Nippon Light Metal Group

Special Feature

CSR Report

Corporate Social Responsibility Report

2017

Creating connections

Nikkeikin

The NLM Group has a variety of connections with people through aluminum and will continue to create connections in the future.

1

Connecting through technologies, connecting with technologies

Nikkei Research and Development Center, the core of Team NLM

FSW Technology

2

Connecting smiling faces through a comfortable breeze

Providing a comfortable living environment in Southeast Asia

Aluminum heat exchanger

3

Connecting people through logistics

The 2.3- meter length created from customer partnerships

Full-length trailer truck

Special Feature 1

Connecting through technologies, connecting with technologies

Connecting Japan and the world by offering comfortable trips through connecting technologies underpinned by the world's number one patent-related comprehensive capabilities※1.

Toward an advanced tourist destination country

Japan has a target of hosting 40 million inbound foreign tourists in 2020 when the Tokyo Olympic and Paralympic Games will take place and 60 million in 2030.

To ensure that foreign tourists enjoy sightseeing throughout Japan, smooth and comfortable domestic travel is important. In particular, the Shinkansen bullet trains that provide long-distance, high-speed passenger transportation are expected to play a prominent role.

The NLM Group will meet these expectations by connecting cross-sectoral development activities, search activities for sharing within the Group information about customer needs, and activities of the sales and marketing, development and manufacturing sections, which will be supported mainly by Nikkei Research and Development Center.

The Hokuriku Shinkansen E7 series
(photograph supplied by East Japan Railway Company)

Believing that reducing the weight of rolling stock through the change of its materials to aluminum will contribute to the enhancement of transportation capacity, we have been working with our clients, the railcar manufacturers, to improve the rolling stock.

Breathtaking performances of the Shinkansen

- Annual passenger volume: Approximately 400 million persons※2
- Total extension: 3,000 kilometers
- Total distance traveled: 12 times around the earth in one day※3 (460,000 kilometers)

Source
※ 1 : Patent Result Co., Ltd.
※ 2 : Annual Report on Survey on Rolling Stock Transport (Ministry of Land, Infrastructure, Transport and Tourism)
※ 3 : JTB Time Table April 2016 edition (weekdays. Includes extra trains.)

FSW technology
Patent-related comprehensive capabilities

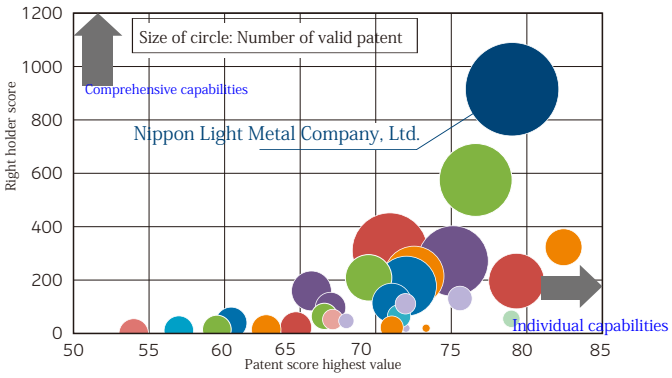
World's number 1※1

Carrying the FSW technology

FSW is a technology for joining two pieces of aluminum by inserting in the butt welding portions a tool that rotates and agitates the metal to be joined. Compared to conventional welding, this technology has advantages such as high intensity, less distortion, flat and smooth joining area and good exterior appearance. As a result, all rolling stock of the Shinkansen is now made of aluminum. In addition, the double skin structure that started to be applied to the Tokaido Shinkansen 700 Series strengthened sound insulating and stiffness properties and created more comfortable space inside the trains. The aluminum materials in double skin structure are manufactured by Nikkei Niigata Co., Ltd.

Currently, the FSW technology is widely used in the manufacture of railway cars, making it an essential technology. The NLM Group connects Japan and the world using this technology so that all tourists can travel in comfort.

Competitive situation relating to FSW technology※



※Data by Patent Result Co., Ltd

Joining the metal using the FSW technology

Connecting a variety of products through the FSW

Aluminum is a synonym for eco-friendly material because of its energy-saving property, which helps reduce the weight of automobiles and railway cars. However, to achieve the characteristics of multiple materials that enable the manufacture of more complex shapes and larger structures, Nippon Light Metal Company, Ltd. recognized from early on the importance of joining technology.

