S&P Global
Mobility

AutoTechInsight Insights
Materials and Lightweighting
October 2024

From scrap to strength: Novelis Europe on vehicle lightweighting and sustainable solutions

09-Oct-2024 11:01 GMT

Matthew Beecham
S&P Global
Supply Chain and Technology, Automotive

Q&A with Novelis Europe

Source: Getty Images Plus/ PhonlamaiPhoto

As the automotive industry grapples with stringent emissions regulations and growing demand for sustainability, the use of aluminum in vehicle manufacturing has emerged as a pivotal trend. This lightweight metal, known for its strength and durability, is increasingly being adopted by automakers to reduce vehicle weight, thereby enhancing fuel efficiency and lowering carbon footprints.

Regulatory frameworks, particularly in Europe and North America, are driving manufacturers to rethink their material choices. The European Union's stringent emissions targets compel automakers to cut vehicle weight, as lighter vehicles consume less fuel and produce fewer emissions. Aluminum, which is approximately one-third the weight of steel, provides an effective solution. By substituting traditional materials with aluminum, manufacturers can achieve significant reductions in overall vehicle weight — often by as much as 50% in certain components.

However, the shift toward aluminum is not without challenges. The automotive supply chain must navigate the complexities of sourcing and processing this metal sustainably. While aluminum is infinitely recyclable, the industry faces hurdles in ensuring that recycled materials are effectively integrated into production. The need for high-quality recycled aluminum is paramount; thus, advancements in sorting technologies, such as Laser-Induced Breakdown Spectroscopy (LIBS) and X-ray Fluorescence (XRF), are becoming increasingly important to enhance recovery rates and material purity.

Sustainability is further emphasized by the growing consumer demand for environmentally friendly vehicles. Automakers are under pressure to not only reduce emissions during the vehicle's life cycle but also to ensure that their manufacturing processes are sustainable. The adoption of aluminum alloys with high recycled content is a response to this demand. These alloys allow manufacturers to maintain performance standards while minimizing reliance on primary aluminum, which is energy-intensive to produce.

Moreover, the automotive industry is witnessing a shift toward Uni-alloy™ designs, which simplify the recycling process by reducing the complexity of material combinations. While these designs present challenges in terms of existing production methodologies, they offer a streamlined approach to recycling that could significantly enhance the sustainability of aluminum use in vehicles.

As the influx of electric vehicles continues, particularly from emerging markets, the demand for aluminum is expected to rise. Battery boxes and lightweight structures are critical components in EV design, further solidifying aluminum’s position in the automotive landscape.

As regulatory pressures mount and sustainability becomes a core focus, the use of aluminum in vehicle manufacturing represents not just a trend, but a fundamental shift in how the industry approaches design and production. To learn more, we spoke to Michael Hahne, vice president of Automotive, Novelis Europe.

Novelis Europe operates as a key player in the automotive aluminum market, leveraging its advanced rolling and recycling facilities across the continent. As a subsidiary of Hindalco Industries Limited, Novelis is recognized as the world’s largest recycler of aluminum and a leading producer of flat-rolled aluminum products.

Key takeaways:

- The automotive industry faces considerable challenges in efficiently sorting aluminum scrap, particularly from end-of-life vehicles. Advanced technologies like laser-induced breakdown spectroscopy (LIBS) and X-ray fluorescence (XRF) are becoming vital for improving recovery rates and material purity.
- Existing production methodologies are hindering the promotion of Uni-alloy designs among original equipment manufacturers, Transitioning to these designs can streamline recycling processes but will require overcoming entrenched practices and tooling limitations.
- The push for lightweighting in vehicles necessitates high-recycled-content (HRC) alloys. Industry standards must adapt to ensure these materials can be used effectively without requiring substantial changes to existing manufacturing processes.
- Ensuring traceability and transparency in the aluminum supply chain is paramount for meeting sustainability goals. Compliance with standards like the Greenhouse Gas Protocol is increasingly important for automotive manufacturers to verify the sourcing of low-carbon materials.

The following is an edited transcript of the conversation.

S&P Global Mobility: What specific innovations in scrap sortation and segregation technologies has Novelis implemented to enhance aluminum recovery from end-of-life vehicles?

Michael Hahne: Novelis has implemented several innovations in scrap sortation and segregation technologies to enhance aluminum recovery from end-of-life vehicles. For pre-consumer scrap, Novelis focuses on educating customers about retrieving scrap from press shops to avoid downcycling and emphasizes the importance of separating materials by families. When separation at the source is not possible, technologies like LIBS and XRF are used to sort the mixed scrap efficiently.

For post-consumer scrap, Novelis employs an approach that involves dismantling aluminum-intensive parts before shredding and conducting dedicated shredding campaigns. This method improves the recovery and purity of the aluminum fractions. Even with separate shredding, further sorting is required to remove contaminants like steel rivets, adhesives, and different aluminum

families. This process enables the use of cleaner scrap in higher proportions in future aluminum products, reducing reliance on primary metal and lowering the CO2 footprint.

