

## Special Feature

# Applying advanced manufacturing capabilities to benefit society and the environment

Used in countless ways in society today, aluminum is increasingly attracting attention as a metal that can benefit users and contribute to environmental initiatives. Amid growing global demand for aluminum, UACJ is leveraging the advanced manufacturing capabilities of the entire UACJ Group to supply valuable products to the world. Moreover, it is working to bring benefits to people worldwide and reduce environmental burden by applying those capabilities to capitalize on the many outstanding properties of aluminum.

## Drawing from advanced manufacturing capabilities refined for over a century

With a global supply network based in Japan, the United States, and Thailand, the UACJ Group has expanded its total production capacity to over one million tons of aluminum products annually. The Group has been applying its diverse range of precision machining technologies in engineering while broadening the applications for aluminum through research and development. Underpinning this expertise is a spirit of craftsmanship that has been refined for over a century. The UACJ Group's advanced manufacturing capabilities provide a solid foundation for its everyday business activities and unique competitive advantages in the industry.



Expertise in aluminum accumulated over more than a century







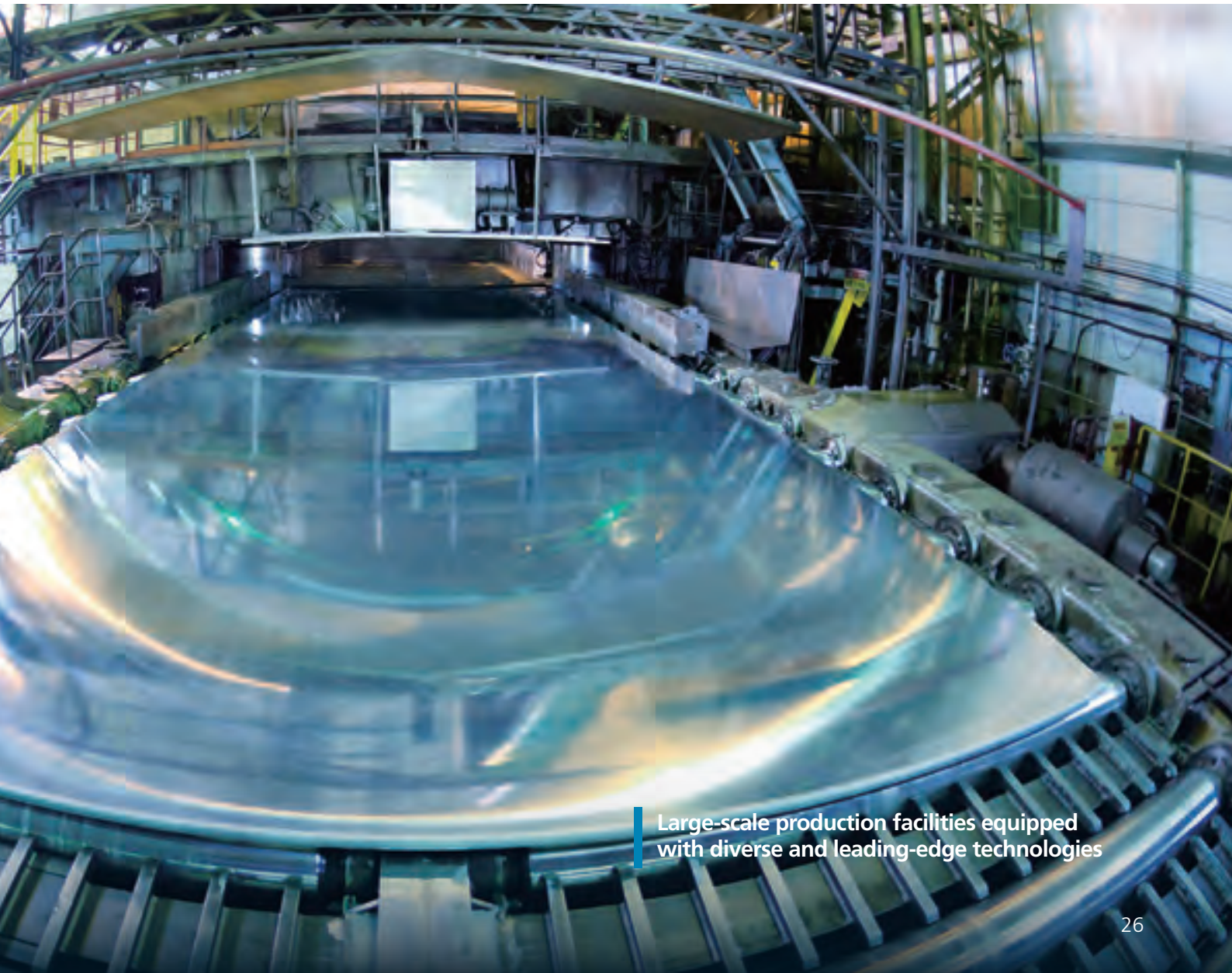
Production technologies for shaping aluminum into any kind of product



