STEEL E-MOTIVE

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Steel E-Motive: Vehicle Architectures for Autonomous Ride Sharing EVs

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voestalpine ONE STEP AHEAD.

Key megatrends such as
urbanization,
the quest for zero emissions vehicles,
changing attitudes towards vehicle ownership

are driving a shift in automotive transportation
and a rethinking of the movement
of people and goods.

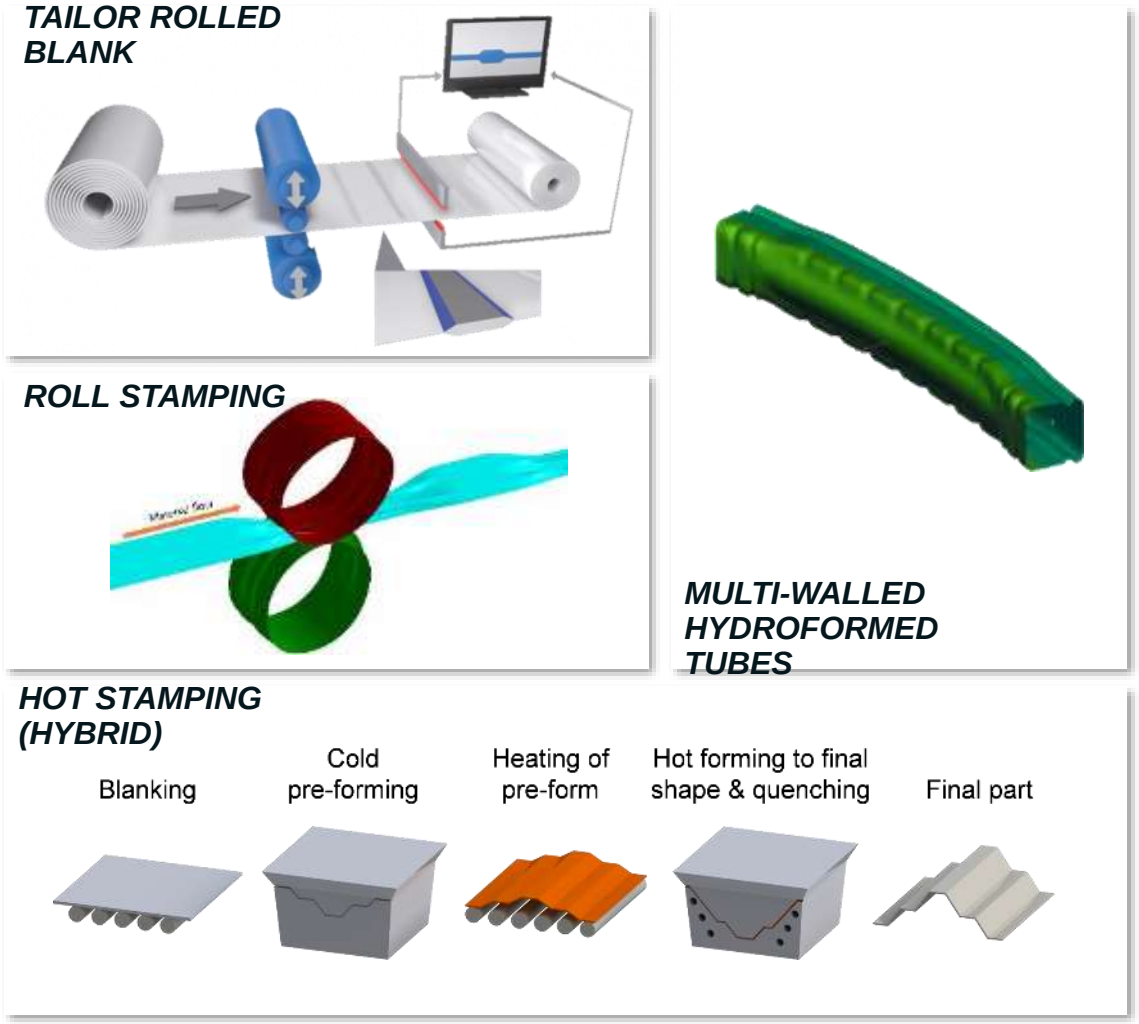
The Steel E-Motive project is a response to this transportation shift,

