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# Plasma Coating Total Solution

**Plasma  
Technology**  
Infinite Possibilities

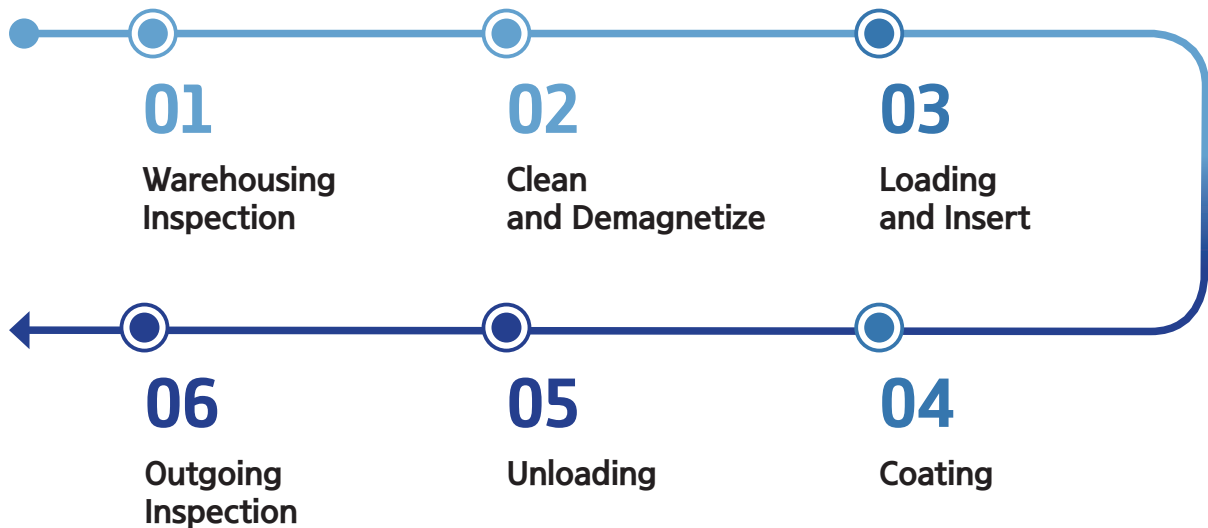
NESS Co., Ltd.

The Most Competitive Company NESS will be your best partner

# Plasma Coating Total Solution



## Production Process



## Plasma Coating

- Abrasion resistance
- Low frictional force
- High hardness
- Chemical stability



- Increase in tool and parts life
- Reduction of maintenance cost
- Increased productivity
- Quality improvement effect

## Thin Film Deposition System

- Full automatic and semi-automatic production process control
- Automatic system error detection and process data storage
- Chamber size can be customized to customer's requirements
- DLC coating system
- PECVD coating system
- Arc Ion Plating coating system
- Sputter coating system
- Filtered Arc Ion Plating coating system
- Ion Beam Sputter coating system
- Ultrasonic coating system



# Plasma Technology Infinite Possibilities

Ness offers high hardness coating services (DLC, TiN, CrN and TiSiN etc.) using plasma. We also manufacture and sell a variety of plasma coating systems to meet customer needs. As a specialist pursuing total plasma coating solution, Ness is doing its best to provide customer-oriented optimal plasma solution and coating services based on excellent technology and continuous research and development. In the future, we will redouble our efforts to become a company that satisfies customers with continuous change and development.

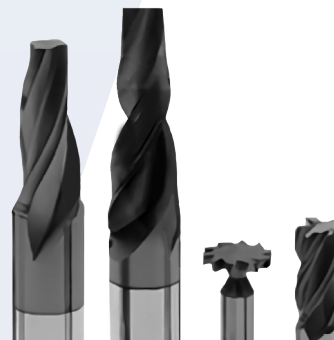
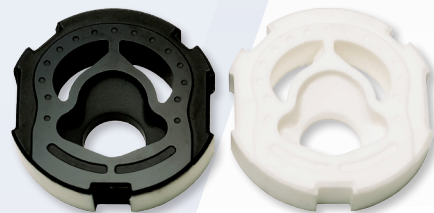
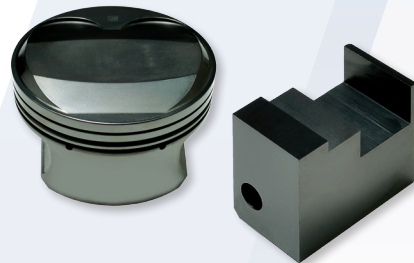
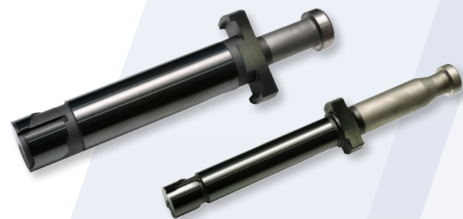


## DLC

As an acronym for Diamond-Like Carbon, DLC represents a carbon coating with properties similar to diamonds, a thin film with high hardness, low coefficient of friction and chemical stability. It can be applied to power transmission parts, injection molds, etc.

