

# INSIDE STORY

As automakers race to meet aggressive CO<sub>2</sub> reduction targets, lightweighting has become a central focus in vehicle design—especially for structural components. In this Inside Story, Envalior technical expert Ron Krotwaar explores how hybrid cross-car beams are helping OEMs reduce weight without sacrificing safety, manage material cost volatility, and align with evolving sustainability goals. Discover how these advanced solutions are reshaping vehicle architecture for electrification, cost-efficiency, and faster development cycles in an increasingly complex global market.

**Automotive Engineering: Given the growing pressure on OEMs to reduce vehicle emissions and meet stricter CO<sub>2</sub> targets, how do hybrid cross-car beams support lightweighting without compromising safety or design complexity?**



**Ron Krotwaar:** Hybrid cross-car beams directly support vehicle lightweighting by combining thin-walled metal inserts with high-modulus thermoplastics, enabling 20–30% weight savings over traditional steel solutions. Despite the weight reduction, these beams maintain or exceed structural requirements — especially in crash

management and torsional rigidity — thanks to tailored material combinations like glass- or carbon-fiber-reinforced PA6. The ability to integrate complex shapes and functional elements also allows engineers to consolidate parts, further reducing weight and system complexity.

**AE: How does the adoption of hybrid technologies in structural components help automakers respond to rising raw material costs and volatility in the global metal supply chain?**

**Krotwaar:** Hybrid solutions reduce overall metal content, decreasing reliance on materials vulnerable to geopolitical and supply chain disruptions (e.g., steel tariffs or energy-intensive production of aluminum). By shifting part of the structure to engineered thermoplastics — often with regional sourcing and more stable pricing — OEMs can better manage material cost volatility. Additionally, hybrid beams support lower-cost tooling, faster cycle times, and elimination of post-processing steps, all of which contribute to more cost-predictable production in uncertain markets.

**AE: Sustainability is becoming a non-negotiable aspect of automotive development. How do hybrid cross-car beams align with circular economy goals and carbon footprint reduction?**

**Krotwaar:** Hybrid beams contribute to sustainability on multiple fronts. Lightweighting leads to reduced tailpipe and lifecycle emissions, while function integration

minimizes the total number of parts and assembly operations, leading to lower energy consumption in production. Envalior's materials portfolio includes bio-based and recycled-content polyamides, further reducing the carbon footprint. In contrast to full metal solutions, hybrid beams avoid processes like welding or galvanizing, which are energy- and resource-intensive, aligning well with OEMs' circularity and ESG strategies.

**AE: In an environment of increasing vehicle electrification, where packaging constraints and modular designs are critical, what advantages do hybrid cross-car beams offer over traditional all-metal solutions?**

**Krotwaar:** Electric vehicles demand tighter packaging, reduced weight, and multi-functional structures to offset battery mass and integrate digital features. Hybrid cross-car beams provide:

- Tailored stiffness-to-weight ratios, allowing designers to optimize mass without compromising safety.
- Integrated channels for wiring, ducts, and mounts that save space and reduce separate brackets or housings.
- Superior NVH performance, which is especially important in quiet EV cabins.
- The ability to adapt designs quickly using simulation-optimized injection molding processes, ideal for modular, scalable EV platforms.

**AE: With OEMs demanding faster development cycles and more regionalized production to mitigate global risk, how does Envalior's hybrid beam portfolio respond to this shift?**

**Krotwaar:** Envalior's approach integrates material innovation with end-to-end development support, enabling faster concept-to-production timelines. Technologies like HPH (Hollow Profile Hybrid) and PMH (Plastic-Metal Hybrid) can be implemented using standard injection molding equipment, reducing capital investment and enabling local manufacturing footprints. Envalior also offers simulation tools, prototyping, and tooling expertise in multiple regions, making it easier for global OEMs and Tier-1s to localize production, respond to regional regulatory pressures, and mitigate risks stemming from cross-border logistics and material dependencies.

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