An unwavering dedication to manufacturing



A supply network based in three countries

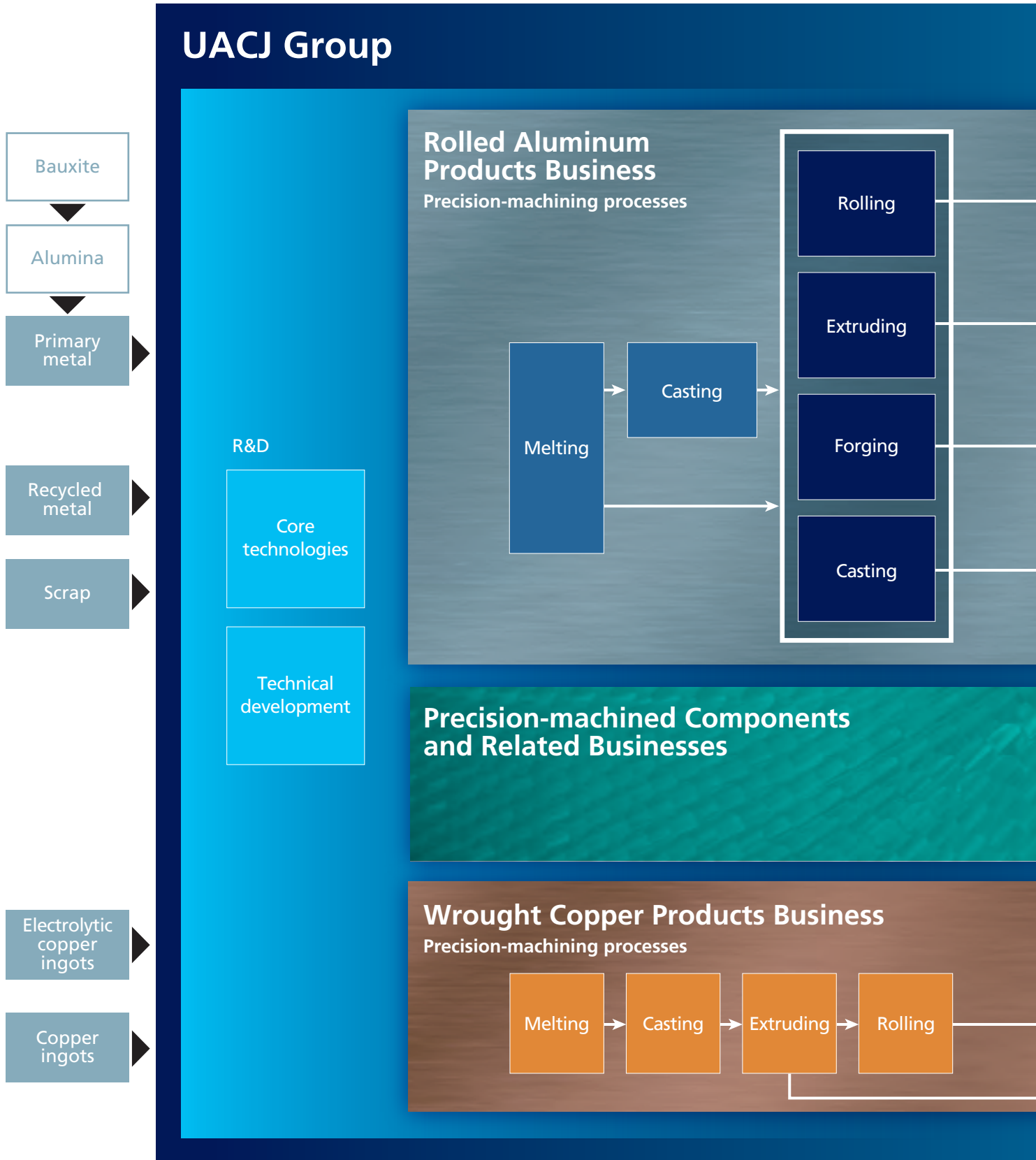


Large-scale production facilities equipped with diverse and leading-edge technologies

