*



*Focus on users: In the test cube of the Grammer ErgoLab, a motion capture camera system records user profiles - here in an automotive interior – for different interactions with seats and interior components.*

*Source: Grammer AG*

#### **Company profile**

Grammer AG, headquartered in Ursensollen, Germany, is active in two business segments: Grammer develops and supplies high-quality interior and operating systems as well as innovative thermoplastic components for the global automotive industry. For trucks, trains, buses, and off-road vehicles, Grammer is a full-service provider of driver and passenger seats. Currently, Grammer AG employs around 14,000 people in 19 countries worldwide, with sales of around 1.9 billion euros in 2021. Grammer shares are listed in the Prime Standard and traded on the Munich and Frankfurt stock exchanges as well as via the Xetra electronic trading system.