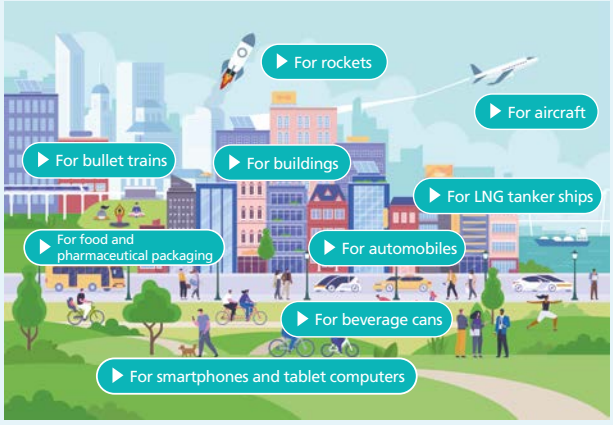
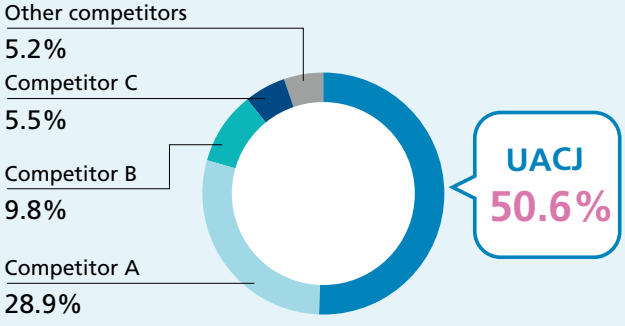
Advances in Business

Boosting production capacity of world-leading businesses to capture robust demand for aluminum products

Aluminum is essential for a broad range of applications across society thanks to its many beneficial properties, including its high strength, light weight, and excellent resistance to corrosion. The UACJ Group has boosted production capacity to meet growing demand for these applications, and, as a result, is now operating world-leading businesses. In Japan, UACJ accounts for 50.6% of total production capacity of flat-rolled aluminum. Globally, the Group is making the most of its expanded capacity to supply this product to over 600 customers. It also supports people's lives around the world by producing aluminum products and components for everything from beverage cans, buildings, and food and pharmaceutical packaging to automobiles, bullet trains, and smartphones and tablet computers. With an international supply network, diverse precision-machining capabilities, and advanced product development expertise, the UACJ Group is attracting attention as a leading player in the global aluminum products industry.



Comparison of flat-rolled aluminum production capacity in Japan (as of March 31, 2023)



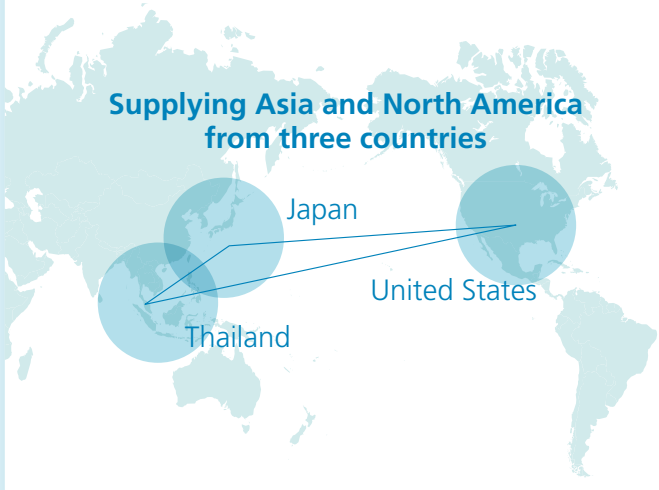
Source: *Alutopia magazine*, Kallos Publishing Co., Ltd., September 2023.

Spotlight on advances

01

Ability to flexibly respond to market conditions through a three-country manufacturing network

To meet robust global demand for aluminum products, the UACJ Group has established a world-leading supply network with production capacity exceeding 1.4 million tons annually. Based in three countries—Japan, the United States, and Thailand—four manufacturing facilities boast over 300 thousand tons of capacity, respectively, enabling the Group to flexibly respond to market conditions. For example, in response to requests for more output from customers in North America, where the aluminum can stock market continues to expand, the Group's facilities in Japan and Thailand have been supplying additional can stock while capital investment proceeds in the United States. This ability to ensure a stable supply provides a solid foundation for attracting customers worldwide.



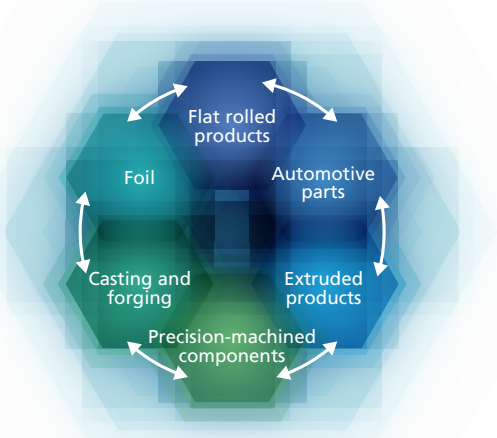
Spotlight on advances

02

Businesses collaborate to create an automotive parts business and enhance diverse precision machining capabilities

UACJ was established through the merger of two companies, and has since expanded its businesses by integrating the precision-machining capabilities of each of those predecessors. In that process, its extruded products and precision-machined components businesses collaborated to create the Group's automotive parts business. This new business is helping the automotive industry reduce CO_2 emissions by making full use of the Company's diverse precision-machining capabilities to develop parts and components that contribute to reducing vehicle weight, such as aluminum bumpers.

In 2016, UACJ bolstered the ability of its automotive parts business to provide machining solutions by acquiring Whitehall Industries Inc. (now UACJ Automotive Whitehall Industries, Inc.), a U.S.-based company with exceptional machining technologies. The Group has been working to further enhance its precision-machining capabilities by combining these technologies with the technological expertise and know-how it has accumulated in Japan.