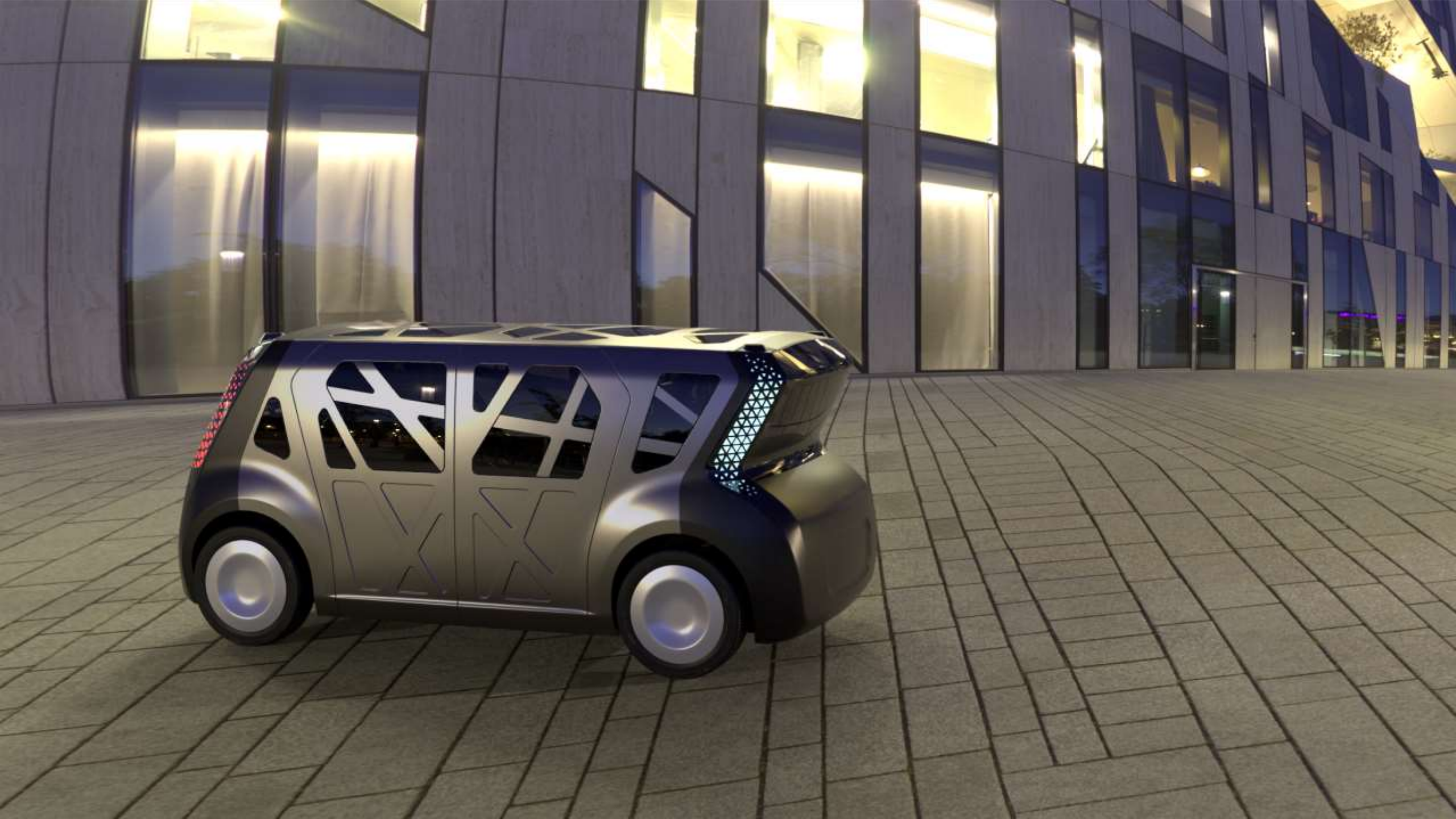
developing new, fully autonomous, ride sharing vehicle architectures.