## Special Feature

Leveraging the Group's strengths to provide value-added solutions to a wide range of industries

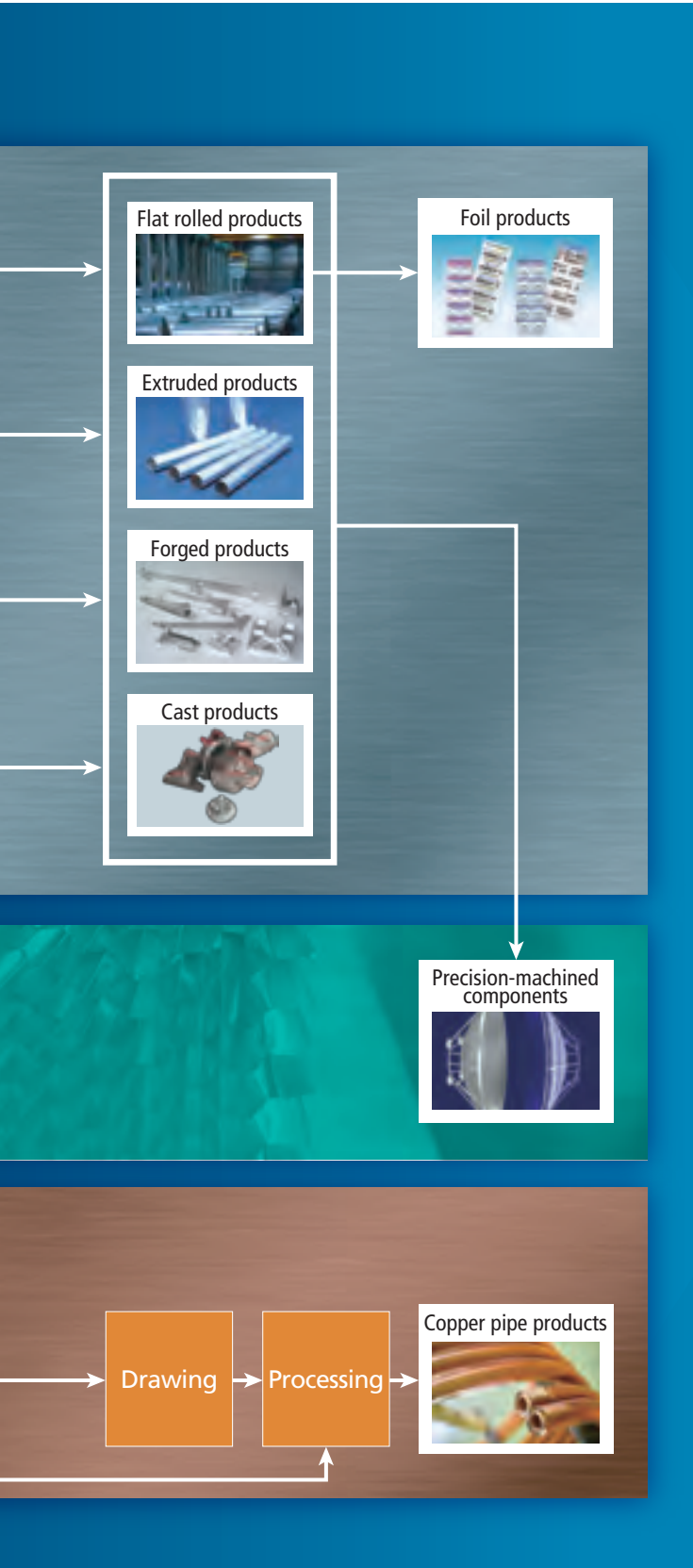
### The UACJ Group's business flow





As one of the few comprehensive aluminum manufacturers in the world today, the UACJ Group applies its diverse and advanced machining technologies to produce various kinds of value-added aluminum products, including flat-rolled aluminum, extruded products, foil, casted and forged products, and precision-machined components. By combining those machining technologies and its

leading-edge R&D, the Group is creating all-new value that sets it apart from its competitors. In addition to supplying basic materials to various industries, all members of the Group share a commitment to its social mission of offering solutions for challenges facing customers and communities around the world while adding more value to aluminum.