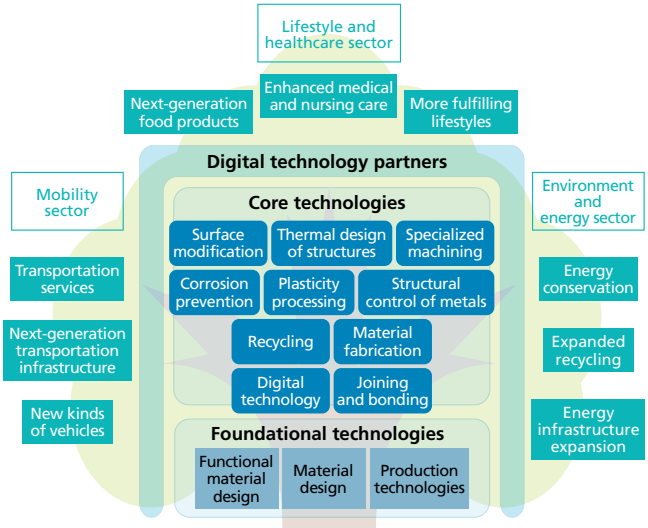


Spotlight on advances

03

Accelerating the pace of product development with a wider network of joint-development partners

UACJ has provided a wide range of solutions to society by integrating its long-established foundational and core technologies to make the most of aluminum's potential. To help devise even more solutions for challenges confronting people today amid major changes happening around the world, the Company is aiming to accelerate the pace of its product development by expanding its network of joint-development partners. UACJ is keen on jointly creating new services with partners that possess advanced digital technologies, particularly in three sectors—mobility, lifestyle and healthcare, and environment and energy—which it has specified to focus on this decade in its long-term roadmap, UACJ Vision 2030.



Benefits of aluminum

• Light weight • Strong • Resists corrosion • Unaffected by magnetism
• Good electrical conductivity • Good heat transmission
• Strong resistance to low temperatures • Non-toxic • Reflects light and heat
• Excellent surface processibility • Easy to cast • Easy to process
• Easy to combine • Useful for vacuum applications • Easy to recycle

North American can stock market

Further boosting production capacity to continue capturing rising market demand

Amid growing awareness of environmental protection In North America, consumers are increasingly considering sustainability when choosing products, and a growing number of them prefer beverage containers made of aluminum rather than other materials, such as plastic. Consequently, market demand for aluminum can stock has been rising. At present, about 80% of newly released beverage products in the United States are sold in aluminum cans. These products vary widely, from energy drinks to alcoholic drinks like hard seltzers, and demand for them is projected to grow in the future.

To meet this consumer demand for aluminum cans, UACJ has carried out two phases of capital investment in Tri-Arrows Aluminum Inc., its U.S.-based subsidiary, boosting annual production capacity to 450 thousand tons. Contracts to supply can stock have been concluded with customers effective through 2025, ensuring that production facilities operate at full capacity.

Historical highlights

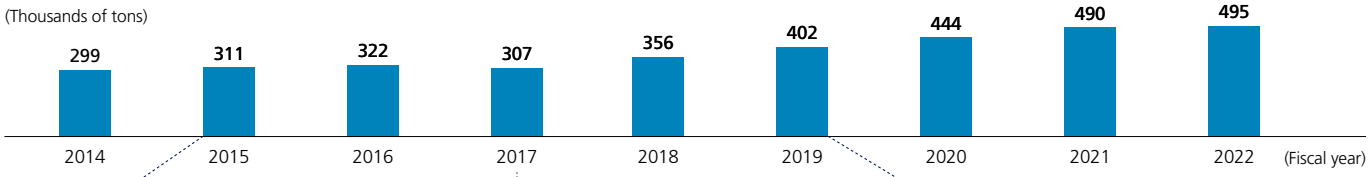
2013
- Tri-Arrows Aluminum becomes a consolidated subsidiary following UACJ's establishment

2015
- Production capacity of casting and hot rolling equipment increased

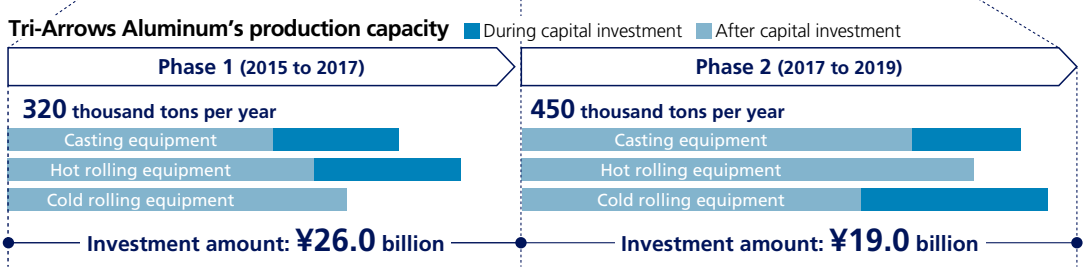
2017
- Production capacity of cold rolling equipment increased, and capacity of casting equipment boosted with the addition of a recycling furnace

2022
- Decision made to further increase production capacity

Tri-Arrows Aluminum's sales volume



Tri-Arrows Aluminum's production capacity



Jonathan Butcher
Vice President (Commercial)
Tri-Arrows Aluminum Inc.

Leveraging world-leading production capacity and productivity to tap growing demand for aluminum cans—an eco-friendly premium package

In North America, aluminum cans are regarded as a premium package from the perspective of environmental protection. The can stock market has continued to expand, with single-digit growth rates seen between 2021 and 2022. Backed by such market data, major can manufacturers have invested in new production lines and factories, and new players have entered the market. We also boosted our production capacity, but given the market environment, we have decided to invest in even more capacity in order to capture robust demand.