Having quickly focused on the FSW technology, a particularly outstanding joining technology, the Company entered into a license agreement with the Welding Institute in England that developed the technology, and worked toward practical application.

In the initial stage, development efforts were targeted at joining railway cars. Currently, the FSW technology is essential in various products, large and small, including an aluminum bridge deck and liquid cooling jacket for personal computers.

Aluminum bridge deck

A research laboratory

Liquid cooling jacket for personal computers

Connecting smiling faces through comfortable winds

Special Feature 2

All aluminum heat exchangers expand comfortable living environments and connect people's smiling faces.

Demand for household air conditioners and power problem

In many regions of Southeast Asia, the maximum temperature is over 30° C throughout the year so that the need for household air conditioners is high. However, there are many issues that impede their popular use. One is the power problem. The power generation infrastructure is still insufficient and demand for electricity for industrial use is rising with economic growth. Widespread use of air conditioners that consume large volumes of electricity will likely lead to power shortages.

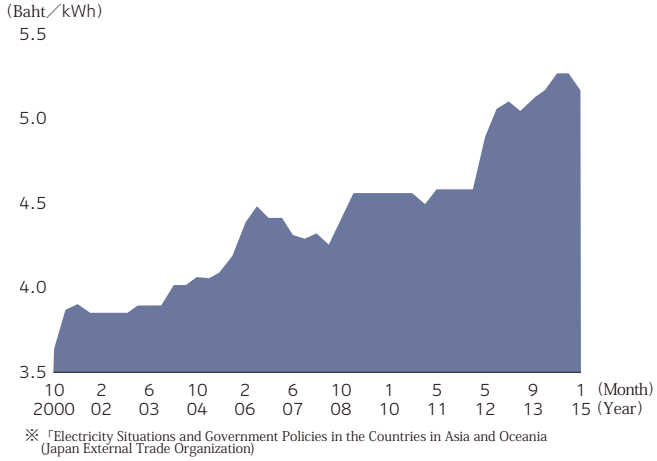
In addition, electricity prices are rising significantly, as has been seen in Thailand where the electricity rate rose as much as 45% in the 15 years from 2000 to 2015※. To overcome these problems, the NLM Group will contribute to facilitating wider use of energy-saving air conditioners.

※Electricity Situations and Government Policies in the Countries in Asia and Oceania (Japan External Trade Organization)

Development of an all-aluminum heat exchanger for energy-saving air conditioners

The cool air from an air conditioner is created by a heat exchanger built in the device. Most conventional heat exchangers for air conditioners were made of combinations of copper and aluminum. Nippon Light Metal Company, Ltd. worked to find practical application for the technology used in all-aluminum heat exchangers, which was already being used in car air conditioners. Although stricter corrosion resistance was required due to differences in the usage environment, the comprehensive capacity as Team NLM helped us overcome this problem and achieve practical application of all-aluminum heat exchangers in household air conditioners as well as an improvement in heat exchange ratio of approximately 30% compared to conventional heat exchangers.

Changes in electric power charges in Thailand※



※「Electricity Situations and Government Policies in the Countries in Asia and Oceania (Japan External Trade Organization)

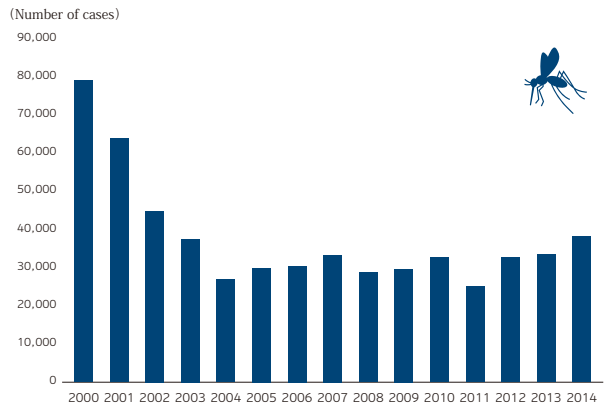
Heat exchange ratio **30%↑**

Making more living environments comfortable

Electricity expenses for the operation of air conditioners were curbed in proportion to the improvement in the heat exchange ratio. Meanwhile, the higher efficiency enabled downsizing of the heat exchanger so that air conditioners can be installed in apartments in urban areas with insufficient space for installing the outdoor unit. In addition, favorable effects in preventing contagious diseases that are peculiar to semitropical regions, such as Dengue and Malaria that are transmitted to humans by the bite of a mosquito are expected.