### Specifications

Coating Material	Carbon	Friction Coefficient	Less than 0.2
Color	Dark gray or Black	Thickness	0.8 ~ 3 $\mu\text{m}$
Hardness	2,000 ~ 3,000Hv	Maximum Application Temperature	300°C
Application Fields	Power transmission components, injection molds, ceramics, cutting tools, automobile parts, medical devices and semiconductors etc.		



## WCC

As an abbreviation for Tungsten Carbide Coating, WCC represents a Tungsten (W)-containing carbon coating, a thin film with abrasion resistance that reduces adhesive wear associated with bonding or cold welding. It can be applied to power transmission parts, low-friction parts, and dry running parts.

### Specifications

Coating Material	Carbon	Friction Coefficient	Less than 0.2
Color	Dark gray or Black	Thickness	1 ~ 3 $\mu\text{m}$
Hardness	1,800 ~ 2,300Hv	Maximum Application Temperature	300°C
Application Fields	Power transmission components, injection molds, ceramics, cutting tools, automobile parts and medical devices		

# TiN

TiN is the most generalized arc coating thin film with corrosion resistance and abrasion resistance. It is applied to punching, mold forming, and tools, and it is used to improve the life and quality of the product without changing the hardness and dimensions of the base material.

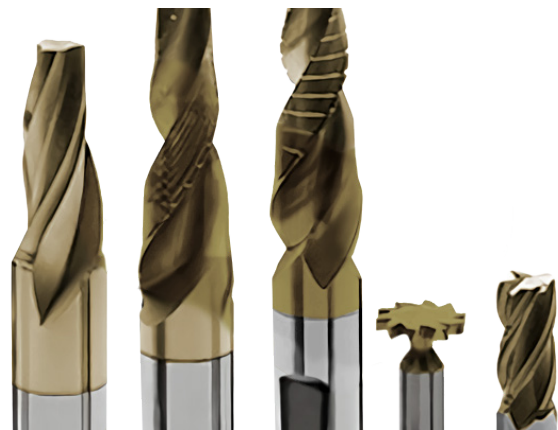


## Specifications

Coating Material	TiN	Friction Coefficient	0.6
Color	Gold-Yellow	Thickness	2 ~ 4 $\mu\text{m}$
Hardness	More than 3,000 Hv	Maximum Application Temperature	600°C
Application Fields	Cutting tool (mainly drill type), wear resistant, universal, decorative, plastic injection mold and medical devices etc.		

# TiSiN

It is a thin film used in extreme cutting conditions. It is composed of multi-layer nano compound composed of amorphous  $\text{Si}_3\text{N}_4$  in TiN structure. It is applicable to high-hardness materials that require properties to reduce heat transfer, oxidation and abrasion at the cutting edge, and to high-speed processing in no-lubrication condition.

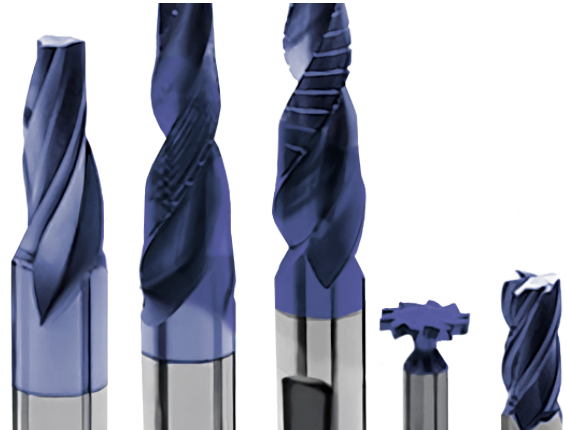


## Specifications

Coating Material	TiSiN	Friction Coefficient	0.3
Color	Native Copper	Thickness	2 ~ 4 $\mu\text{m}$
Hardness	More than 3,200 Hv	Maximum Application Temperature	1100°C
Application Fields	High speed tool, cutting tool, cemented carbide end mill for fine machining, gear cutting tool		

## AlCrN

It is an AlCr based thin film, recently noted as an arc coating thin film. Applied to tools requiring high temperature oxidation resistance, high temperature hardness and low thermal conductivity, AlCr protects the tool and minimizes the cutting load due to high cutting toughness.



### Specifications

Coating Material	AlCrN	Friction Coefficient	0.35
Color	Light Violet	Thickness	2 ~ 4 $\mu\text{m}$
Hardness	More than 3,200 Hv	Maximum Application Temperature	1100°C
Application Fields	Applications requiring oxidation resistance and corrosion resistance, such as cutting and pressing, die casting, semi-cold forming, and injection molding.		

