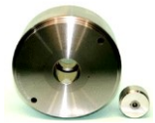
Deep hole type　Deep hole inner surface PVD coating

The new coating enables the formation of a protective ceramic film on the inner surface of deep holes while retaining the advantages of PVD coating which can be processed at 500℃ or lower. It improves the life of deep-hole dies and deep-hole parts with progressive wear on the inner surface of the deep hole.

diXis® Facing dual-beam arc ion plating

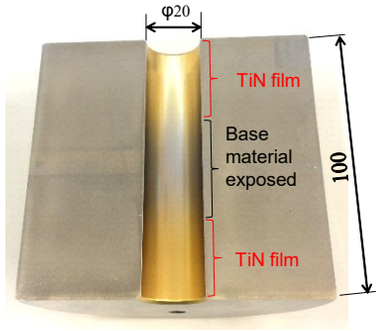
Can the inner surface of the deep hole be PVD coated?

With general PVD coating, it is extremely difficult to form a film on the inner surface of a deep hole that exceeds L (length) / D (inner diameter) ≒ 1.



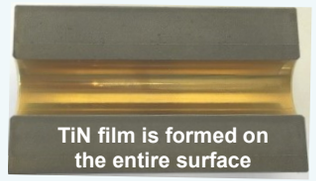
For cold forging

For powder molding



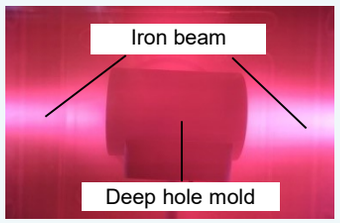
Cut model of deep hole mold
L/D=5　(hole dimension: φ20×100)

- Unique facing dual-beam arc ion plating realizes ceramic film formation on the inner surface of deep holes.
- Hard ceramic protective coatings (TiN, TiAlN etc.) can be formed on the inner surface of deep holes with L (length) / D (inside diameter) = 2-7.
- Even on the inner surface of the deep hole, it exhibits the same high hardness and excellent adhesion as a general ceramic protective film.

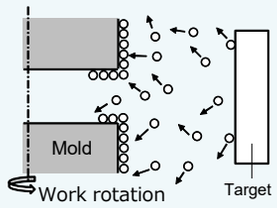


L/D=5 (inner diameter :φ10×50)

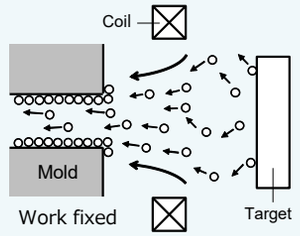
Cut model of deep hole mold with **diXis-TiN** generated



Ion beam irradiation



General PVD coating



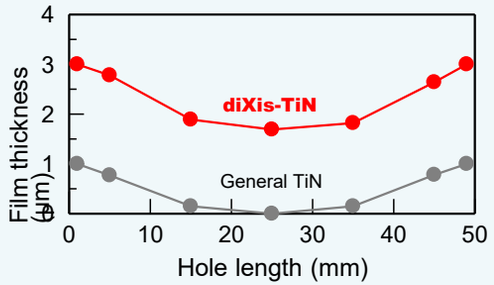
Generation image of **diXis**

Deep hole type　Deep hole inner surface PVD coating

Application to deep hole

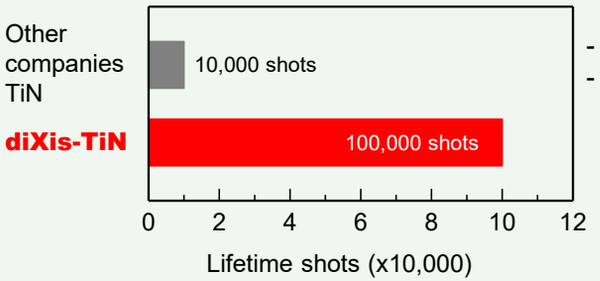
Film thickness distribution

- Inner surface of through-hole that emphasizes wear resistance:
  L / D ≤ 5 is recommended
- Inner surface of through-hole that emphasizes mold releasability:
  L / D ≤ 7 is recommended



Powder sintering molding of iron-based automobile parts

In powder sintered molds for automotive parts made of pure iron, the lifetime has been improved more than 10 times compared to conventional molds.



- Carbide shrink-fit die
- Hole dimensions :φ10×100L

Lineup

diXis-TiN
Titanium Nitride
Best-balanced gold for all types of deep hole molds
- Hardness: 3000HV<
- Thickness: 3±1μm
- Heat resistance temp. : 600℃
- Surface roughness : Rz<0.8
- Friction coefficient : 0.5
- Coating temp.:<500℃

diXis-TiCN
Titanium Carbon Nitride
For galling of deep hole dies
Low friction coating
- Hardness: 4000HV<
- Thickness: 3±1μm
- Heat resistance temp. : 400℃
- Surface roughness : Rz<1.0
- Friction coefficient : 0.2
- Coating temp.:<500℃

diXis-TiAlN
Titanium Aluminium Nitride
Excellent wear resistance and heat resistance
Coatings for metal molding
- Hardness: 4000HV<
- Thickness: 3±1μm
- Heat resistance temp. : 800℃
- Surface roughness : Rz<1.0
- Friction coefficient : 0.5
- Coating temp.:<500℃

diXis-CrN
Chrome Nitride
Excellent mold releasability and corrosion resistance
Coatings for resin molding
- Hardness: 2500HV<
- Thickness: 3±1μm
- Heat resistance temp. : 700℃
- Surface roughness : Rz<0.8
- Friction coefficient : 0.5
- Coating temp.:<500℃

diXis-Acro
Aluminum Chrome Nitride
For harsh wear environments
New generation basic AlCrN
- Hardness: 4000HV<
- Thickness: 3±1μm
- Heat resistance temp. : 1000℃
- Surface roughness : Rz<1.0
- Friction coefficient : 0.5
- Coating temp.:<500℃

It can be used not only for round holes but also for various hole shapes.