Steel E-Motive Comprehensive Portfolio of Steel Grades and Fabrication Processes

Example Steel Grades for Steel E-Motive:

- Ultra-high strength: Martensitic and Press Hardened Steels
- 3rd Generation steel grades: DH, CH, RA, QP, MedMn
- High formability grades: BH, HSLA

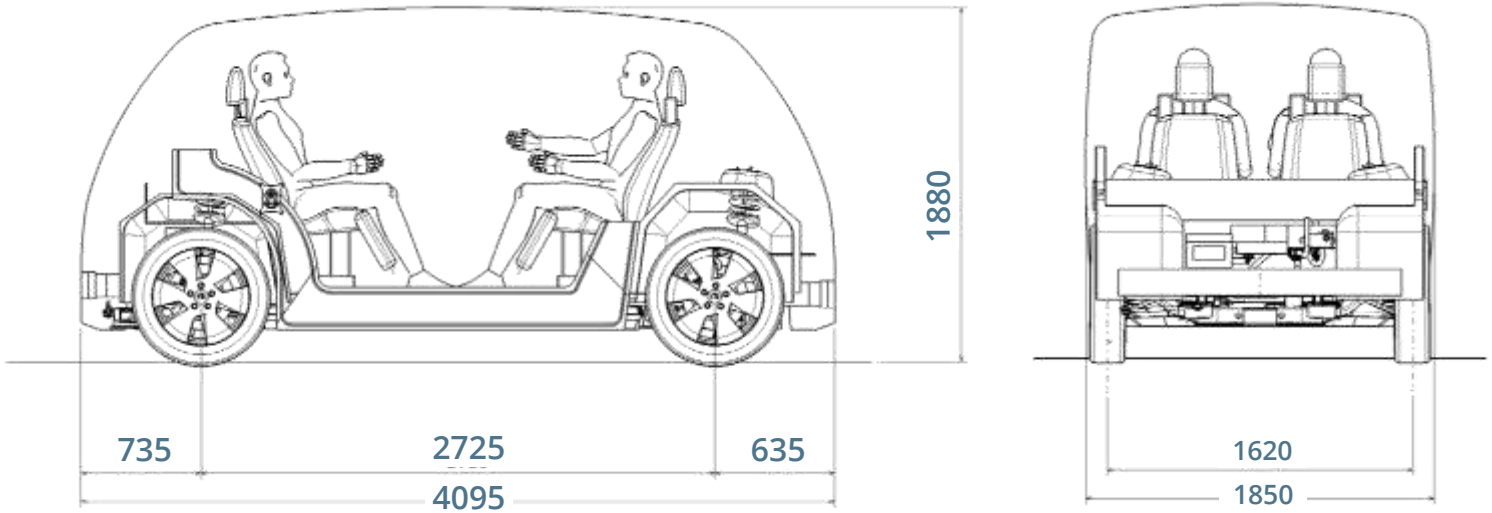




Steel E-Motive: Two Vehicle Variants Based on a Single, Modular Platform

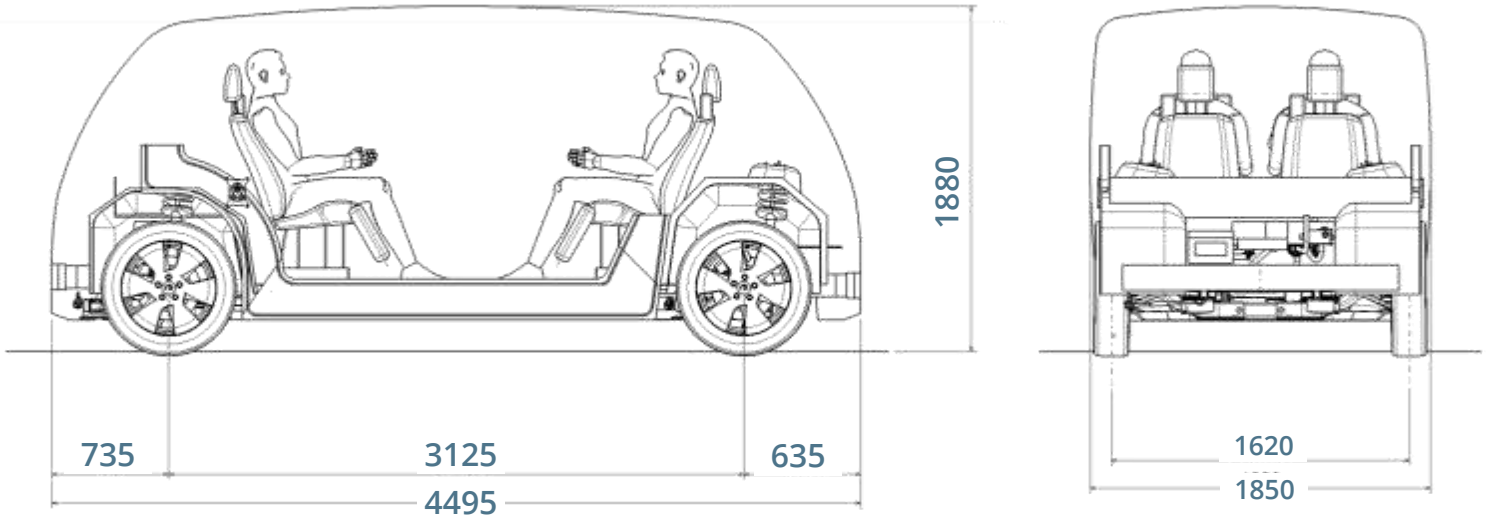
SEM1: Short Wheelbase Urban Version

- Single speed front electric drive
- Compact design and vehicle footprint
- Comparable to European B/C segment size