## CrN

It is a thin film that can cope with environmentally regulated Cr wet plating method. It has high temperature corrosion resistance and high elasticity, adhesion, oxidation resistance, high hardness compared with Cr plating layer, and maintains high performance in high-temperature and high-pressure environment.



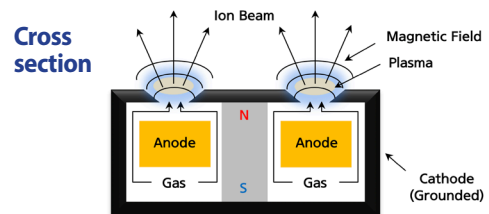
### Specifications

Coating Material	CrN	Friction Coefficient	0.5
Color	Silver Gray	Thickness	2 ~ 4 $\mu\text{m}$
Hardness	More than 2,000 Hv	Maximum Application Temperature	700°C
Application Fields	Injection mold, home appliance OS device, automobile parts, medical devices, die casting mold etc.		

# DLC Coating System

## / System for DLC and WCC Coating using Linear Ion-beam Source

The ion-beam source applies a high electric field (hundreds to thousands of volts) over a narrow track (the distance between the anode and the cathode). At this time, when a high purity gas is caused to flow through the track, the gas is decomposed into an atom, and plasma (light energy) is generated by this phenomenon. The generated plasma is emitted straightly and strongly outward by the magnetic field. The ion-beam source of this principle is used to form the DLC film.



## / Specifications

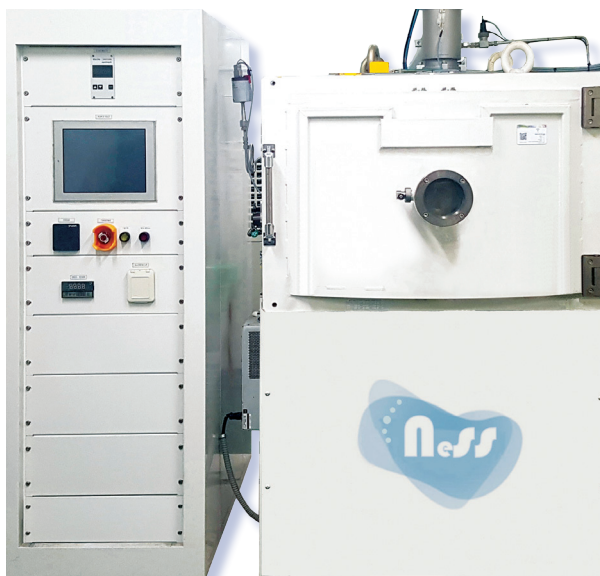
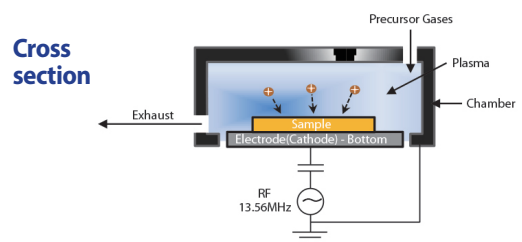
Application	DLC coating, WCC coating, Metal coating	
Plasma source 1	Iron Beam source	Source size – 380 x 110 mm or 840 x 100 mm
Plasma source 2	Sputter source	Source size – 400 x 115 mm or 880 x 115 mm
Chamber size	Batch type	H 1000 x Ø1000 mm or H 600 x Ø800 mm
Product loading	Vertical type	Revolution and rotation
Product control	PC Window control	Full automatic process and process data store

# PECVD System

## / Surface treatment using CVD method and coating system of thin films such as DLC and Si-DLC

A small amount of high purity gas (mainly reactive gas) is allowed to flow into the vacuum chamber and a high electric field (hundreds to thousands of volts) is applied to the electrode portion at the same time. Plasma is generated by the decomposition and reaction of high-purity gas between the electrode and the chamber.

A thin film is formed by utilizing the plasma generated at the electrode portion. Rf power and pulsed power are used for power supply devices that generate high electric fields.



Operating PECVD

## / Specifications

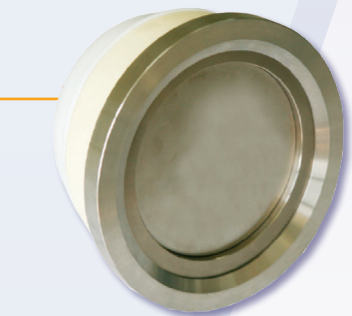
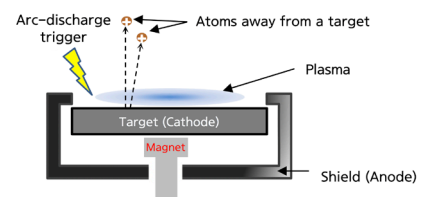
Application	DLC, Si-DLC coating	
Plasma source	Rf Power with matching box	
Chamber size	Batch type	H 600 x Ø800 mm
Product loading	Horizontal type	Rotation
Product control	PC Window control	Full automatic process and process data store

# Arc Ion Plating System

**System for coating thin films of nitride such as TiN, TiSiN, and AlCrN using Arc Source**

Cathodic arc source allows a small amount of high purity gas (mainly reactive gas) to flow through the chamber while momentarily striking the cathode of the source with high current (tens to hundreds of A). At this time, a plasma spot occurs on the surface of the target, and the spot randomly emits target ions to the surface of the target. The released ions form a thin film together with the reactive gas in the chamber.

