

# Aluminum Supply Chain for the Automotive Extrusion Market

## Responding to Consumer Demand

By Mark Butterfield, Metal Exchange Corporation

*Editor's Note: This is the second in a series of six articles in which the author will explore opportunities for the aluminum extrusion industry in the automotive market. The series will specifically address the supply chain, raw material supply, extrusion, fabrication, and assembly.*

### Growing Automotive Demand

Looking through 2023 and beyond, the automotive, heavy-truck, and truck-trailer industries appear to have strong sustainable momentum. In fact, by the end of this decade, the combined demand for aluminum extrusions from these industries is set to surpass that of the building and construction industry. In the last decade alone, the use of extruded shapes in vehicles has more than doubled to a utilization of 50 lbs or more per vehicle in 2022. At the same time, the aluminum extrusion industry has seen automotive original equipment manufacturers (OEMs) overwhelmingly committed to transitioning to electric vehicle platforms.

According to Ducker Carlisle, over \$46 billion is being invested in zero-emission vehicle (ZEV) technologies, such as plug-in hybrid electric vehicles (PHEV), battery electric vehicles (BEV), and fuel cell electric vehicles (FCEV). That's in addition to \$7.5 billion being invested in electric vehicle charging infrastructure. As a result of this shift by OEMs, by 2027, overall extrusion demand could grow by 70%, with total extruded components and assemblies growth expected to reach 528 million lbs.

In the period between 2015 and 2021, the U.S. extrusion industry brought 21 non-automotive presses and 21 automotive presses online (representing just under 500 million lbs of capacity) across the U.S. and Canada (Figure 1). This was primarily focused on the 8–10 inch press size range.

Looking ahead to the period between 2022 through 2024, the industry already expects approximately 8-10 new presses (or around 250 million lbs of capacity) slated specifically for automotive, primarily in the 10 inch range. Non-automotive growth in the same time period is expected to reach 28 presses (or 770 million lbs).

The extrusion industry recognizes the opportunity created by this increased demand across both the automotive and non-automotive sectors and is responding with nearly 1 billion lbs of extrusion capacity. This is quite impressive when one considers an advanced press line alone can cost \$12–20 million—excluding building and infrastructure costs and depending on its size, technical capabilities, and end use.

With this continued shift to automotive and the associated fast-growing demand, raw material supply has become a critical issue. In particular, three major industry stakeholders are driving the conversation on this—metal suppliers, extruders, and Tier 1 OEM customers. All three



Figure 1. A new 6,500, 12 inch automotive extrusion press line was installed at Pennex in 2016.



Figure 2. In 2023, industry stake holders are driven by three main concerns regarding raw material supply.

wish to ensure stable industry capacity in the short term, as well as working to achieve long term sustainability objectives and developing new innovative alloys capable of meeting the performance demands of an evolving market with new applications (Figure 2).

Beyond industry concerns and economics, geopolitical events have played a large role in the supply and demand for billet, causing OEMs to question market supply and volatility. Recent geopolitical events from the last few years include:

- 2020-2021: The global COVID-19 pandemic ground demand to a screeching halt, followed by booming pent-up demand. Continued production disruptions quickly swung the market into a supply deficit and billet premiums increased to above \$0.30/lb.

- 2022: Post-pandemic challenges surrounding the recovering supply chain resulted in longer lead times, with reflecting price points. Quantitative tightening increased the cost to carry inventory, motivating manufacturers to reduce stocks. While the easing of supply chains have led to normalized billet premiums.

- 2023: Continued interest rate hikes are reducing extrusion demand in many sectors resulting in billet premiums falling below the cost to produce.