SEM2: Long Wheelbase Extra Urban Version

- Front and rear wheel electric drive
- Extended wheelbase
- Up to 6 occupants
- Maximised SEM1 carry-over



STEEL E-MOTIVE Addresses Key Expected User and Fleet Operator Requirements for Autonomous Ride Hailing Vehicles

Creating a desirable, comfortable and convenient journey experience

PASSENGER COMFORT & CONVENIENCE

Protection of occupants and road users in all eventualities

SAFETY

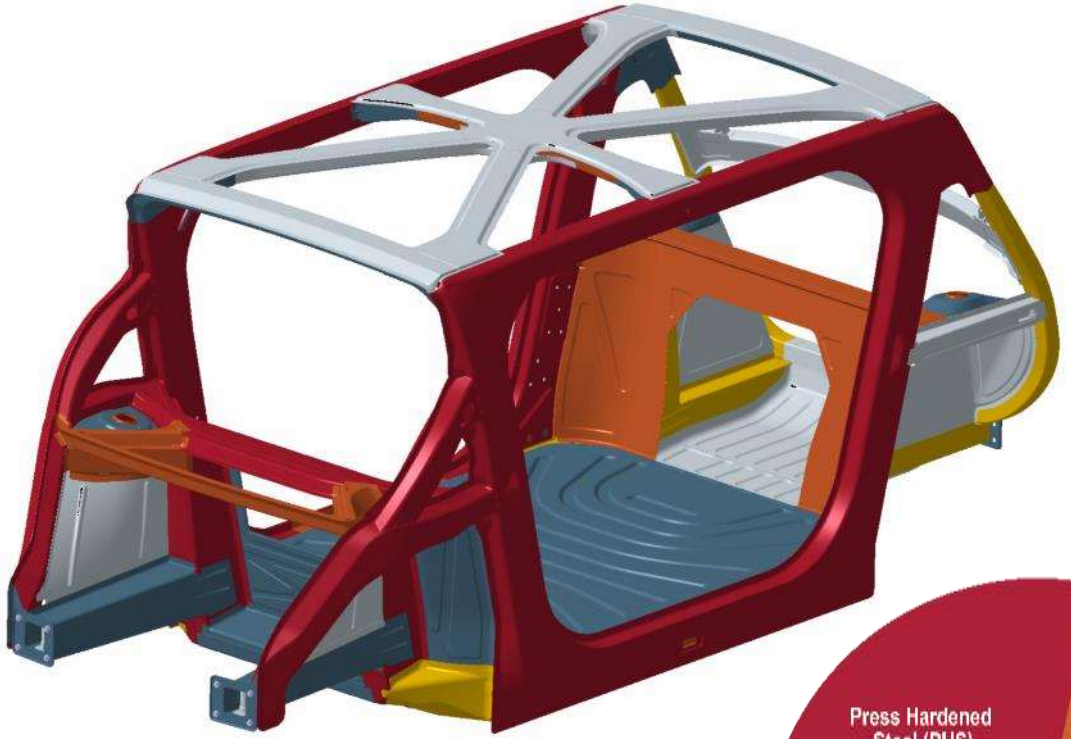
Ensuring competitive pricing for passengers and profitability for fleet operators

