

Smooth type Dropletless PVD coating

- A high-performance PVD coating that suppresses the formation of surface irregularities.
- Effective against galling, corrosion, and poor mold release in cold forming.
- Compatible with polished finish molds and high-precision molds, as well as realizing improved moldability.

Unique smooth coating technology

- For typical PVD coatings (AIP), microscopic irregularities called droplets are formed on the surface.
- We have developed our own PVD technology (thin film AIP/HCD/UBMS/+polishing) to provide smooth coatings with suppressed formation of droplets.

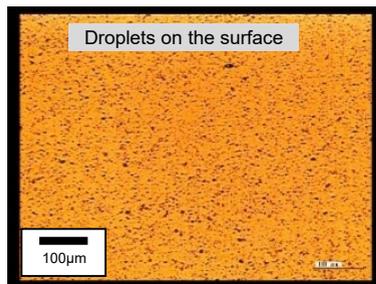
- Poor galling due to convex shape
- Poor corrosion from concave shape
- Poor mold release due to concavo-convex shape



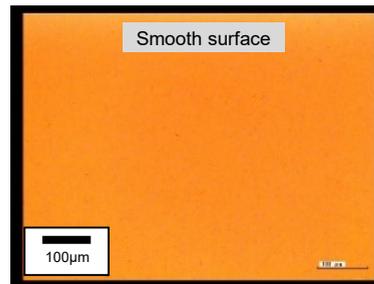
Solves molding defects with smooth type coating

No galling, no adhesion

- In cold molding with soft materials may cause "galling" in which the molding material adheres to the mold surface.
- Uneven coating surfaces tend to retain molding material, but smooth coated surfaces prevent molding material from staying on the surface and allow it to slide smoothly.
- The smooth type has a film composition with excellent mold releasability.
 - Iron-based molding material: Smooth AX / Smooth MX is recommended
 - Resin molding material : Smooth CX is recommended

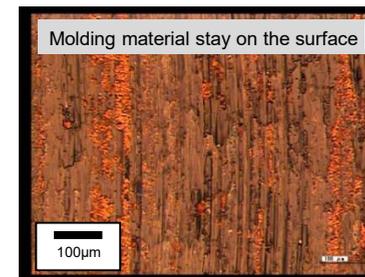


TiN

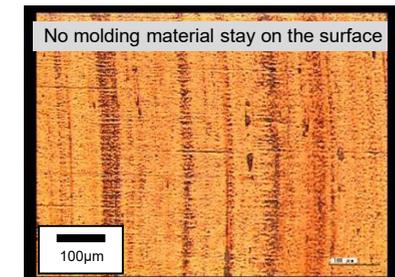


Fine FT

Surface observation image of coating film



TiN



Smooth MX

Surface observation image of coated film after abrasion test

Smooth type Dropletless PVD coating

Lineup

Fine FT

Titanium Nitride (HCD)

- Hardness: 2500HV<
- Thickness: 3±1µm

For anti-galling of various molds
Smooth TiN coating

- Heat resistance temp. : 600°C
- Surface roughness : Rz<0.1
- Friction coefficient : 0.5
- Coating temp.: <500°C

Fine FG

Titanium Carbon Nitride (HCD)

- Hardness: 3000HV<
- Thickness: 3±1µm

Low friction and further suppresses galling
Smooth TiCN coating

- Heat resistance temp. : 400°C
- Surface roughness : Rz<0.3
- Friction coefficient : 0.2
- Coating temp.: <500°C

Fine FC

Chromium Nitride (HCD)

- Hardness: 2500HV<
- Thickness: 3±1µm

Excellent resin releasability
Smooth CrN coating

- Heat resistance temp. : 700°C
- Surface roughness : Rz<0.1
- Friction coefficient : 0.5
- Coating temp.: <500°C

Smooth AX

Titanium Aluminium Nitride (AIP)

- Hardness: 3500HV<
- Thickness: 1.5±0.5µm

Thin film suitable for high precision molds
Smooth TiAlN coating

- Heat resistance temp. : 800°C
- Surface roughness : Rz<0.2
- Friction coefficient : 0.5
- Coating temp.: <500°C

Smooth MX

Titanium Molybdenum Nitride (UBMS)

- Hardness: 2000HV<
- Thickness: 3±1µm

High adhesion by molybdenum
Smooth TiMoN coating

- Heat resistance temp. : 500°C
- Surface roughness : Rz<0.1
- Friction coefficient : 0.5
- Coating temp.: <500°C

Smooth CX

Chromium Nitride (UBMS)

- Hardness: 2000HV<
- Thickness: 3±1µm

Overwhelming mold releasability and corrosion resistance
Smooth CrN coating

- Heat resistance temp. : 700°C
- Surface roughness : Rz<0.1
- Friction coefficient : 0.5
- Coating temp.: <500°C

Cold forging of iron-based parts

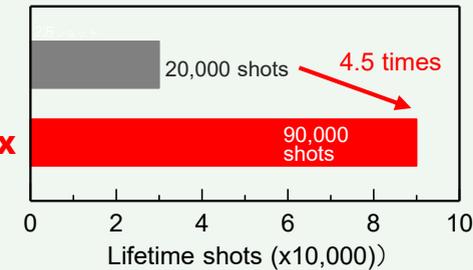


Smooth and highly adhesive smooth MX allows the punch shape to be maintained.

- Tool : Punch of powdered HSS
- Material : SS steel
- Effectiveness: Suppression of bearing wear

Other companies
TiCN

Smooth MX



Injection molding of plastic parts



The resin can be easily released from the mold, and wear caused by glass fibers can be suppressed.

- Mold : Pre-hardened steel
- Material : PA6-GF
- Effectiveness : Suppression of adhesive wear

Other companies
CrN

Smooth CX