Plans for investing in greater production capacity to capture rising demand as tight market conditions continue

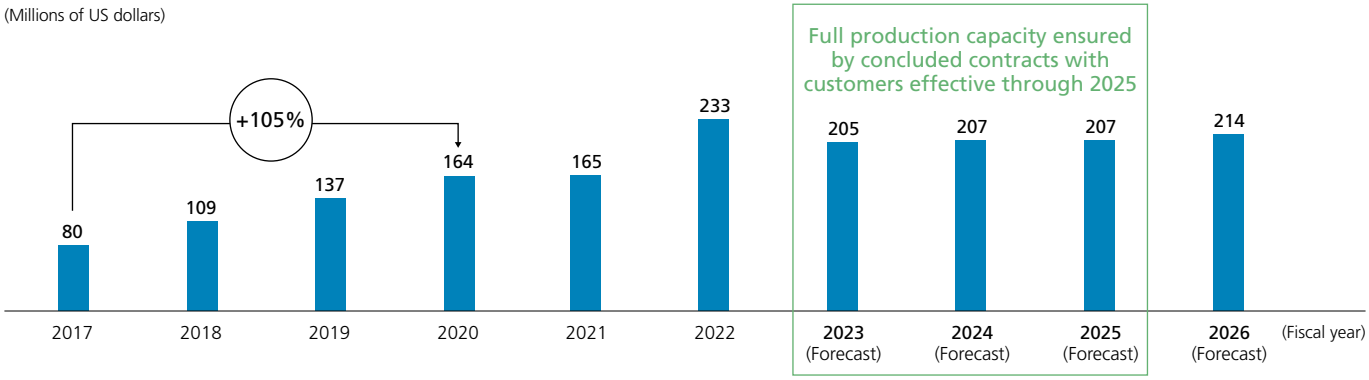
Business conditions

Market opportunities	Tri-Arrows Aluminum's competitive advantages	Challenges and tasks
• Demand for can stock increasing at a rate of 3% annually • Shift away from plastic is driving up demand for can stock • Rapidly growing market offers potential for pricing power and wider product applications	• Operating highly productive factories • Long-term relationships with can manufacturers and brands • Very cost competitive due to world-leading productivity • Rapidly progressing sustainability management driven by the application of scrap recycling technologies	• Expand sources of raw materials • Step up cooperation with UACJ (Thailand) and the Group's companies in Japan • Increase production capacity through strategic investments

Aluminum can stock demand in the North American market has been rising substantially and is projected to grow by about 3% annually through to 2030. North American can manufacturers have been investing in higher production capacity, but overall supply is not expected to catch up with the rising demand until around 2030.

Aiming to tap this demand, Tri-Arrows Aluminum is planning to invest in greater production capacity over the medium and long terms. It will begin by expanding hot rolling equipment to eliminate production bottlenecks, which would increase productivity by about 13%. The company is also examining how to continue improving cold rolling operations and expand its recycling system to reuse more scrap aluminum.

Tri-Arrows Aluminum's EBITDA results and targets



Recent highlights

ASI Performance Standard certification acquired in November 2022

Tri-Arrows Aluminum acquired Performance Standard certification from the Aluminium Stewardship Initiative (ASI) in November 2022. This certification provides a means for demonstrating how the company addresses sustainability issues at the consistently high level expected by its customers, which include globally operating can manufacturers and beverage brand owners. The ASI certification also enables the company to report on its performance based on objective indicators, including its ESG performance and wide-ranging initiatives for making the aluminum can stock supply chain more sustainable. Tri-Arrows Aluminum has been using the certification as an opportunity for building trust with customers and expanding its business.

Asian market

Production capacity expanded to supply products globally, particularly to the Asian market where demand is projected to grow

To capture growing market demand for aluminum products in Asia, UACJ has carried out three phases of capital investment in UACJ (Thailand) Co., Ltd. As a result, this subsidiary has become a world-class supplier with annual production capacity of 320 thousand tons. Moreover, its production plant, Rayong Works, became Southeast Asia's only facility capable of integrated flat-rolled aluminum production, encompassing all processes from casting and hot and cold rolling to finishing, after the first two phases of investment were completed in 2015. Production capacity was then expanded during the third phase of capital investment up to 2019. To start up Rayong Works, UACJ sent highly skilled technical staff from Japan to train local employees on the operations of newly installed large-scale machinery as well as equipment moved from Nikko Works in Japan. Local employees in Thailand now handle all operations and some are being trained for management positions.

Historical highlights

2012
- Commenced construction of Rayong Works

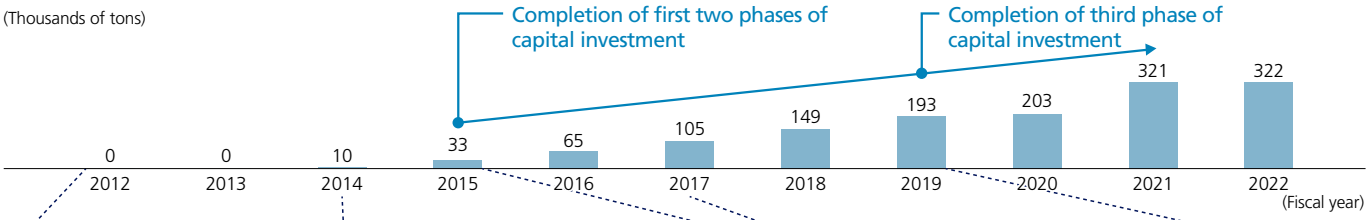
2014
- Commenced operations spanning from cold rolling to surface finishing and coating

2015
- Commenced integrated production with the installation of casting and hot rolling equipment