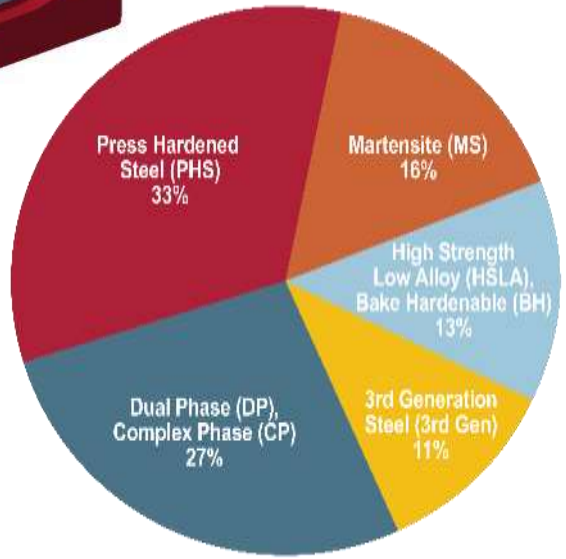
TOTAL COST OF OWNERSHIP

Addressing global sustainability challenges

ENVIRONMENT & SUSTAINABILITY

Steel E-Motive, SEM1 Body in White Steel Grade Utilisation





Mass Efficient BIW = 282kg

- The right steel grade in the right place
- High application of UHSS grades (>1500MPa), primarily for occupant and battery crash protection
- Mixture of stamped, roll formed, roll stamped, tailored blanks, press hardened steel and hydroformed parts
- Spotweld, laser weld and structural adhesives

Passenger Comfort And Convenience

Despite its compact size, Steel E-Motive has a spacious interior with convenient accessibility for users.

One-box architecture providing an open, spacious interior and occupant positioning.

Rear facing front occupants for enhanced journey experience.

Unique integrated B-Pillar and scissor doors, enabling >1.0m aperture for enhanced occupant ingress/egress.

Steel E-Motive Scissor Doors

Front and rear wheel steer. Tighter turning circle enables the vehicle to operate and access tight locations.

Semi-glazed panel roof, enhancing airiness spacious feeling.

Steel-enabled flat floor and competitive step in height.

Steel E-Motive Battery Packaging: Intelligent, Lightweight, Low-Cost Solution

Modules mounted to carrier frame, which is integrated to the body structure, achieving safety, stiffness and durability requirements.

* Compared to conventional sealed pack unit

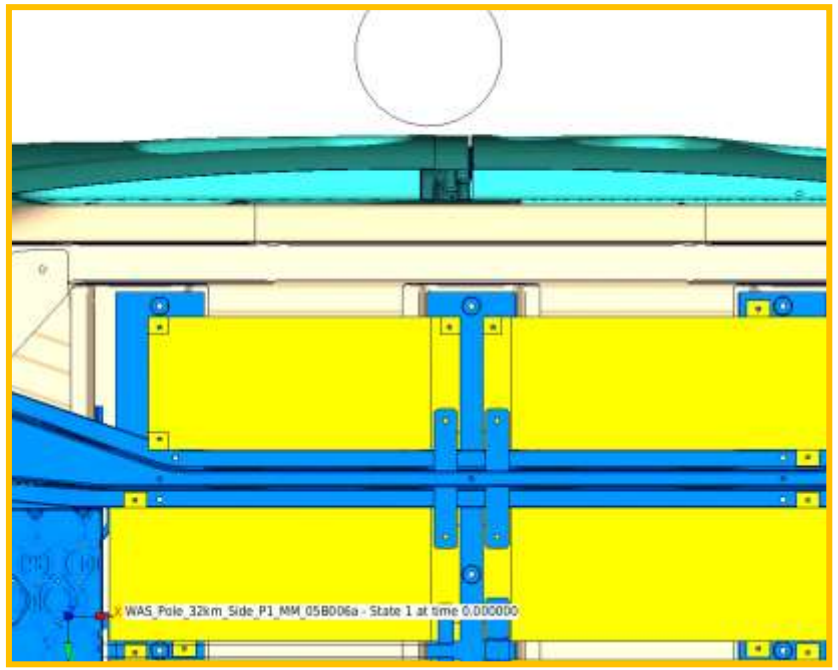
Crash Safety: First Autonomous Vehicle Concept with Full Potential to Meet Stringent Global Crash Requirements **(Achieves performance in keeping with IIHS "Good" rating)**