**UACJ offers solutions for adding value by combining its diverse machining technologies**

**Major applications/customers**

- Beverage cans 
- Automobiles 
- Aviation and aerospace 
- Shipbuilding 
- Pharmaceuticals/ Foods 
- IT 
- Air-conditioning 
- Construction 

## Regional spotlight

# North America

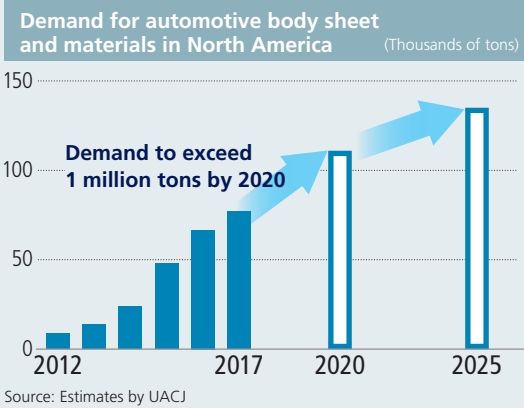
Responding to concerns over supply in the world's largest can stock market and automakers' efforts to comply with tougher environmental regulations



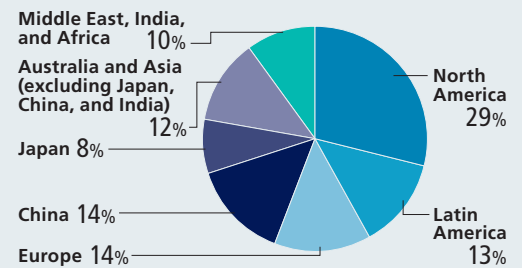
### Market trends

- The shift to electric vehicles and more lightweight cars accelerated due to stricter environmental regulations
- Beverage can demand stabilized in North America, the world's largest market
- Flat-rolled aluminum manufacturers shifted from can stock to automotive materials

### Market data



### Global demand for aluminum can stock by region

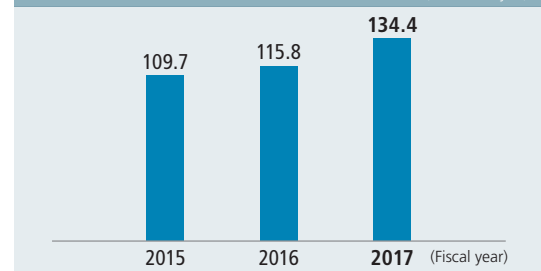


Source: Estimates by UACJ based on the Aluminium Rolled Products Market Outlook published in November 2017 by CRU International Limited

### Fiscal 2017 highlights

- A new melting and casting line for scrap aluminum began operating at Tri-Arrows Aluminum's Logan Mill
- Aluminum extrusion subsidiary UACJ Automotive Whitehall Industries became the first company in North America to equip its parts production lines with a new HybrEx extrusion press
- A new R&D center was established in the U.S. in April 2014 as the Group's first R&D facility outside Japan

### Net sales in North America



## The UACJ Group's recent activities

### Leveraging increased production capacity to meet demand for both automotive materials and can stock

Amid increasingly strict environmental regulations in the automotive industry, automakers are proactively adopting aluminum as a material for reducing vehicle weight. In response, UACJ has laid the foundations for its automotive materials business in the North American market. Three group companies are now systematically working together to meet brisk demand: automotive body sheet manufacturer Constellium-UACJ ABS LLC, automotive structural material manufacturer UACJ Automotive Whitehall Industries, Inc., and Tri-Arrows Aluminum Inc., which supplies structural materials produced at its Logan Mill.

In 2017, Logan Mill began operating a new melting and casting line for scrap aluminum, thereby raising its cost competitiveness. In the same year, UACJ Automotive Whitehall's factory became the first in North America to install a state-of-the-art HybrEx extrusion press, enabling it to ensure high quality and supply products at a lower cost.

