



# Alumobility - Fulfill the Promise of a Lighter, more Efficient and Sustainable Future by Collaboration

AMAP, August 18, 2022

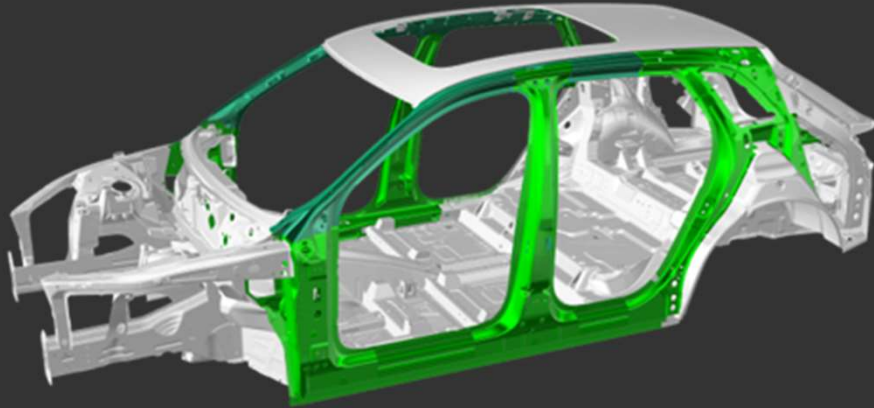
Speaker: Dr. Thomas Rudlaff



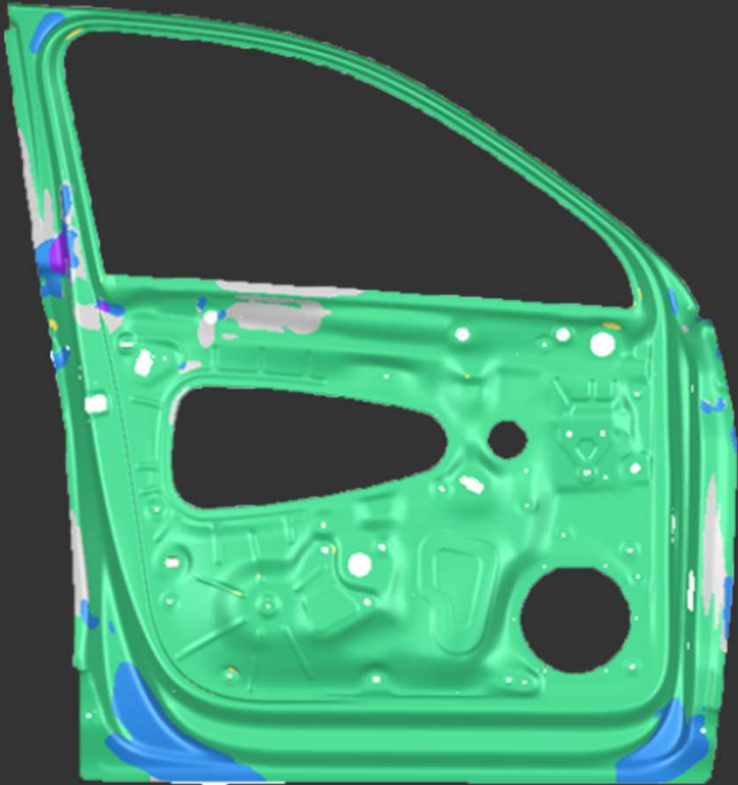
# Today's Agenda

## Alumobility

- Vision and Team
- Current Projects
- Planned Events

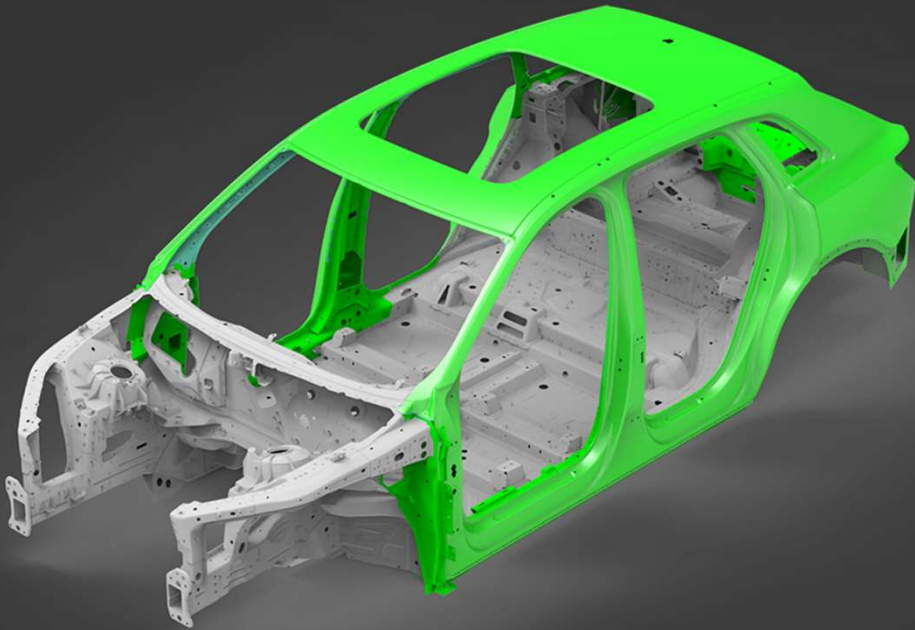


# Why Create Alumobility?



- Expedite industry knowledge related to aluminium auto body sheet (ABS)
- Match the pace of the auto industry disruption & advancement
- Respond to OEM challenges
- Address communications gaps relative to competing lightweight materials

# Alumobility Vision



- **A global ecosystem of the world's leading aluminium companies and downstream technology partners**
- **Committed to providing innovative solutions that drive value for OEMs and consumers**
- **Focused on weight saving, efficiency & sustainability**
- **Transparent and broad industry dissemination of results**

# What Alumobility is Not



**Alumobility and its members do not engage in joint**

- **R&D/IP rights creation**
- **OEM program development**
- **Standard-setting**
- **Commercialization activities**

## Alumobility is Complementary to Existing Associations

A technical centric consortium seeking broad downstream industry collaboration



### Existing Associations

- Regionally focused
- Lobbying and public policy
- Market development reports
- Fundamental technical manuals and training
- Aluminum industry support (e.g. market analysis)
- Members include primary companies & all AL forms

### Alumobility

- Globally focused
- Technical projects to address adoption hurdles
- Demonstrate to OEMs the latest technologies through design studies
- An ecosystem of partners offering specific areas of expertise to support aluminum ABS adoption
- Collaboration with innovative suppliers focused on the automotive industry