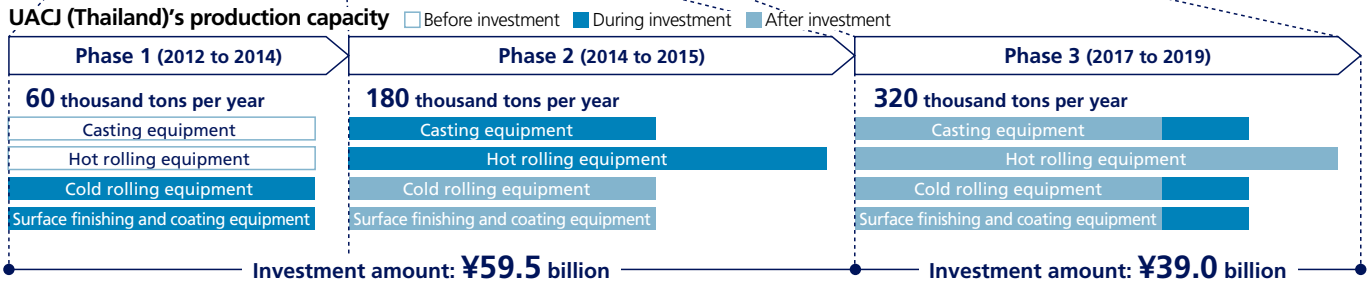
2020
- Joined an initiative to create a recycling program in Southeast Asia

2022
- Began generating electricity from solar power system at Rayong Works

UACJ (Thailand)'s sales volume



UACJ (Thailand)'s production capacity



Teerapun Pimtong
General Manager
Sales & Marketing Department
(domestic can stock)
UACJ (Thailand) Co., Ltd.

Aiming to develop businesses that contribute to society while continuing to grow as one of Southeast Asia's largest flat-rolled aluminum manufacturers

Looking back on the past 10 years, we faced many challenges when starting up Rayong Works, such as constructing facilities, installing machinery, increasing the number of employees, and implementing training programs, but operations began without any serious issues thanks to the cooperation of all employees. UACJ (Thailand) grew very quickly in just six years. The company is now one of the largest flat-rolled aluminum manufacturers in Southeast Asia, and its share of the domestic can stock market is over 50%. I am happy to have played a part in this growth, and I hope the company will continue growing while developing businesses that contribute to society, especially by creating a circular economy through used can recycling.

Aiming to grow and attract customers globally by leveraging production capacity and excellent transport access

Business conditions

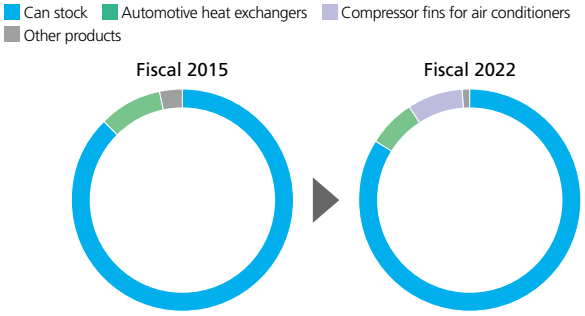
Market opportunities	UACJ (Thailand)'s competitive advantages	Challenges and tasks
• Steeply rising demand in the Asia-Pacific region backed by economic growth • Increasing exports to countries shifting away from plastic containers	• Operating Southeast Asia's only state-of-the-art aluminum rolling mill • Excellent access to other Asian countries where demand is projected to grow • Solid relations with beverage can manufacturers from Japan and other countries	• Increase production capacity beyond 320 thousand tons • Continue securing and training local workers to independently operate manufacturing facilities • Boost earnings by cutting costs and diversifying products, sales regions, and customers • Strengthen ties with international customers • Deploy recycling technologies and establish recycling systems

Demand for products manufactured by UACJ (Thailand) is projected to grow in Asia on the back of the region's economic growth. Specifically, demand for aluminum compressor fins for air conditioners is forecast to increase steadily against the backdrop of climate change and population growth. Demand for automotive heat exchangers is expected to remain on par with growth in recent years. Likewise, demand for aluminum can stock is projected to continue rising, and UACJ (Thailand) will supply this product not only in Asia but also to the North American market (although in declining amounts as supply conditions improve in the United States).

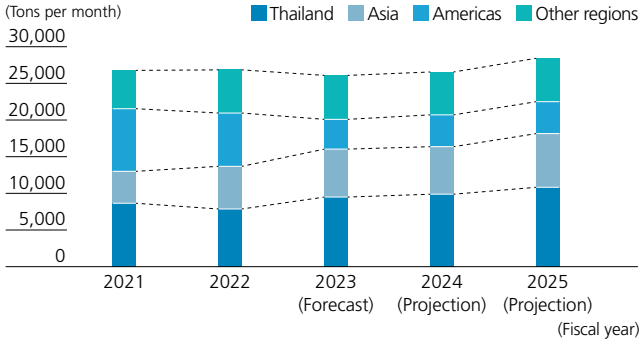
One of UACJ (Thailand)'s competitive advantage is its direct access to ASEAN markets, where demand for aluminum products has been brisk. Moreover, in response to growing interest among customers in addressing environment issues, the company is taking advantage of its location to procure recycled materials within Thailand and from other ASEAN countries.

UACJ (Thailand)'s annual production capacity is expected to reach 340 thousand tons by March 2024. In the future, the company will work to raise its earnings capacity, upgrade Rayong Works to a digitized production facility, and have it entirely managed by local personnel.

Breakdown of products manufactured by UACJ (Thailand)



Breakdown of UACJ (Thailand)'s sales volume by region



Recent highlights

One of the world's largest rooftop solar power systems installed at Rayong Works

In September 2022, UACJ (Thailand) began generating electricity from a solar power system installed on the rooftop of Rayong Works. With about 40,000 solar panels, the system can generate around 25 gigawatt-hours of electricity per year, making it one of the world's largest rooftop systems. This is expected to reduce the production plant's CO_2 emissions by about 14 thousand tons annually. While the amount of electricity generated has generally been in line with original estimates since power generation commenced, the company is planning to add more panels to boost output by another 2 megawatt-hours per year.