How do you foresee the role of AI and optical identification technologies evolving in the sorting of aluminum scrap, and what impact do you expect these advancements to have on recycling processes?

The combination of optical identification and AI is already being used to separate objects with different morphologies or colours and is highly effective for sorting different categories of aluminum alloys based on their applications. For example, shredded aluminum from castings, extrusions, and sheets, which have distinct morphologies, can be separated with high throughput. However, for separation into specific families by chemical composition, technologies like LIBS or XRF are still necessary. Ultimately, these methods are complementary in the recycling process.

Can you elaborate on the challenges you face in promoting Uni-alloy designs among OEMs, and how do these designs contribute to more effective recycling?

One of the key challenges in promoting Uni-alloy designs among OEMs lies in overcoming the limitations of existing production methodologies and tools that are already in place. Implementing Uni-alloy designs often requires running changes to adapt these established processes. However, for new concepts, there is much greater design freedom, which opens the door to the adoption of new high-recycled-content (HRC) products that are already qualified for use.

Uni-alloy designs contribute to more effective recycling by simplifying the supply chain across the entire product life cycle. They also reduce complexity in both pre- and post-consumer recycling, making the process more streamlined and efficient.

What specific advancements have been made at Novelis to enhance the quality and performance of secondary aluminum alloys for automotive lightweighting?

Novelis has made significant advancements in enhancing the quality and performance of secondary aluminum alloys for automotive lightweighting through two key areas: Recycling material sourcing and process innovation within production steps. By focusing on material sourcing, including the automotive circularity platform (ACP) ecosystem approach via a consortium, Novelis ensures a reliable and sustainable supply of high-quality recycled materials. Additionally, innovations in the production process have contributed to improving the performance of secondary aluminum alloys, making them more suitable for automotive lightweighting applications.

Can you discuss the advanced manufacturing techniques and specific aluminum alloys that your company recommends for lightweighting in automotive applications?

Novelis recommends the e170RC alloy for lightweighting in automotive applications, particularly because it covers most of the outer skin applications, which represent a significant share of a vehicle's components. One of the key advantages of high-recycled content alloys like e170RC is that they can be used in existing applications without requiring any adjustments to tools or modifications to process parameters. Additionally, these alloys maintain the same recovery rates and are fully compatible with existing manufacturing processes, meaning there is no impact on the customer's process window, and they are ready for industrialization.

How does Novelis ensure traceability and transparency in its supply chain for low-carbon aluminum products, and why is this important for automotive manufacturers?

Novelis ensures traceability and transparency in its supply chain for low-carbon aluminum products by conforming with the publicly available Greenhouse Gas Protocol for Product Life Cycle Accounting and Reporting Standard, as issued by WRI/WBCSD, and based on principles of LCA (ISO 14040/44) and product carbon footprint assessment (ISO 14067). The conformity is certified by a third-party auditor. This is crucial for automotive manufacturers as it ensures the use of sustainably sourced, low-carbon materials, helping them meet environmental and regulatory requirements.

What strategies does Novelis have in place to collaborate with OEMs on optimizing product design for weight reduction while complying with safety standards?

Novelis collaborates with OEMs on optimizing product design for weight reduction through its Customer Solution Center, which uses aluminum-specific designs based on customer data via CAD/CAE. Additionally, lighthouse projects focused on these innovations are already being industrialized, ensuring compliance with safety standards while reducing weight.

What challenges do manufacturers face when transitioning from traditional materials to aluminum for lightweighting, and how can Novelis assist in overcoming these challenges?

Manufacturers face no non-manageable challenges from a design or process perspective when transitioning to aluminum for lightweighting. The main challenge lies in adopting a total cost of ownership (TCO) approach with full transparency, which, when embraced, results in a win-win situation for both parties. The TCO approach involves evaluating the total costs associated with acquiring, operating, and maintaining a product over its entire life cycle, rather than focusing solely on the initial purchase price. This method allows businesses to assess long-term value, considering factors such as energy efficiency, maintenance, and disposal, enabling more informed decisions.

How do you foresee the influx of Chinese electric vehicles impacting aluminum demand among European automakers, and what strategies is Novelis implementing to address this?

The influx of Chinese electric vehicles is expected to increase aluminum demand, particularly for battery boxes, with a preference for local sourcing. To remain competitive, European automakers will need to drive innovation, which aligns with Novelis' agenda of supporting advanced, high-quality aluminum solutions.

What implications does the EU's anti-subsidy probe on Chinese electric vehicles have for the European aluminum market and Novelis' operations?

The EU has concluded an investigation into whether the Chinese unfairly subsidize their EV industry. Novelis opposes unfair trade practices. We are confident that the EU has done a thorough and fair investigation, and we respect the outcome.

CONTACTS

The Americas
+1 877 863 1306

Europe, Middle East & Africa
+44 20 7176 1234

Asia-Pacific
+852 2533 3565

www.spglobal.com/mobility