# Alumobility Leadership



## Led & Advised by



**Thomas Rudlaff**  
Managing Director



**Mark White**  
Technical Director

## Governed by Board of Directors



**Pierre Labat**  
President



**Jack Clark**  
Vice-President



**Lionel Gerber**  
Treasurer



**Mario Greco**  
Secretary

## Supported by



**Xavier Varone**  
Technical Committee Chairman



**Stacie Tong**  
Communications  
Committee Chairwoman

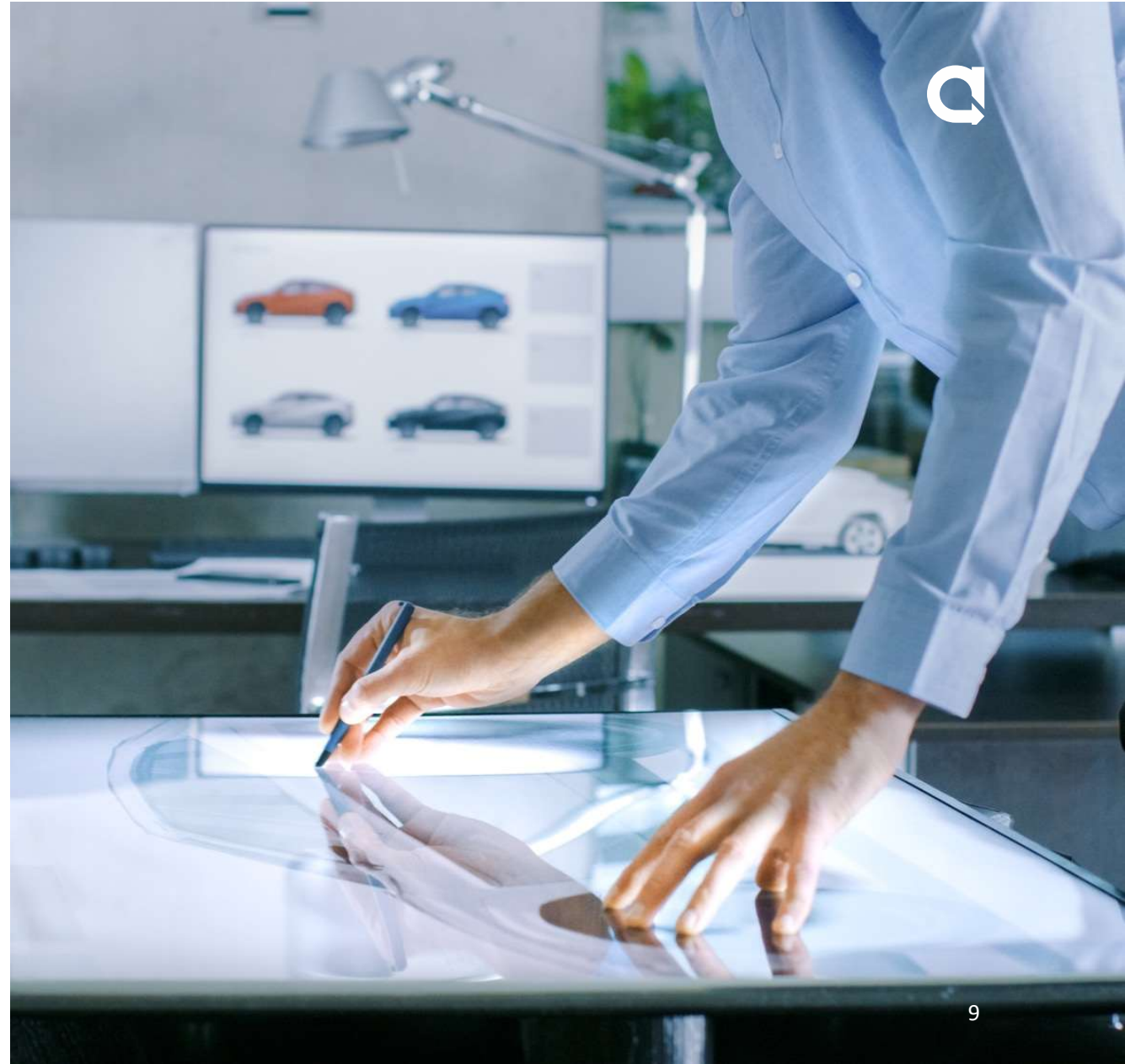
## External Antitrust Counsel

## Alumobility Projects: Case Studies

- Concern hypothetical production of vehicle parts made of aluminum
- Based on existing OEM platforms/concepts currently in steel
- Do not relate to future automotive platforms/concepts.

## Key Principles for All Projects:

- Target minimum 40% weight reduction
- Offer comparable attribute performance to reference design
- LCA studies to demonstrate the carbon benefit of AIV solutions
- Offer VIU studies using antitrust compliant inputs





# Alumobility Achievements to date



- Materialize Ecosystem with the on-boarding of Atlas Copco, Sika & ARO in 2021
- New Members will come soon
- Run & Promote active projects
  - Light weight Door study presented at AC Doors & Closure conference as well as specific Alumobility Webinars (June & July 2021)
  - Audi e-tron Top Hat benchmark study – introduced Euro Car Body 2021 conference
    - Also Presented to OEMs - Audi, Daimler, Ford, Hyundai.
  - Zoom in on e-tron B-Pillar presented at the Aachen FKA conference (sept 2021) & at specific Alumobility webinars (October & November 2021)
  - Joining Study presented at ACI Joining 2022 and Webinars
  - White Paper on scrap recycling