Japanese market

Adapting to the changing market by optimizing production for more earning power

The Japanese market has been changing as the country's population declines. In response, UACJ closed a factory and transferred manufacturing equipment between its other factories in an effort to optimize its production network for generating earnings. After launching structural reforms in 2019, the Company succeeded in reducing fixed costs, raising productivity, and improving profitability. In the flat rolled products business, for example, the higher productivity of the Company's domestic operations was a key factor for its fiscal 2023 forecast of ¥32.5 billion in consolidated ordinary income (before the effect of the metal price lag).

Historical highlights

2014
- Started reorganizing the product mix at production facilities

2020
- Centralized production of thick plates at Fukaya Works as part of structural reforms
- Began operating automotive body panel finishing lines at Fukui Works

2021
- Closed Nikko Works as part of structural reforms

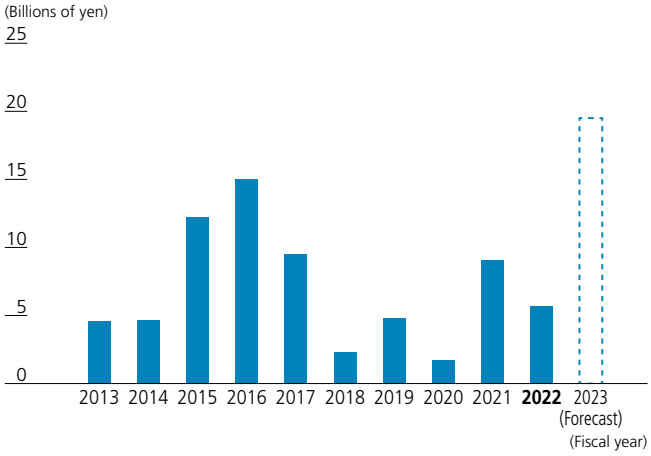
2022
- Completed the transfer of production equipment to Nagoya Works from other factories

Breakdown of products and number of employees by factory

Can stock, Foil stock, Automotive body panels, Automotive heat exchangers, Air conditioner compressor fins, Printing plates, IT device materials, Thick plates, Other products

		Nagoya Works	Fukui Works	Fukaya Works
As of March 31, 2015	Product type			
	Employees	1,343	477	452
As of March 31, 2023	Product type			
	Employees	1,550	753	395

Ordinary income (before the effect of the metal price lag) from the domestic flat rolled products business



Minoru Okajima
Vice Senior General Manager, General Manager of Production Department Nagoya Works Flat Rolled Products Division

All factories collaborated to reorganize product manufacturing, and we will leverage the unique advantages of each one to drive steady growth

Over the past 10 years, we shifted product manufacturing between our three production facilities, making each one unique and highly productive. Nagoya Works has become an all-round factory that handles a variety of products and makes new ones with a spirit of challenge. Fukaya Works has continued to evolve as a factory specializing in thick plate production. Fukui Works primarily manufactures can stock, but all of its members joined hands to start up automotive body panel finishing lines and commence mass production in a short period of time with assistance from the Company's sales and R&D departments as well as the other two factories. We will work to leverage this product manufacturing structure to produce results and drive growth in the future.

Further optimizing product manufacturing and sales structures to maximize profits

Business conditions

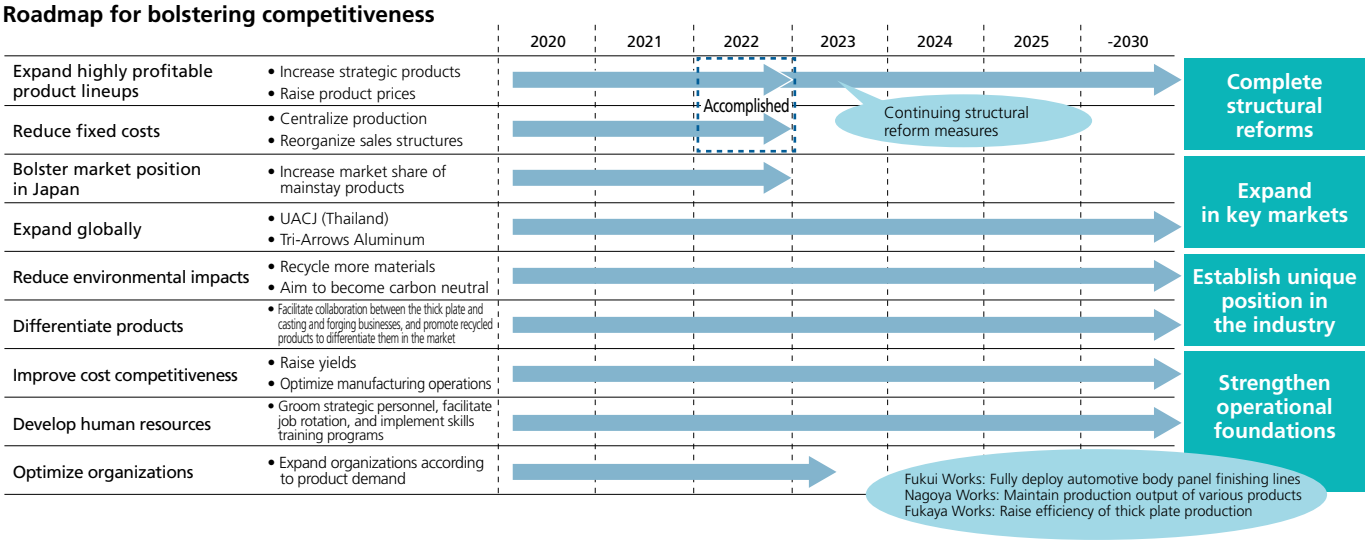
Market opportunities	UACJ's competitive advantages	Challenges and tasks
• Adoption of aluminum by automakers amid growing need to reduce environmental impacts • Advances in digital technologies are driving up demand for aluminum materials used in IT-related devices and semiconductors • The packaging and container industries are under increasing pressure to supply recyclable products	• Overwhelming market share in Japan • Manufacturing diverse types of products • Market-specific strategies • Long history of excellent relations with customers • Ability to flexibly meet customers' needs	• Promote aluminum can recycling in partnership with customers • Increase customers in the automobile industry and have Fukui Works boost cost competitiveness • Attract new buyers of thick plates in the hydrogen industry

UACJ has set a target for its three factories in Japan to collectively achieve total sales volume of 600 thousand tons of mainstay products, specifically can stock and automotive components. Toward this end, the Company will continue to optimize its product manufacturing and sales structures in order to maximize profits.

