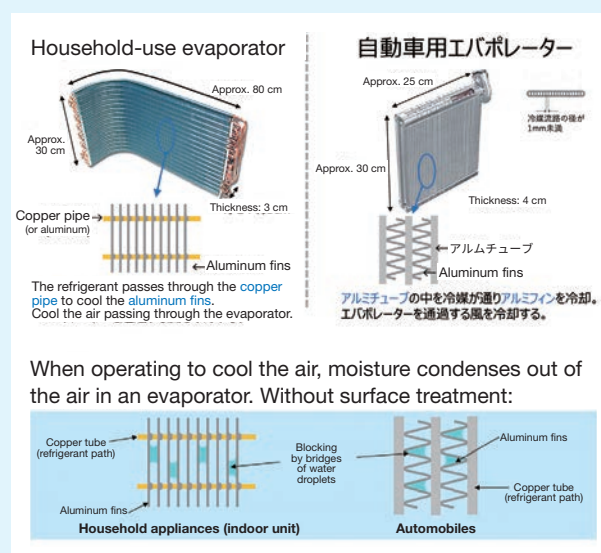


## Globally Accepted Technologies for Surface Treatment

Our surface modification technologies enhance the functionality of materials. They are utilized for many products that are essential to people's daily lives. The Nihon Parkerizing Group significantly contributes to people's lives and the growth of industries through its surface modification technologies. In pursuit of a decarbonized society, we will continue to develop advanced creative surface modification technologies.

### Technology 01 / Evaporator

Air conditioners are indispensable in people's lives, and energy-saving technologies in this area evoke the image of a reduction of environmental impact and lead to consumers saving money on their electricity bills. Technology is being developed fiercely from different perspectives. Air conditioners are equipped with components called "evaporators" to heat and cool the air. In the summer, the moisture in the air condenses in the evaporator of an indoor air conditioner unit. If the condensed water droplets block gaps in the evaporator, the flow of air is limited and ventilation resistance increases, resulting in higher electricity bills. A surface treatment technology to "provide hydrophilicity" is used for evaporators. This property prevents the condensed water from blocking gaps in the evaporator and helps reduce electricity bills.



## Hydrophilicity



## To slide, or not to slide?

### Technology 02 /

### Shelving for beverage showcases and construction site scaffolding

The sloping parts of beverage showcases in supermarkets and convenience stores are made to allow merchandise to slide (lubricating treatment) so that merchandise can easily be removed by customers and refilled by staff. In contrast, the materials used to make construction site scaffolding and other surfaces that shouldn't be slippery undergo surface treatment to prevent objects from sliding on them.

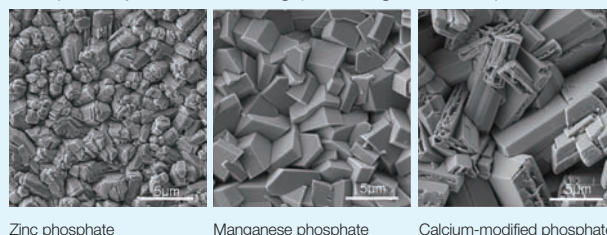
Many different surface treatment technologies are used in people's everyday lives. Here, we have provided just a few of the many examples. Surface treatment technologies have infinite possibilities depending on your ingenuity and creativity. Surface modification technologies are so advanced that they can make material surfaces resistant to wear and stains, hydrophilic, and/or lubricating. They can be used for many different functions.



## Technology 03 /

## Phosphating technology

Metal surface treatment whose origin is in the protection of metal from rust and corrosion. A typical example of this surface treatment technology is zinc phosphate coating. Iron rusts inherently. Because of advancements in surface treatment technologies, however, zinc phosphate coating can significantly increase durability and corrosion resistance. This coating is extensively applied to metals exposed to corrosive environments. In the past, zinc phosphate coatings were used industrially to prevent tools, weapons and other metallic products from rusting. In recent years, technology has been used as a paint base to limit the peeling of coated films and prevent rust from spreading even if the coated film is damaged. Zinc phosphate coatings are a standard method extensively used in the automobile and other industries. In addition to being a base for other coatings, zinc phosphate has another important use: it facilitates cold forming when used together with lubricants in metal drawing, extrusion, forging and other processes. There are many applications where the cold forming of metals is done, such as cutting thick steel wire into thin short pieces and processing them into bolts, punching them out to make machine parts such as gears, making thin wires and reducing the diameter of thick pipes. Unlike other machining processes such as cutting, cold forming has two primary advantages: It does not waste materials and it strengthens the processed parts by work-hardening (achieving the same performance as expensive materials using inexpensive materials). Depending on the purpose, various types of phosphate treatments are available, including zinc phosphate, iron phosphate, manganese phosphate and calcium-modified zinc phosphate.



Zinc phosphate

Manganese phosphate

Calcium-modified zinc phosphate

# Will not rust



## Technology 04 /

## Heat treatment technologies

Auto parts must be strong enough to prevent wear. Special surface modification is required because the metallic surfaces of engine parts exposed to high temperatures and high pressures are susceptible to wear. For example, in the isonite heat treatment technology, nitrogen and carbon permeate into a steel material to form a compound layer of iron and nitrogen. Isonite is economical because it enhances wear, fatigue, and corrosion resistance, while reducing the need to use expensive special metals. This technology is extensively used for machine parts, auto parts and tools.