## Project Overview

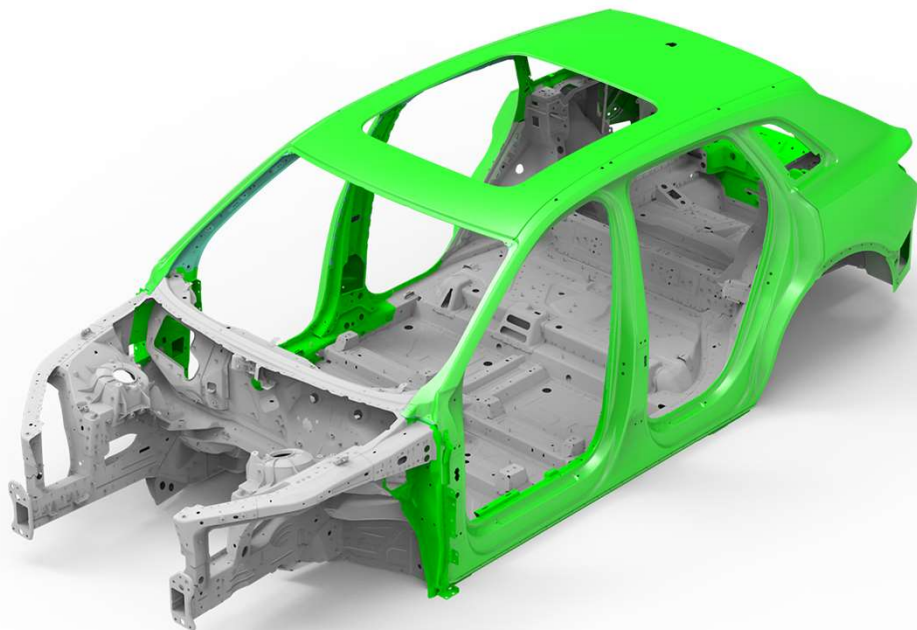
**Rational:** Midsize SUV door offers a high-volume steel opportunity that is produced globally.

**Results:** Achieved **~50% weight reduction** compared to steel incumbent at **~€3/kg saved**

**Communication:** Alumobility hosted Webinars (06/21) & Bad Nauheim Doors & Closures conference (11/21)

**Benefits:** Initiated Alumobility collaboration, OEM engagement, and the development of an antitrust compliant VIU model

**Follow Up Actions:** A high number of OEM technical review, including VW door development team



## Project Overview

**Rational:** Demonstrate Aluminum's ability to offer comparative performance to steel in crash critical components on a heavy BEV SUV

**Results:** Weight savings of 81kg (42%), part count reduction and competitive performance to steel

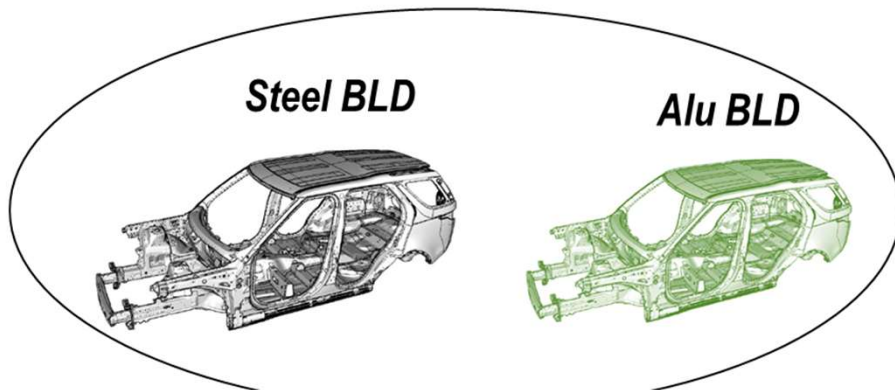
**Communication:** Direct Audi engagement (09/21) EuroCarBody conference (10/21), Aachen Conference (09/22) and Alumobility Webinars (2022)

**Benefits:** Engage new partners and provided the ability to present at the premier automotive conference

**Follow Up Actions:** Respond to OEM inquires, complete LCA, complete VIU, and present sub-component studies



## Construct Total Value in Use Models



BIW - Aluminum & Steel – same vehicle platform  
Joining technology - RSW, SPR & Adhesive bonding  
Production volume - Mid (150k/year) & High  
(350k/year)



## Project Overview

**Rational:** Develop an ecosystem of joining partners & update outdated assumptions negatively impacting AL

**Results:** Provide a total VIU (value in use) for high / low volume Aluminum intensive vs. Steel intensive body shops

**Communication:** AC Joining conference in US & EU (04/22 & 05/22), Aachen (09/22) & Alumobility Webinars in early 2022

**Benefits:** Foster the Alumobility partner network and address a perceived adoption hurdle for AL. Direct engagement with JLR's senior body team.