At Fukaya Works and Fukui Works, efforts are underway to boost the productivity of thick plate manufacturing and increase sales volume by 30%. Demand for aluminum thick plates is projected to grow as more semiconductor production equipment will be required for next-generation communications, and large hydrogen tanks for transport ships will be needed as countries adopt hydrogen as an energy source. These trends will create opportunities for the Company to attract new customers.

In addition, the Company has been manufacturing air conditioner compressor fins at full capacity, backed by rising demand for air conditioning amid concerns about climate change, demand growth of emerging countries, and the expansion of the heat pump market. UACJ is planning to boost production capacity to meet demand going forward.

Roadmap for bolstering competitiveness



Recent highlights

Closed-loop recycling implemented to help reduce environmental impacts

UACJ initiated a closed-loop recycling* process for automotive body panels in fiscal 2021. In this process, the Company supplies aluminum sheet to an automaker, collects aluminum scrap remaining after the automaker forms the sheet into automotive body panels, and recycles this scrap to manufacture and supply new aluminum sheet. UACJ is also exploring ways to apply closed-loop recycling to other products as a means to help further reduce environmental impacts in the future.

* A recycling process by which manufacturing scrap or used products are recycled into the same types of materials or products at the same level of quality.

Automotive parts market

Tapping growing demand for automotive body panels in Japan amid stricter fuel efficiency regulations

In recent years, fuel efficiency regulations have been tightened along with efforts to achieve carbon neutrality. Accordingly, automakers around the world are developing and marketing vehicles that offer excellent environmental performance, particularly electric, hybrid, and plug-in hybrid vehicles with improved cruising range and mileage. Aluminum is an essential material for improving this environmental performance because it can help reduce vehicle weight. In fact, aluminum is being used for more and more types of automotive parts and components, and the amount of aluminum sheet used per automobile has been rising.

UACJ had been manufacturing automotive body panels at Nagoya Works and Fukaya Works in Japan, but then concentrated its manufacturing operations at Fukui Works, which included large-scale expansion of automotive body panel finishing lines. Production has been proceeding in line with planned output since fiscal 2023.

Historical highlights

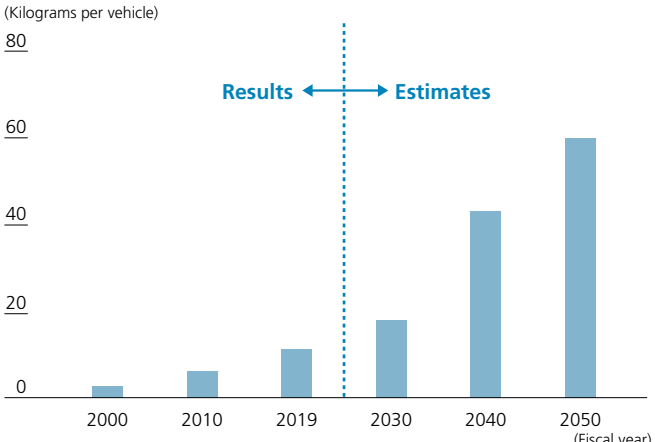
2017
- Decision to install new automotive body panel finishing lines at Fukui Works

2021
- Low-carbon body panels (with recycled materials making up about half of the finished material) adopted for EVs
- Initiated a system for collecting and recycling scrap aluminum from car manufacturing processes

2022
- Launched the U-ALight® brand of aluminum sheets for the auto industry

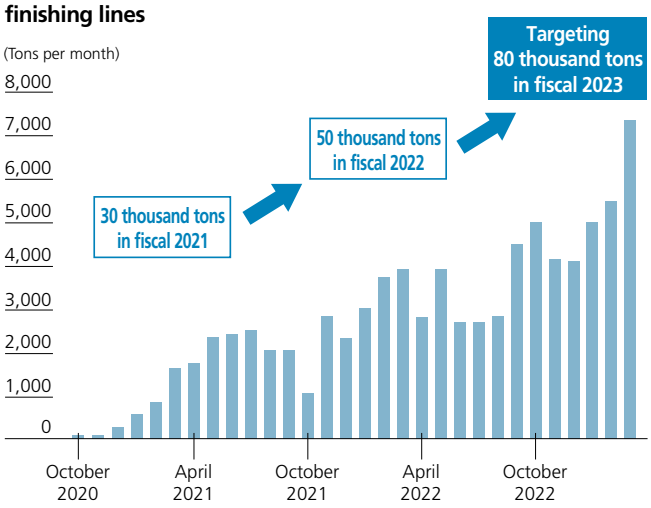
2023
- Automotive body panel production centralized in Japan at Fukui Works

Weight of aluminum body panels per automobile



Source: *Aluminium Vision 2050* published by the Japan Aluminium Association

Fukui Work's production capacity of automotive body panel finishing lines



Nobuhiro Fukuda
General Manager
Automotive Materials Marketing & Sales Department
Flat Rolled Products Division