North America is the world's largest market for canned beverages, consuming approximately 94 billion aluminum cans annually. Maintaining a stable supply of can stock, however, is a growing concern because flat-rolled aluminum manufacturers have been shifting production from can stock to automotive materials in

recent years to meet rising demand from the automotive industry. In response to that major trend, UACJ plans to boost production capacity at Logan Mill in order to increase its supply of flat-rolled aluminum for both automotive materials and can stock. Annual production at the mill is scheduled to reach 400,000 tons by fiscal 2020, comprised of 350,000 tons of can stock and 50,000 tons of automotive materials.

In addition to boosting production capacity through these initiatives, UACJ established a new R&D center in Chicago, Illinois, in April 2018. As the Group's first research and development facility outside Japan, the center will facilitate speedier product development and more precisely target demand for automotive materials and other products in the North American market.

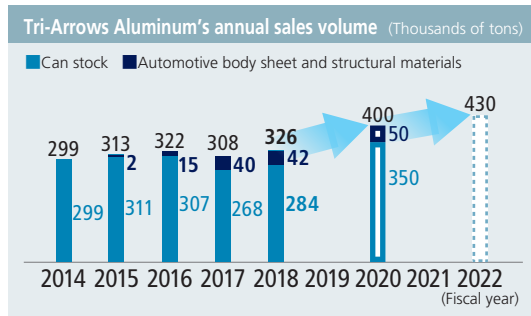


## Management tasks

### Focusing on key issues at each factory in order to take advantage of increased production capacity

As UACJ continues to invest in greater production capacity of its operations around the world, it is necessary to ensure that new manufacturing equipment operates according to plans at each factory. At Logan Mill, for example, our job is to raise the efficiency of production. The mill's efficiency was among the world's best when it specialized exclusively in producing can stock, but manufacturing has become more complicated now that it has begun supplying automotive body sheet and structural materials, so we need to make production techniques more precise than ever before. At Constelli-

um-UACJ, we will dispatch expert teams that specialize in raising productivity to help improve the skill levels of its operators, and are working to make this company profitable as soon as possible. By overcoming these challenges, we look forward to leveraging our world-class efficiency to meet demand for can stock as well as rapidly growing demand for aluminum automotive materials.



### Henry Gordinier

President and CEO  
Tri-Arrows Aluminum Inc.



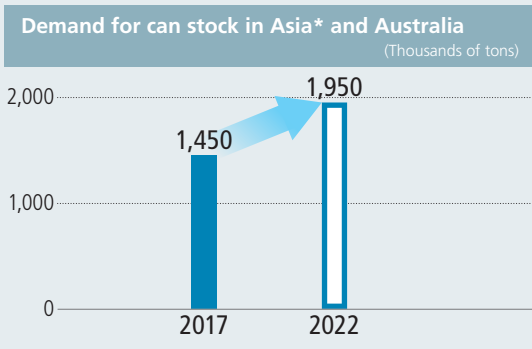




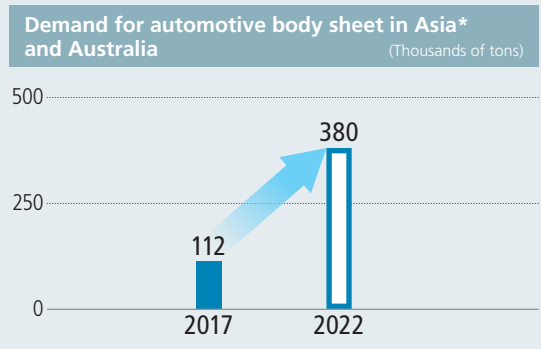
Market trends

- Demand for beverage cans rose on the back of economic growth
- The shift to electric vehicles accelerated following stricter environmental regulations for automobiles in China, boosting orders to heat exchanger manufacturers
- The Thai government positioned the manufacturing sector as the driver of economic development and stepped up support
- Training workers and transferring skills in manufacturing industries has emerged as a major challenge

Market data



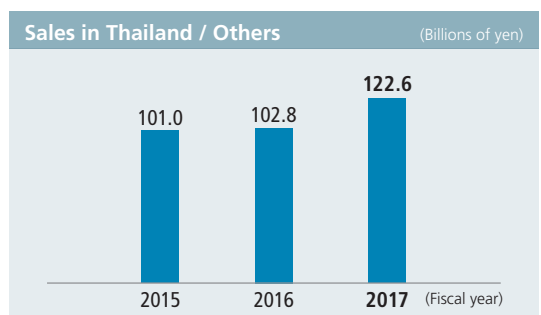
\* Excluding Japan and India  
Source: Estimates by UACJ based on the Aluminium Rolled Products Market Outlook published in November 2017 by CRU International Limited