## Expansions in Secondary Billet Production

Today's raw material supply can be broken down according to its material source, with 53% representing secondary billet and 47% being supported by primary. Once opposed by OEMs, the use of recycled content in automotive applications is now in demand. Since 2013, greater than a dozen companies have invested in excess of \$1 billion to increase secondary billet capacity in the U.S. by nearly 2.5 billion lbs (Table I). More than half of this increase in capacity has come from companies with no downstream extrusion operations. Greater than 40% of this investment has occurred in the last two years as a response to increased demand, as well as the need for new technologies to produce aluminum in a more sustainable and scalable way (Figure 3).

Year	Company	Location	Capacity
2013	Pennex	PA	110,000,000
2015	Aluminum Shapes*	NJ	150,000,000
2016	Matalco	OH	350,000,000
2018	SCM	VA	100,000,000
2019	Ellwood	OH	150,000,000
2019	Matalco	WI	250,000,000
2020	ABC	MX	160,000,000
2021	SCM	VA	150,000,000
2021	Vista	GA	40,000,000
2022	Hydro	MI	265,000,000
2022	Hydro	PA	114,000,000
2022	Vista	GA	30,000,000
2022	ABC	MX	160,000,000
2023	Matalco	KY	275,000,000
2023	Western	TX	140,000,000
			2,444,000,000

\* Now Operated by Western

Table I. U.S. and Canadian investments in secondary aluminum billet capacity (2013–2023).



Figure 3. Pennex is among the many aluminum companies that have expanded secondary aluminum billet casting capacity.

One key finding of the Aluminum Extruder Council's (AEC's) recently updated Environmental Product Declarations (EPDs), which cover over 100 presses and almost 40% of the North American extrusion output, is that the extrusion process itself only accounts for a quarter of the embodied carbon in an extrusion profile (the remainder being from the raw material). There are two ways this data can be leveraged by extruders to obtain more sustainable billet.

First is the value of increasing the recycled content of the billet. The EPD showed that in 2020-21, on average participants used 47% primary metal and 53% recycled

content. The AEC commissioned a sensitivity analysis that shows increasing recycled content to 70% reduces the global warming potential (GWP) by 23%. New processes and technologies continue to maximize the capabilities of secondary billet. An example of this is Hydro CIRCAL, which is a recycled product made from an unusually high percentage of post-consumer scrap inputs of at least 75%.

The second is to examine the source of the prime and the nature of the power used in the smelting process. For example, the sensitivity analysis shows that, in Canada where hydropower is used, an 18% reduction in GWP is achieved. Conversely, with the average prime aluminum coming from China, where coal-fired electricity is common, the GWP increases roughly 65%.

## Imports of Primary Aluminum Billet

Due to its access to vast amounts of sustainable hydro-electric power and close proximity, Canada is by far the largest supplier of aluminum to the U.S. In fact, Canada has played a major part in filling the gap in domestic U.S. production. However, the country faces steep competition in regards to the value-added products (VAP) market, particularly from suppliers such as Emirates Global Aluminium (EGA) in United Arab Emirates, Rusal in Russia, Vedanta in India, Qatalum in Qatar (part of Hydro), and Aluminium Bahrain (Alba) in Bahrain (Figure 4). Regardless of the geopolitical pressures, the import market will continue to navigate the increased demand within the U.S., providing OEMs with a higher level of confidence in the overall supply of raw material to U.S. extruders.

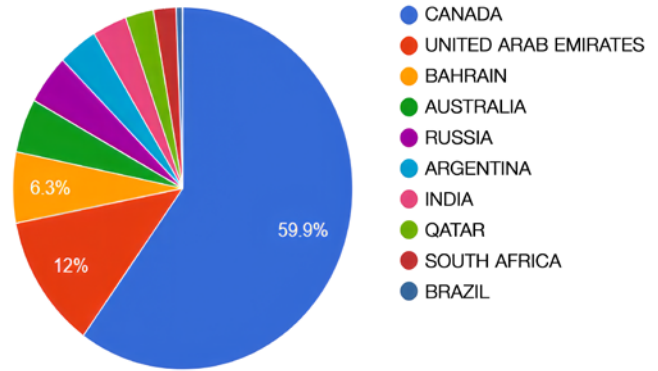


Figure 4. Top countries importing aluminum billet into the U.S. (Source: Datamyne.)