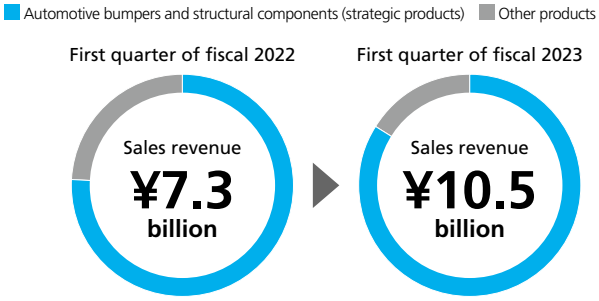
Contributing to a low-carbon economy and developing materials needed by the auto industry as it focuses on carbon neutrality and CASE

With the growing need for reducing vehicle weight to improve fuel efficiency, the adoption of aluminum for automotive components has been a big change over the past 10 years. More recently, the auto industry has turned its attention to carbon neutrality and connected, autonomous, shared, and electric (CASE) vehicle technologies, which have raised expectations for aluminum's potential besides its light weight. We have responded by setting up a closed-loop recycling system and developing our U-ALight® SMART® and UACJ SMART® Mass Balance brands of aluminum sheets for automotive applications. We will continue studying aluminum's properties to develop materials, production methods, and schemes that are needed by customers and that contribute to a low-carbon economy.

Increasing production capacity to continue expanding in the North American automotive parts market

Since joining the UACJ Group in April 2016, UACJ Automotive Whitehall Industries, inc. has increased its production capacity following proactive capital investment, deployed more advanced extrusion and forming technologies, automated production processes, and adopted stricter quality controls. Meanwhile, U.S. President Joe Biden has issued an executive order calling for over half of all new passenger cars sold in the United States to be electric vehicles powered by batteries and fuel cells or plug-in electric hybrids by 2030. Consequently, demand for aluminum structural components is bound to rise as these vehicles become more widespread in the years ahead. In preparation, UACJ Automotive Whitehall has begun operating a new production facility in Arizona as a strategic base for supplying products to electric vehicle manufacturers, and is continuing to invest in its factory in Michigan to increase production capacity. As a result of these initiatives, the company has evolved from a Teir 2 supplier to a Teir 1 supplier of products to automakers, particularly of strategic products of bumpers and structural components. By supplying high-quality products to customers, UACJ Automotive Whitehall aims to capture demand in the North American market, which is projected to grow in the future.

Breakdown of sales by product



UACJ Automotive Whitehall's expansion since joining the UACJ Group

2016
- Whitehall Industries Inc. acquired by UACJ Corporation

2017
- Progress Drive Manufacturing Facility constructed in Michigan
- Paducah Manufacturing Facility expanded

2018
- Third extrusion press installed
- Detroit Sales Office opened

2019
- Lean manufacturing methods widely deployed

2020
- Fourth extrusion press begins operating

2021
- New manufacturing facility constructed in Flagstaff, Arizona
- Progress Drive Manufacturing Facility expanded

2022
- Fifth extrusion press begins operating

2023

Al Bernat
Vice President (Sales)
UACJ Automotive Whitehall Industries, Inc.

Leveraging our integrated manufacturing system to capitalize on the auto industry's shift to electric and hybrid vehicles

The auto industry is making the transition from internal combustion engine-powered vehicles to electric and hybrid vehicles. Against that backdrop, aluminum is being increasingly used for automotive components thanks to its outstanding mechanical properties and machinability, as well as its recyclability. This industry transition is opening up excellent opportunities for UACJ Automotive Whitehall to diversify its product portfolio. Our manufacturing system integrates all process from extrusion to processing and product assembly. By leveraging this business model to supply products to customers, we not only intend to grow as a business but also to tackle environmental problems.

Honing a century of skills and techniques to grow aluminum's potential and value

UACJ's R&D milestones

In order to further the potential of aluminum, UACJ is engaged in a wide range of research and development activities, from further cultivating basic technologies related to material design and production processes to the development of products and utilization technologies. To date, we have partnered with universities and national research institutions for joint research, participated in national projects, developed advanced technologies in collaboration with customers and processing manufacturers, and conducted R&D for the practical application of our main commercial products, such as automotive parts, can stock, and heat exchanger materials for air conditioning. In 2018, we established research centers in the U.S. and Thailand, creating a structure to serve the global market on the technical side. In recent years, we have focused on research and development that contributes to solving social issues, which has driven our business growth.

R&D milestones since the inception of UACJ

2015	The new Mazda Roadster utilizes UACJ's lightweight aluminum bumper assembly
2017	UACJ develops the cladding-free MONOBRAZE® brazing technology
2018	R&D centers are established in the U.S. and Thailand
2019	The U-Al Laboratory® innovation space and Rekishi Miraikan ("Hall of the Historic Future") are established
	UACJ is selected to participate in NEDO's* advanced research program for the creation of advanced circulation technology for aluminum
2020	A new course on practical course on next-generation innovations in aluminum is jointly launched with Hokkaido University
	The Mobility Technology Center (MTC) is established within the Automotive Parts Business Division
2021	My Foil Plus, which shows helpful uses for aluminum foil during disasters on its packaging, is released
	Oshirasehaku®, foil capable of notification on opening, is commercialized

* New Energy and Industrial Technology Development Organization

Technology trends in the aluminum industry and UACJ's R&D policy

Recently, the aluminum industry has been a hotbed of efforts to develop aluminum recycling technologies for the reduction of CO2 emissions during production, widely demanded by society. In addition, aluminum is expected to offer new, undiscovered applications, expanding its already widespread usage.

Through participation in NEDO projects, we are also working to build a circular economy for aluminum, and at the same time, we are developing products that contribute to solving social issues. We are also using DX as a force multiplier in developing new applications, and conducting research toward automation and productivity improvements to cope with a shrinking workforce.

