Product Introduction

Polishing technology
Polishing treatment and Matte finish

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Introduction

Various metal members such as iron, aluminum, and copper are utilized in many fields such as automotive industry, building field, and medical field. These metal members in many cases, in order to improve the appearance and functionality (slidability, deburring, corrosion resistance), it is common that some surface treatment is performed.

We have sold surface treatment agents such as chemical polishing, electrolytic polishing, and matte finish for metallic materials for many years. This paper presents these technologies.

Product Summary

Surface treatments such as chemical polishing, electrolytic polishing, and matte finish have the following features.

Features

- Appearance is improved by glossiness improvement or roughening.
- It is also possible to polish the recessed part or the back side of the workpiece because it is treated with a chemical solution.
- In the electrolytic polishing of stainless steel, the chromium ratio of the material surface increases by the treatment, and the corrosion resistance is improved.
- In chemical polishing, deburring of fine precision parts can also be carried out stably.
- It has a number of years of achievements.

Treatment process

Since the treatment process varies depending on the material and the treatment content, some examples are introduced in this paper.

For example, in the chemical polishing treatment of copper, the treatment is performed in the following step.

Degreasing → Chemical polishing → (anti-discoloration) → Drying

In the electrolytic polishing of stainless steel, the treatment is performed in the following steps.

Degreasing → Neutralization → Electrolytic polishing → (pickling) → Neutralization → Drying

In the alkali chemical matte finish treatment of aluminum, the treatment is performed in the following steps.

Degreasing → Chemical matte finish → Desmatting → Drying

*In the above three treatments, water washing is performed between each step.

Mechanisms

In chemical polishing and electrolytic polishing, the target metal is immersed in the treatment solution, it is possible to obtain a smooth surface by preferentially dissolving the convex portion. (Figure 1) However, just by immersing it in a chemical, both the convex portion and the concave portion are uniformly dissolved. Therefore, the dissolution rate is adjusted with a treatment agent.

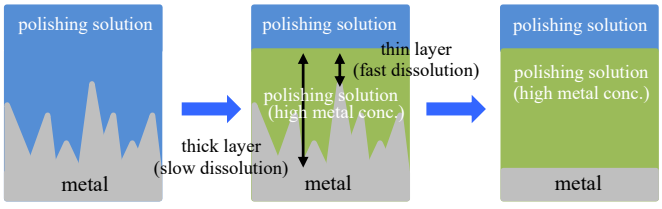


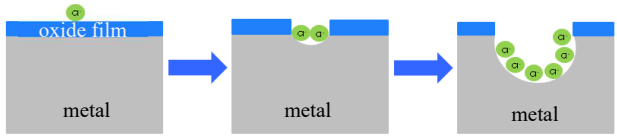
Figure 1: Dissolving Mechanism of Chemical Polishing and Electrolytic Polishing

In chemical polishing, a reaction inhibitor is added to an acidic liquid, and a dissolution rate is changed by a concentration gradient of a metal ions to smooth the surface. In the concave portion, the metal dissolution reaction is

suppressed because the concentration of metal ions dissolved from the material increases. In the convex portion, the metal dissolution reaction proceeds because the metal ions dissolved from the material are easily diffused. Due to this difference in dissolution rate, the convex portion is preferentially dissolved and smoothed.

Electrolytic polishing has a similar mechanism, but the electrolytic polishing solution is a slightly viscous liquid that controls the diffusion of metal ions. In the concave portion, the metal ion dissolved from the material is difficult to diffuse and the metal dissolution reaction is suppressed, and in the convex portion, the metal ion dissolved from the material easily diffuses, so that the metal dissolution reaction proceeds. Due to this difference in dissolution rate, the convex portion is preferentially dissolved and smoothed. Further, in electrolytic polishing, the convex portion near the counter electrode has a high current density, so that it is easy to dissolve.

In chemical matte finish, the surface is roughened by the use of pitting corrosion. The chlorine-containing treatment agent locally destroys the oxide film on the metal surface, and the dissolution reaction proceeds. (Figure 2) Use this phenomenon to make materials rougher.



The presence of chloride ions (Cl^-) locally destroys the oxide film.

Corrosion progresses locally.

As Cl^- moves toward the inside of the pitting, the Cl^- concentration increases and the pitting progresses.

Figure 2: Dissolving Mechanism of Matte Finish

In closing

There are various types of chemical polishing agents, electrolytic polishing agents, and chemical matte finish agents depending on the material and purpose. (Table 1) If not only existing materials but also new materials are developed, it is also possible to custom-make the corresponding polishing and matte finish agents.

Table 1: Lineup of Polishing and Matte Finish Agents

Product name	Purposes	Type
6C016	Electrolytic polishing agent for stainless steel	Acid
K-584	Chemical polishing agent for stainless steel	Acid
ES-581	Matte finish agent for stainless steel	Acid
6C019	Chemical polishing agent for steel	Acid
6F233S	Chemical polishing agent for copper	Acid
6G064	Matte finish agent for copper	Acid
Chemilite 53	Chemical polishing agent for aluminum	Acid
Aluetch 83	Matte finish agent for aluminum	Acid
6L132	Matte finish agent for aluminum	Alkaline
K-381	Chemical polishing agent for zinc die casting	Acid
Titanic 99	Chemical polishing agent for titanium	Acid