## Sustainability Matters

Sustainability has been a focus of the aluminum extrusion industry for a while, particularly in the building and construction market, where reduction in embodied carbon is a high priority. Today, that focus on sustainability is expanding to many markets. Governments, OEMs, consumers, and investors have all made their message clear, and as an industry, aluminum extruders are responding. Along with implementing environmentally friendly equipment and practices within their facilities, extruders must also investigate their supply chains to understand their overall impact on the environment. If processes or energy generation is harmful, then a published plan for gap closure is expected.

As recently as five years ago, it was incomprehensible for an aluminum producer to "contaminate" their virgin metal with recycled materials. Today, billet producers face pressure to do just that, mixing scrap metal into their prime metal to reduce the level by which their processes

contaminate the environment. The shift from primary to secondary production of aluminum started decades ago, when many domestic primary aluminum smelters began closing their doors. As a result, billet production in the U.S. has seen a trend toward the use of secondary aluminum that is very similar to the data shown in Figure 5.

In addition to including recycling in their production, big-name aluminum producers are developing low-carbon products, based on different emission-reduction technologies and strategies. For example, ELYSIS, a company developed by Alcoa and Rio Tinto, has developed an inert anode technology that generates O<sub>2</sub> instead of CO<sub>2</sub>e during the smelting process. In addition, EGA has introduced CelestiAl, a primary product that uses solar energy as its power source for the production of aluminum, and Century Aluminum has introduced Natur-AL, a primary product that uses thermal energy naturally produced in Iceland as its power source for its smelting process.

### Conclusion

Automotive demand continues to increase with a market electrified by the trend towards EVs. As an industry, aluminum extruders are responding with increased capacity and new technologies across the entire value stream. This begins with the use of raw materials that align with

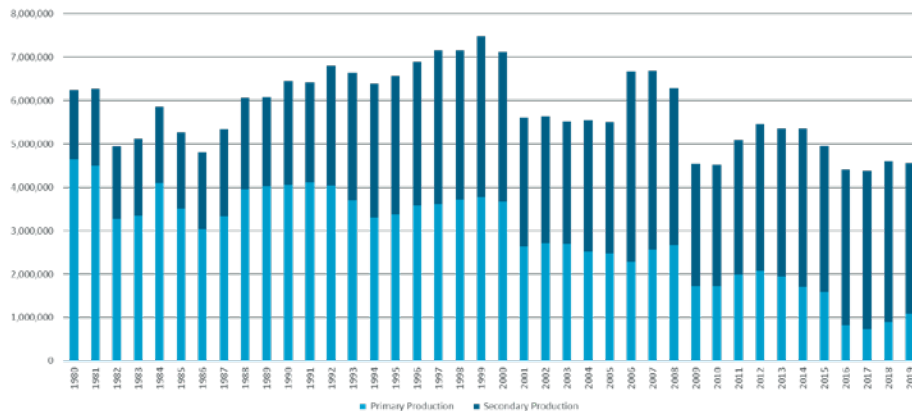


Figure 5. The amount of secondary aluminum has been increasing over the last several decades, compared to prime aluminum. (Source: U.S. Geological Survey.)

the unique needs and expectations of the market, while also aligning to the specific needs of end user's sustainability objectives. The automotive market will respond positively to the security of a stable growing supply chain in the U.S., reinforcing aluminum's position as the material of choice and extrusion as the preferred process. ■

*With more than 30 years of experience in the aluminum extrusion industry, **Mark Butterfield** is currently president of Manufacturing at Metal Exchange Corporation, which includes the Pennex and Electro Cycle brands. An established industry leader, he also serves the Aluminum Extruders Council (AEC) in multiple positions, including vice chairman of the board of directors, chairman of the Automotive Committee, and vice chairman of Extrusion Technology 2024.*