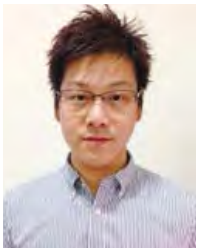
The NLM Group will continue to expand comfortable living environments and connect people's smiling faces.

Number of Malaria cases in Thailand



Source: World Health Organization (WHO)

Comment from person in charge

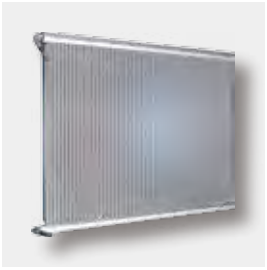


I engage in sales of heat exchangers to electronic manufacturers that have manufacturing bases in Southeast Asian countries.

We have difficulties in Southeast Asian countries that are different from those in Japan, such as the fact that the length of rainy seasons and political changes have direct impact on sales volumes.

Kensuke Kondo,
General Manager, Sales Department,
Nikkei Siam Aluminum Ltd

Through the widespread use of heat exchangers with high energy-saving effects, I have been able to help make people's living environments more comfortable in Southeast Asia and have been filled with a stronger sense of pride and responsibility.



All aluminum heat exchanger

In 2011, we commenced operation of Amata Nakorn Factory (Nikkei Siam Aluminum Ltd.), manufacturing heat exchangers for household air conditioners in Thailand where many Japanese-affiliated air conditioner manufacturers have presence. From here, we ship our products to other Asian countries.

Special Feature 3

Connecting people through logistics

Through connections between our customers, truck manufacturers and Team NLM, we will develop new standard dry van type full-length trailer trucks and contribute to solving problems in the logistics industry.

Issues facing the logistics industry in Japan

- Elimination of the shortage of truck drivers and improvement of work environment
- Increase in efficiency of highway truck transportation in response to the need for speedy delivery
- Reduction of CO_2 emission from delivery

Development of new standard dry van type full-length trailer trucks

Japan's first new standard dry van type trailer truck with vehicle combinations had a total length of 21 meters and was created through collaborative development efforts among Yamato Transport Co., Ltd., which aims to achieve same-day delivery in high-demand routes between Tokyo and Nagoya and Osaka, Isuzu Motors Limited, the leading truck seller in Japan, and Nippon Fruehauf Co., Ltd., which has strengths in the development of light weight and high resistance aluminum transportation equipment and products. The truck has been contributing to the improvement of freight transportation efficiencies between sites.

As a preference measure under the Act on Special Districts for Structural Reform, driving of this new standard full-length trailer truck on public roads was allowed in accordance with the general permission nationwide of projects for improvement of freight transportation efficiencies through the use of longer- than-average full trailer trucks that have vehicle combinations for separable freight, and following a relaxing of legal restrictions in conjunction with the permission.

The 2.3-meter length created from customer partnerships

Raising the loading efficiency as much as possible and minimizing the length of the vehicle joining sections without impairing the operability—this difficult question was solved in this new standard full-length trailer truck. An increase of approximately 23% in loading capacity compared to that of the conventional standard 18.7 meter full-length trailer trucks was achieved. As a result, the new trailer truck can carry 32 roll box pallets※ compared to only 26 units for conventional trailer trucks. Now that larger volumes of freight can be transported at one time, it is expected to lead to s reduction in CO_2 emissions during freight transportation and reforms in the way of working for truck drivers who support logistics.

※Roll box pallets: Carts for transportation that are widely used in land transportation, wholesale and retail industries for temporary storage at sorting sites and for carrying cargo to truck loading sites

Roll box pallets

Loading capacity **23%↑**

Comment from person in charge

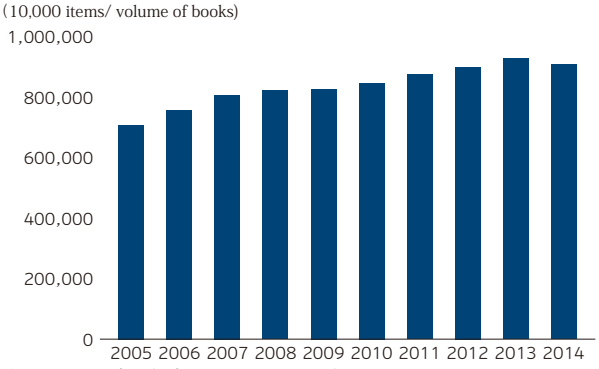
This development project started with customer consultation received by our company. Given strong demand for personal freight transportation in Japan, the issue of improving loading capacity and efficiency in freight transportation was a major challenge for the transportation industry, which hoped to meet cargo owners' expectation for faster delivery.