**Follow Up Actions:** Mixed materials studies & follow-up excitement generated from preliminary study

# Summary & Conclusions



- Compared to the **2006 data**, this study **validates a competitiveness in AIV BiW joining cost compared to Steel RSW.**

Study	RSW Steel	RSW Aluminum	SPR Aluminum
2006	<i>Not studied</i>	<i>Not Mainstream</i>	<i>400% RSW</i>
2022	<i>Studied</i>	<i>Mainstream</i>	<i>10-16% RSW</i>

- The study shows that some **AIV joining** scenarios are **similar or lower cost** than steel **RSW BiW joining**.
- With further **part integration** opportunities, **AIV body shop cost** can be **further reduced** relative to steel RSW.
- Aluminum **SPR body shops** use the **lowest amount of energy**.
  
- Influential factors:
  - For all assembly scenarios – Labor cost is the most influential
  - For SPR Scenarios – SPR unit cost > Structural adhesive cost > Rivet gun price > Energy cost
  - For AIV RSW scenarios – Structural adhesive cost > Weld gun price > Energy cost
  - For Steel RSW scenarios – Energy price > Weld gun price > Structural adhesive cost

# Last Mile Delivery Vehicle (LMDV)



## Project Overview

**Rational:** Show how AIV light-weighting benefits BEV LMDV by improving range, payload and durability & showcase what Alumobility is able to do for the industry

**Results:** Aluminum is more competitive than steel from a Total Cost of Ownership (TCO) perspective

**Communication:** Peer reviews with fleet operators, EuroCarBody (10/22) and Alumobility Webinars

**Benefits:** Promote aluminum as the material of choice for this specific growing market segment

**Follow Up Actions:** Presentations directly to OEMs (Ford & Arrival already booked)



*Alumobility White Paper:*

***ALL VEHICLES  
SHOULD BE MADE  
FROM ALUMINUM***

**In a nutshell...**

aluminum makes better vehicles because it's

more efficient:

weight comes direct as 2<sup>nd</sup> lever after aerodynamics for Car efficiency

better performing:

less weight always means better performance

safer:

Aluminum is better at durability, corrosion resistance, and energy absorption in a crash

more sustainable:

Aluminum is infinitely recyclable

most cost effective lightweight material in large scale production



## *Alumobility White Paper:*

### *Closing the Loop on Automotive Aluminum Scrap to Minimize Carbon Emissions*

#### **In a nutshell...**

Together, primary and scrap help meet the demand for aluminium while mitigating climate change.

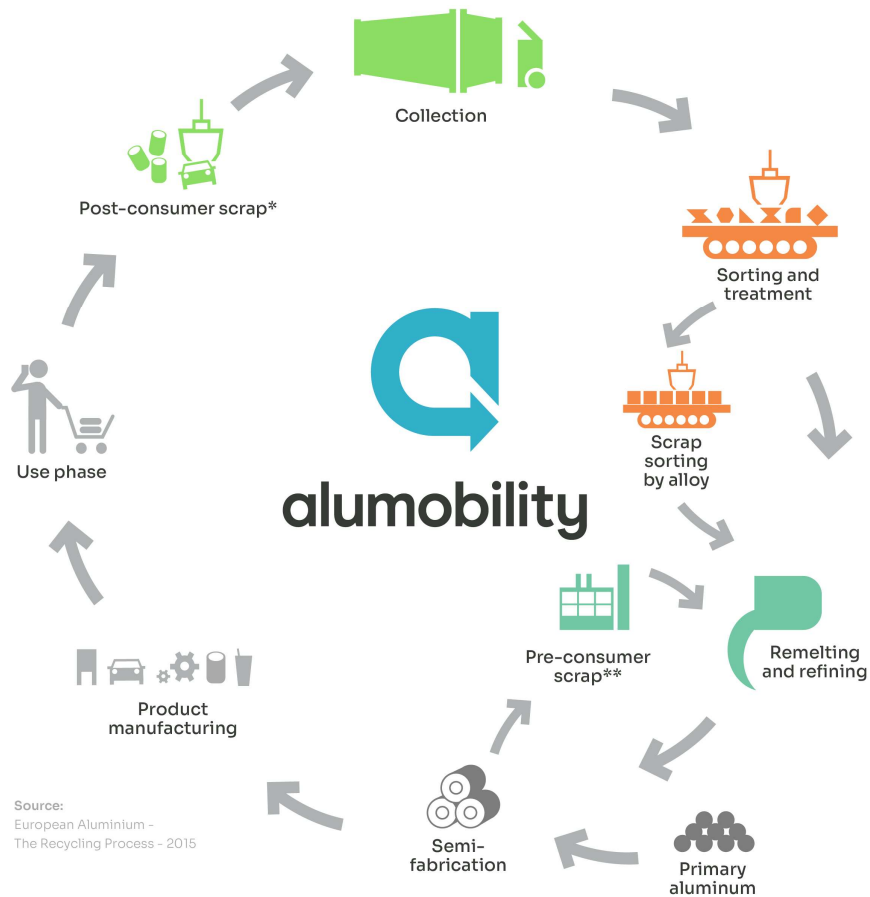
Scrap uses 95% less energy compared to primary and closed-loop scrap is immediately available.