USNCAP full frontal rigid barrier ("FFB")
IIHS front Offset Deformable Barrier (ODB)
IIHS Small Offset Rigid Barrier (SORB)
USNCAP rigid pole
IIHS side barrier
FMVSS305 EV
FMVSS216a/ IIHS

Insurance Institute Of Highway Safety (IIHS)
Small Offset Rigid Barrier (SORB) Simulation

Crash Safety: Very Good Battery and Occupant Protection
(Achieves performance in keeping with IIHS "Good" rating)

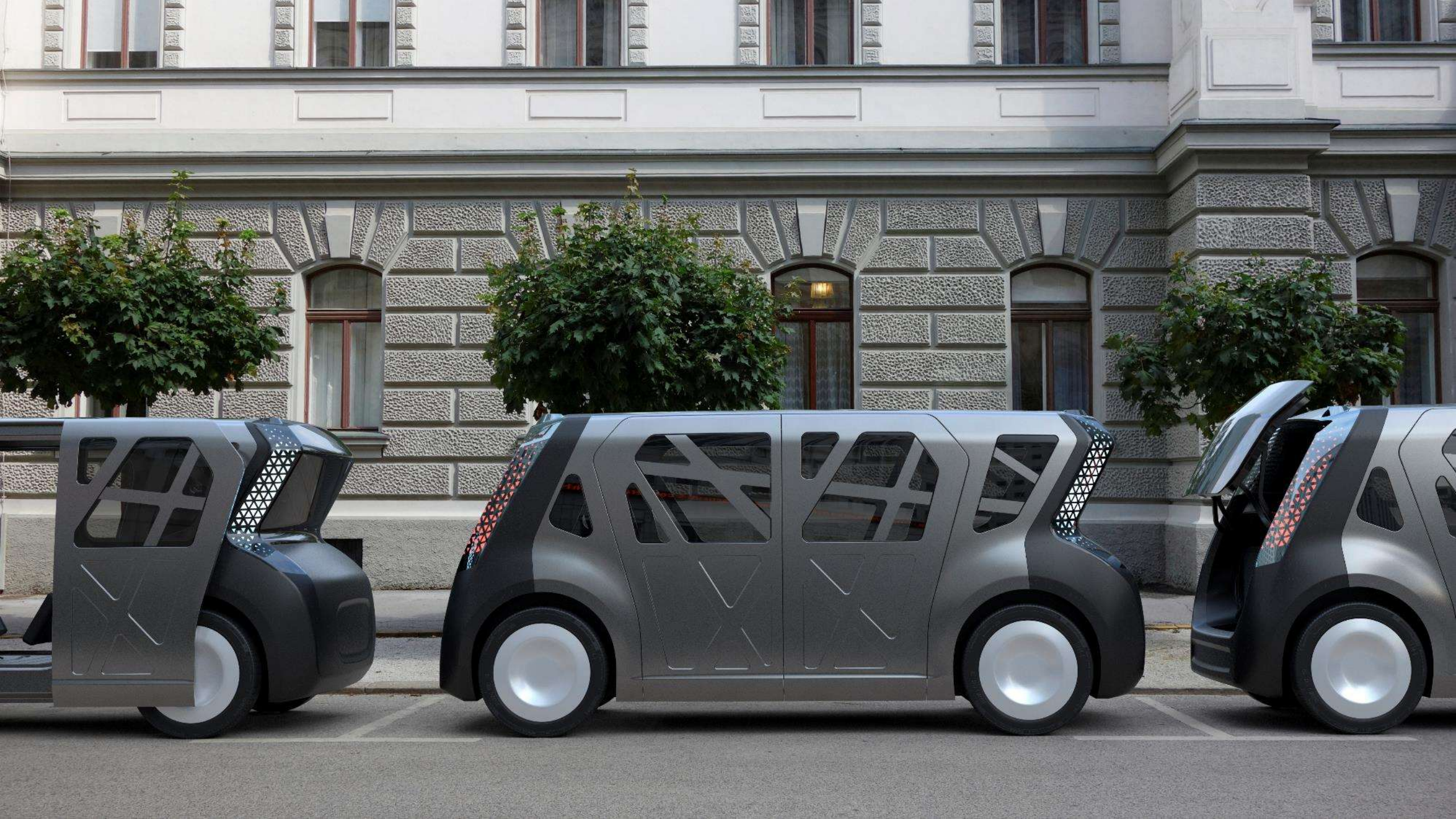
USNCAP 32kph side pole (battery protection)