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Fiscal 2017 highlights

- Sales volume of flat-rolled aluminum for can stock increased substantially, reflecting population growth
- Sales of heat exchanger materials were strong on the back of rising demand for automobiles
- Average monthly production output reached 10,000 tons at Rayong Works as local personnel improved their skills



## The UACJ Group's recent activities

### Meeting growing demand by boosting production capacity to 320,000 tons at Southeast Asia's only comprehensive flat-rolled aluminum factory

In Southeast Asia, the population has been increasing along with economic growth and consumer spending is on the rise. Consequently, demand for aluminum for beverage cans, automobiles and other products continues to grow. To meet this growing demand, UACJ (Thailand) Co., Ltd., has been constructing and expanding Rayong Works— Southeast Asia's only flat-rolled aluminum factory integrating melting, casting, hot and cold rolling and finishing lines —since fiscal 2012. Rayong Works has mainly been manufacturing aluminum can stock and heat exchanger materials since the completion of its second phase of construction in 2016, which increased annual production capacity to 180,000 tons, among the highest in Asia. In addition to supplying products to Thailand's beverage can market and auto parts factories, UACJ (Thailand) has expanded its customer base from Asia to Australia and Middle Eastern countries, contributing to Thailand's growing exports of aluminum products.

In anticipation of rising demand in the future, UACJ plans to increase investment in Rayong Works with a view to boosting production capacity to 320,000 tons, which is

about the same as Nagoya Works and Fukui Works, respectively. Despite that unrivalled capacity, however, cost competition is heating up in the region due to the recent entry of aluminum manufacturers from other Asian countries, including China and South Korea. Therefore, UACJ (Thailand) is striving to broaden its sales channels while giving priority to cost competitiveness going forward.



UACJ's aluminum casting plant under construction in Thailand

## Management tasks

### Transferring skills from experienced Japanese engineers to raise skill levels of local personnel

Training local personnel has been a big project at Rayong Works ever since it began operating. Improving the level of their skills not only raises our productivity, but also fosters the human resources that will lead Thailand's industrial sector in the future. Therefore, from the time Rayong Works was under construction, we appointed experienced engineers from Japan to pass on their skills to our Thai personnel. The engineers have set up a system for ongoing training, compiling standardized manuals detailing each specific operation in manufacturing areas, explaining working objectives and procedures, and conducting on-the-job training when operations start up. As a result of this initiative and the installation of automated equipment, our Thai engineers and workers

employed for only two or three years can now handle all of the plant's manufacturing operations, which would normally require about 10 years.

While aiming to make the company profitable by fiscal 2019, we will continue focusing on training in order to enhance the skills of our Thai employees so they can take over the remaining duties currently handled by Japanese staff, such as maintaining facilities and operating production lines when facilities are expanded.



**Hironori Tsuchiya**

President and director  
UACJ (Thailand) Co., Ltd.



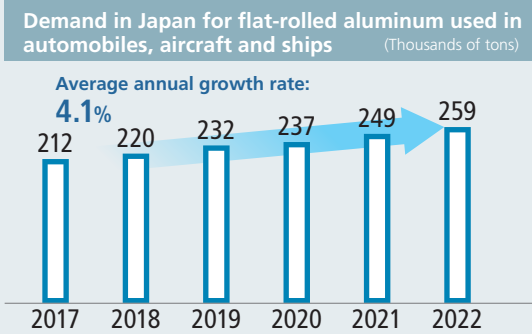
Transferring skills and providing solutions while expanding the supply of high-demand automotive body sheet