Sorting and segregation of scrap are the low-hanging fruit for decarbonizing mobility.

OEMs, tiers, stampers, and scrap dealers are key to maximize the potential they have in hand today and to shape the circularity of tomorrow through their design & support.



# Closing the loop is key



Source:  
European Aluminium -  
The Recycling Process - 2015

- Big volumes owned by a few players: easy to collect and direct scrap
- By nature, the stamping process generates a large amount of scrap



Rectangular Sheet



Stamping Blank

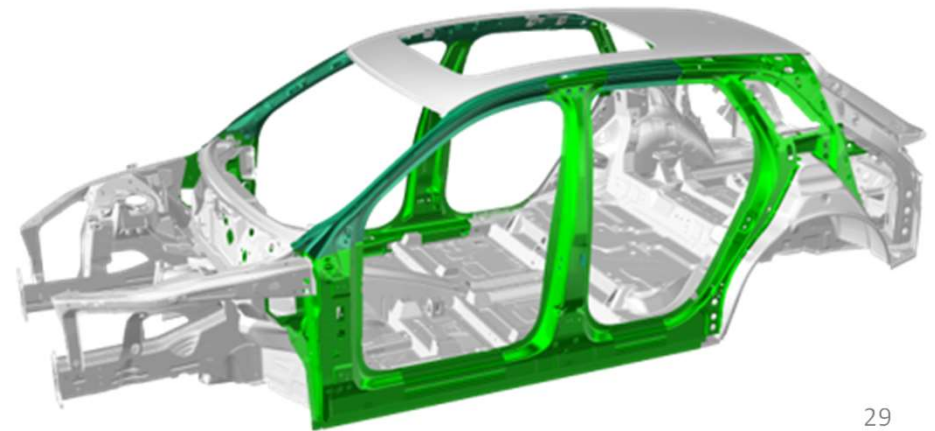


Finished Part

(1) Rectangular Sheet is produced from a coil, then (2) blanked into the part specific shape, finally (3) drawn & trimmed to the finished part



- Promote active projects
  - Promote Alumobility projects at the Aachen Body Engineering 09/2022 (half day session chair by T.Rudlaff/M.White)
  - Last Mile Delivery Vehicle design to demonstrate the benefits of light-weighting with Aluminum
    - Will be presented at EuroCarBody 10/2022
  - Presentation about Sustainability planned for ACI Sustainability Conference 11/2022
  - More Alumobility Webinars planned





## Create an LCA model to enable future industry communications

### Specific Sustainability focused communications – e.g.

- Counter steel's communication comparing high strength material to common aluminum alloys & using selective CO2 figures (e.g. lowest steel, highest AL).
- Communicate on the need to normalize steel and AL weights in LCA models (e.g. 1 ton of steel is replaced by 600kg of AL).
- Demonstrate the need to lightweight in EVs and dispute steel's claim of near zero CO2 generation in the use phase
- Decarbonization comparison considerations (e.g. green steel and hydrogen impact) – Comparing CO2 for AL and steel in the future.
- Apply LCA model to all future major Alumobility Projects.



## Compliance Statement

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Through technical studies and working in partnership with global automotive manufacturers, Alumobility will help further develop smarter, lighter, safer, and more sustainable vehicles. Alumobility and its members are committed to strict compliance with applicable antitrust laws. This is a reminder that Alumobility does not engage in any joint R&D regarding aluminum ABS products/production technology or related product development or any other R&D seeking intellectual property rights protection; standard setting activities, including future aluminum ABS products; joint commercialization or marketing activities of aluminum ABS products; cooperation of aluminum ABS suppliers on actual, ongoing or future bids for automotive platforms. These activities are the domain of individual member companies at their own discretion.