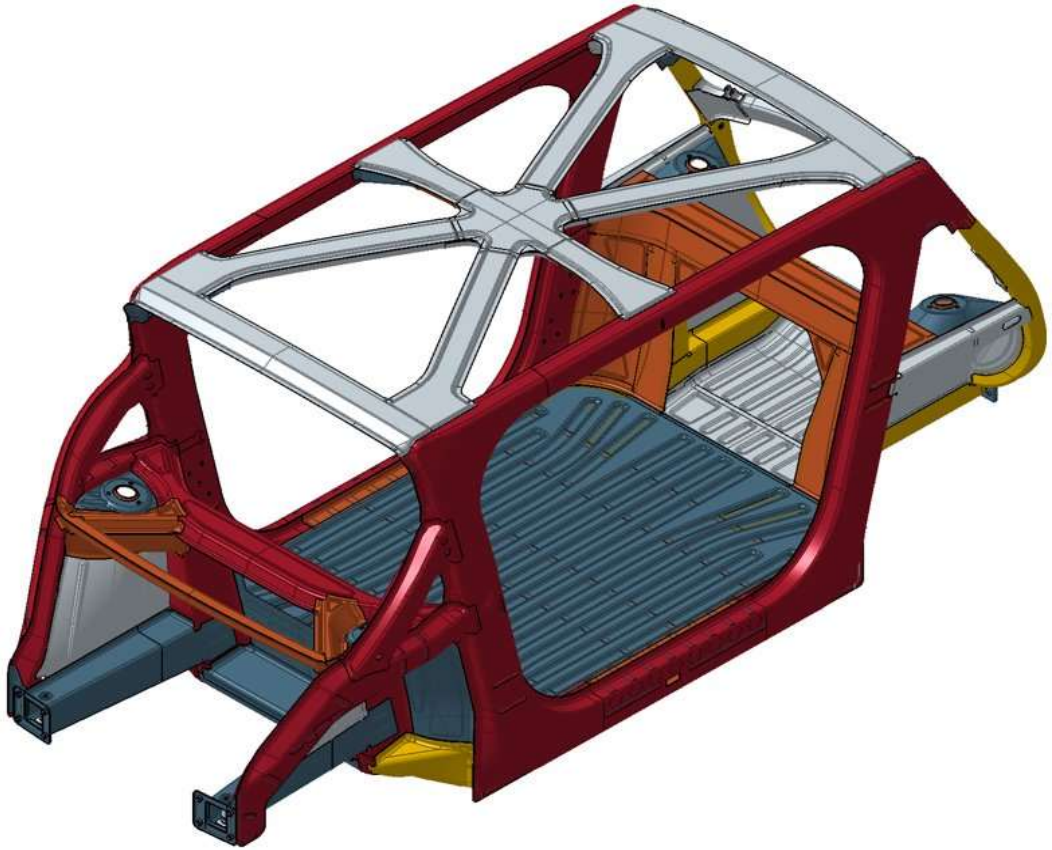
>30mm intrusion clearance to battery maintained