Theme	Issue	Target	KPI	Actions planned for fiscal 2023
Climate change action/ development of energy-saving technologies • Participation in national projects	Promotion of aluminum recycling	• Development of upgrade recycling technology • Impurity detoxification	• Greater purity of recycled aluminum • Lower impact of impurities in the manufacturing process	• Technology roadmap established • Launch of testing plant
	Scope 1 emissions reduction toward carbon neutrality	• Reduction of CO_2 emissions through application of new fuels	• Clarification of the effect of ammonia co-firing on molten aluminum	• Participation in proof of concept testing and exploration of applicability
New business cultivation • Integration with digital technology (fusing aluminum and digital) • External collaboration • Development of a new aluminum alloy for 3D printers	Evolution of disaster preparedness flood barrier business through DX	• Determination of flood barrier specifications using video data • Utilization of flood barrier installation timing notifications based on local weather event notification	• Time/people required for flood barrier site survey and determination of specifications • Effectiveness of flood barrier installation timing notifications	• Launch of proof of concept tests
	Verification of mutual support networks during disasters	• Verification of a mutual sharing network service for stockpiled water	• Number of subscribers to network services	• Launch of network, including use by Shizuoka Bank and other customers
	New commercialization of services using aluminum rupture detection	• Start of remote management service confirming customers opening pharmaceuticals and related products	• Number of services developed using rupture detection foil	• Diversification of service utilization
	Development of materials for fuel tanks used in next-generation rockets	• Maintaining performance equivalent to or better than 2219 alloy at a lower cost	• Strength after additive manufacturing equivalent to plate processing and welding	• Candidate alloy roadmap established
Manufacturing process refinements • Utilization of DX	Establishment of new inspection technology through the use of sensing technologies	• Improved productivity of plate manufacturing processes using digital technologies	• Improved yield • Increased production efficiency	• Exploration of latest technologies to develop automation technologies
Talent cultivation and new technology development • Industry-academia-government collaboration	Development of cutting-edge technology through industry-academia collaboration and cultivation of the next generation of professional talent	• Cultivation of human resources for the metal materials industry who will lead the next generation • Development of new sustainable aluminum alloys and manufacturing processes	• Number of students in joint university courses • Number of research projects in joint courses	• Activities at The University of Tokyo/Hokkaido University

Cutting-edge R&D

NEDO-partnered technology development for high-purity recycled aluminum

Aluminum's many qualities, including its lightweight nature, is expected to drive rapid demand growth. However, one issue that has emerged from its production is the high CO_2 emissions from electricity consumed during smelting. By recycling used aluminum instead of smelting new aluminum, CO_2 emissions during production can be reduced by 97%. However, since recycled aluminum material contains impurities, its use cases are limited.

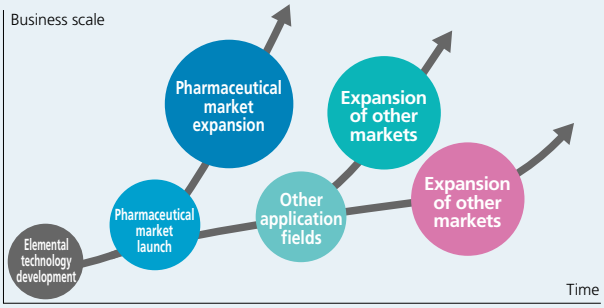
UACJ is taking on the challenge of solving this problem by participating in the national advanced research program for the creation of advanced circulation technology for aluminum, implemented by the Ministry of Economy, Trade and Industry (METI) and NEDO. In this project, we are working toward developing cutting-edge technology to first use advanced sorting technology to recover high-grade waste aluminum from vehicle and other product scrap, and then to restore it to become wrought aluminum through special processes, including to remove impurity elements. This allows used recycled aluminum to be re-created into products of the same grade as new aluminum, such as that used in vehicles. After a five-year development period which began in fiscal 2021, the plan is to successfully complete a demonstration phase and commercialize this technology in fiscal 2030 or later. Through the development of technologies for achieving high purity in recycled aluminum materials, we will contribute to a significant reduction of CO_2 emissions and the realization of a sustainable society.

New business creation

Creating a better world with a new technology that detects broken aluminum foil

Increasing medical costs have become an issue for society. One factor driving up costs is leftover medication from patients forgetting to take prescription drugs. We are developing an aluminum foil that detects when medication packaging is opened and a medication management system that uses this foil. In the opening detection technology we have developed, an energized circuit is printed on processed aluminum foil for pharmaceutical packaging. When the foil is opened, the patient, their prescribing physician, and designated family member(s) is notified. After several years of development, we have completed the elemental technologies and are now working toward market launch. Going forward, we intend to expand beyond pharmaceuticals into other fields, aiming to make this a successful new business.

Market expansion for opening detection foil



Toward carbon neutrality

Development of recycled automobile materials halving CO_2 emissions

As countries around the world tighten regulations on CO_2 emitted by vehicle operation, aluminum is being more rapidly adopted in vehicle bodies to reduce weight. However, the emissions reductions needed are not only during vehicle operation, but also throughout the entire life cycle, including during vehicle manufacturing and material production. Since the production of new ingots during electrolytic smelting emits a large amount of CO_2, the use of recycled materials has been a promising way to lower the share of new ingots used and significantly reduce emissions from production.

Given these circumstances, we have developed low-CO_2 recycled aluminum materials. These materials reduce CO_2 emissions from material production by approximately 50%, achieved by using approximately 50% of the scrap materials generated in our manufacturing process as recycled raw materials and therefore reducing the amount of new ingots used. These materials are already being used in body panels for major automobile manufacturers. Scrap material produced in the manufacturing process has conventionally been difficult to recycle because of its high impurity content due to the mixture of multiple alloy series, which tends to cause a reduction in strength and ductility. However, we have succeeded in significantly improving recycled material properties by devising a manufacturing process that establishes a material structure. We will continue to develop technologies to achieve carbon neutrality and explore closed-loop recycling and the use of green ingots.