Simply making longer trailer trucks would not satisfy requirements such as improved loading efficiency and driver's operability, and this new standard full-length trailer truck has been created solely through a combination of cooperation among the sales, development and manufacture sections, connections in Team NLM and our connection with customers.

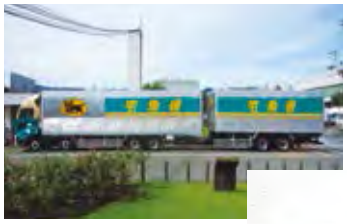
We are committed to continuously developing products that contribute to people's enriched and comfortable life and to creating the future in which people are connected through logistics.

Mr. Hidehiko Watanabe, Project General Manager, No. 2 Development Department, Nippon Fruehauf Co., Ltd. (the person in the middle in the photograph)

Change in the number of small- volume goods handled



Source: Ministry of Land, Infrastructure, Transport and Tourism



A full view of a new standard dry van type full trailer truck

Joining section of trailer truck

Activities for preserving biodiversity

In the NLM Group, we promote activities for preserving biodiversity at our sites in Japan and other countries in accordance with our biodiversity guidelines. In promoting the activities, we apply various methods that are appropriate for each phase. Specifically, we monitor the impact of our business activities on biodiversity, engage in business activities in consideration of biodiversity, and cooperate with local communities in our efforts to reduce the impact on biodiversity.

Tree planting and biotope creation

Activities for protecting coral reefs

Nikkei Siam Aluminium Ltd. (Thailand)

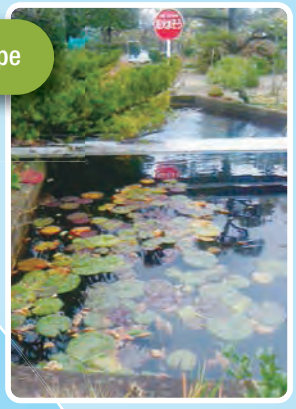
Tree-planting activities on an industrial estate

Amata Nakorn Factory of Nikkei Siam Aluminium Ltd. (Thailand)

Greening of factory premises

Tomakomai Complex of Nippon Light Metal Co., Ltd.

Garden and biotope



Nikkei Niigata Co., Ltd.

Fruehauf Mahajak Co., Ltd. (Thailand)

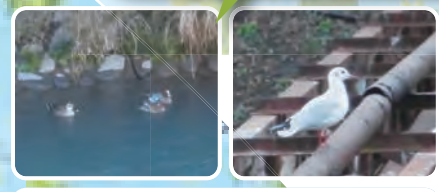
Garden on office building rooftop and biotope

Amata Nakorn Factory of Nikkei Siam Aluminium Ltd. (Thailand)

Wellgrow Plant of Nikkei MC Aluminum (Thailand) Co., Ltd.

Neighborhood cleaning and environmental monitoring

Observation of wild birds that come to the discharge channel



Kambara Complex of
Nippon Light Metal Co., Ltd.

Fishway construction

Kakimoto Dam

Fishway that was constructed
in Toshima Dam

Collaborations with NPOs

Participation in the creation of
Kyosei no Mori (forest of coexistence)
by Nikkei Technology Center Co., Ltd.

Mangrove protection activities

Nikkei Siam Aluminium Ltd. (Thailand)

Monitoring of drainage at the Shimizu Plant
of Nikkei Light Metal Co., Ltd.

Tree planting at Miho no Matrubara (World Heritage) and beach cleaning

Nikkei Sangyo Co., Ltd.

Riken Light Metal Industry Co., Ltd.

Patrol of the outer perimeter of the factory
by Toyo Rikagaku Kenkyusho Co., Ltd.

Cleaning of the area around the factory
by Nikkei Extrusions Co., Ltd.

Cleaning of the area around the factory
Shiga Factory of Nikkei Panel System Co., Ltd.

Cleaning of the area around the plant Wellgrow Plant
of Nikkei MC Aluminum (Thailand) Co., Ltd.

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