IIHS 60kph side barrier II (occupant protection)

IIHS "good" rating (based on predicted intrusions)



COST: Vehicle and Body Designed for Conventional Fabrication and Assembly Processes

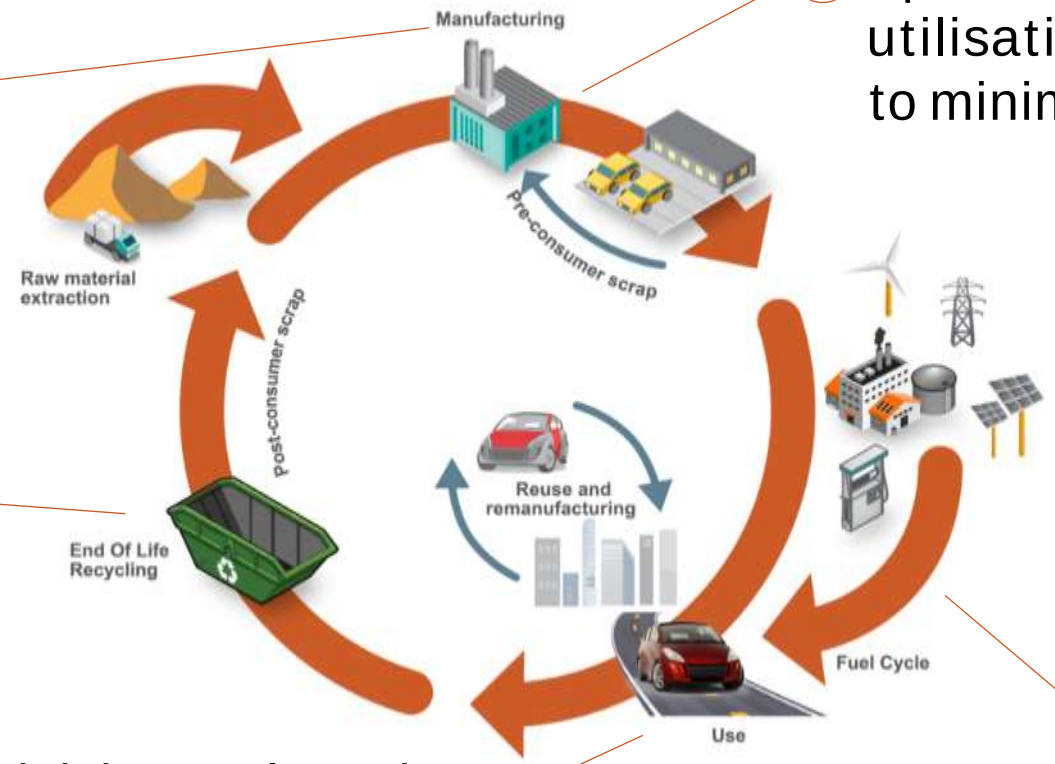


- Steel body design optimised to maximize material utilisation, minimize scrap rate
- Full formability analysis for critical/challenging panels
- Suitable for >250,000 units/year
- Conventional press, fabrication and joining tools
- Compatible with existing global automotive manufacture facilities at costs that support profitable margins both OEMs and the MSPs
- Competitive costs with current production BEVs despite SEM architectural advancements
- “Fast to Market” - Fully engineered vehicle program that start-up companies can exploit

ENVIRONMENT & SUSTAINABILITY: Comprehensive LCA and Optimisation. Demonstrating Potential for *92% Reduction* in GHG (2020 vs 2035 scenario)

1 Decarbonise steel production (e.g. hydrogen Electric Arc Furnace)

2 Optimise vehicle design, material utilisation and fabrication processes to minimise production emissions



3 HV battery production emission study and > 2030 forecast

6 Maximise Re-use, Re-manufacture, Recycling

5 Real world drive cycle and autonomous drive cycle smoothing

4 Decarbonise electricity grid supply for xEV

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Future Mobility

Only Steel

Can Make Real

For any enquiries, please contact
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