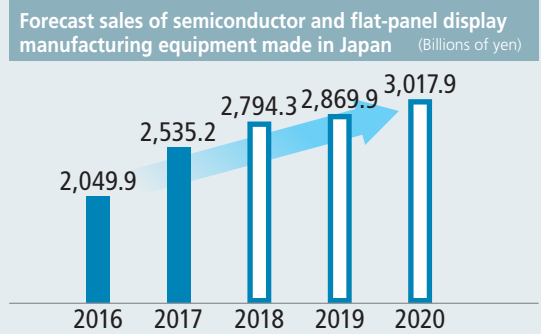
Market trends

- North American initiatives for reducing vehicle weight have spread to Japan
- The market for liquid crystal panel and semiconductor manufacturing equipment was brisk due to strong sales of tablet computers and other IT-related devices
- IoT and AI were increasingly applied at factories
- A shortage of factory workers became an increasingly urgent issue

Market data



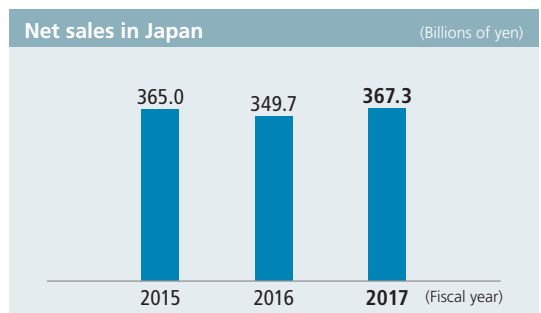
Source: Aluminium Rolled Products Market Outlook published in November 2017 by CRU International Limited



Source: Data on forecast demand for semiconductor and flat-panel display manufacturing equipment published in July 2018 by the Semiconductor Equipment Association of Japan

Fiscal 2017 highlights

- Decision made to install a new automotive body sheet heat treatment line at Fukui Works to meet growing demand
- State-of-the-art extrusion equipment was installed at UACJ Extrusion Nagoya Corporation's automotive parts manufacturing facilities
- Workplace reform projects commenced (see page 46 for details)



## The UACJ Group's recent activities

### Bolstering production capacity of automotive materials while supplying products to a wide range of industries

In Japan, UACJ supplies aluminum products to meet the diverse needs of a wide range of industries, including aluminum for beverage cans, automobiles, aircraft, ships, IT-related devices and equipment, and building materials. In each of these markets, demand for aluminum is projected to remain strong in the future. For example, in the beverage can market, of which UACJ holds an unrivalled share of around 50%, can stock demand is forecast to grow even more, especially for low-alcohol beverage cans and bottle-shaped cans for coffee and other types of drinks. Moreover, due to the popularity of smartphones and table computers, solid demand is expected for aluminum materials used to make device casings as well as liquid crystal and semiconductor manufacturing equipment.

Demand for aluminum automotive materials in particular is projected to rise, driven by initiatives originating in North America for reducing the weight of automobiles. This trend has also reached Japan, where demand for automotive body sheet and other aluminum components is gaining momentum. In response, UACJ

added new facilities at Fukui Works for manufacturing automotive body sheet and materials, supplementing production of these products already handled by Nagoya Works, which also manufactures heat exchanger materials. With operations scheduled to commence in 2020, production capacity in Japan is set to reach approximately 100,000 tons.

#### Outlook for automotive body sheet demand in Japan (Thousands of tons)



Source: Aluminium Rolled Products Market Outlook published in November 2017 by CRU International Limited

## Management tasks

### Training programs launched to transfer skills at all manufacturing plants

Transferring skills is our biggest task at manufacturing plants in Japan. Many of UACJ's engineers who had been involved in starting up manufacturing operations in Japan will retire over the next decade. Therefore, having them pass down the production techniques, know-how, and broad expertise they gained over many years to younger employees will be essential for the Company to maintain its competitive edge as a manufacturer.

With that in mind, we are now creating training opportunities at each production plant in Japan. At Nagoya Works, for instance, engineers are learning about high-added-value production in an in-depth technical training program led by experienced technical staff from various departments as well as retired engineers who

have been rehired. Opportunities to learn skills have also begun at Fukui Works. The training includes instructions on starting up manufacturing facilities, particularly the new automotive body sheet heat treatment line scheduled to begin operating in 2020.

By teaching younger employees people about the manufacturing techniques and expertise accumulated at UACJ through these programs, we hope to maintain and improve the Company's competitiveness while also contributing to the competitiveness of Japan's manufacturing industry and preserving the human assets it has developed.



Engineering study manuals used at UACJ

#### Mizuho Taneoka

Representative Director, Member of the Board,  
Senior Managing Executive Officer