**Cross section**



**Operating Cathodic Arc source**

## Specifications

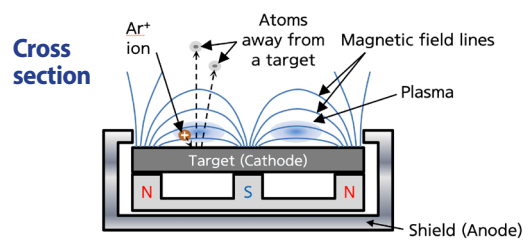
Application	Ceramic coating	TiN, TiSiN, AlCrN etc.
Plasma source	Iron Beam source	Ø125 mm
Chamber size	Batch type	H 1000 x Ø1000 mm or H 600 x Ø800 mm
Product loading	Vertical type	Revolution and rotation
Product control	PC Window control	Full automatic process and process data store

# Sputter Coating System

## Various metal coating systems using sputter source

A small amount of high purity gas (mainly reactive gas) is allowed to flow into the vacuum chamber and a high electric field (hundreds to thousands of volts) is applied to the electrode portion at the same time. Plasma is generated by the decomposition and reaction of high-purity gas between the electrode and the chamber.

A thin film is formed by utilizing the plasma generated at the electrode portion. Rf power and pulsed power are used for power supply devices that generate high electric fields.



## Specifications

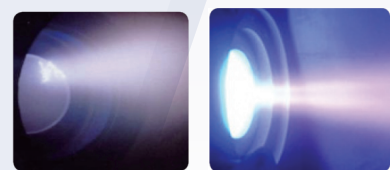
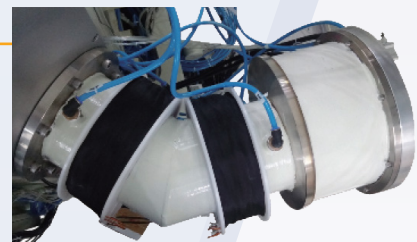
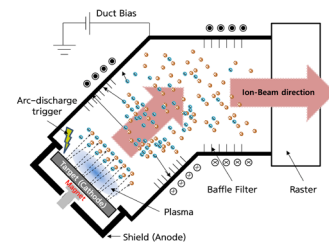
Application	Metal coating	Al, Cu, Ti, Cr etc.
Plasma source	Sputter source	Source size – 400 x 115 mm or 880 x 115 mm
Chamber size	Batch type	H 1000 x Ø1000 mm or H 600 x Ø800 mm
Product loading	Vertical type	Revolution and rotation
Product control	PC Window control	Full automatic process and process data store

# Filtered Arc Ion Plating System

**Thin film coating system with excellent surface roughness applied by filter method during arc ion plating coating**

It is a source that uses duct to filter random and some impurities that occur in the Cathodic Arc source. The electromagnetic field is added to the duct to induce the metal ions and to filter the impurities and macroparticles to form a very pure and outstanding ultra-high hardness thin films.

**Cross section**



**Operating Filtered Vacuum Cathodic Arc**

## Specifications

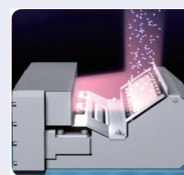
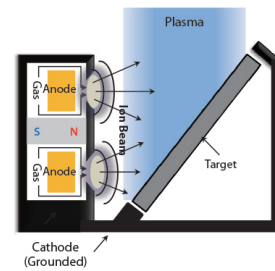
Application	DLC(ta-C) coating, Metal coating	Ultra smooth Surface
Plasma source	Cathodic Arc source	Electromagnetic field controled
Chamber size	Batch type	H 1000 x Ø1000 mm or H 600 x Ø800 mm
Product loading	Vertical type	Revolution and rotation
Product control	PC Window control	Full automatic process and process data store

# Ion Beam Sputter Coating System

**Multilayer optical thin film coating system using Ion beam sputter**

Applying stable and strong plasma (mainly inert Ar ions) formed on the ion-beam source to the surface of the sputter, only very fine (Denty) target ions with little macroparticles are sputtered. These ions form optical, fine, or multilayer thin films.

**Cross section**



**Operating Ion Beam Sputter**

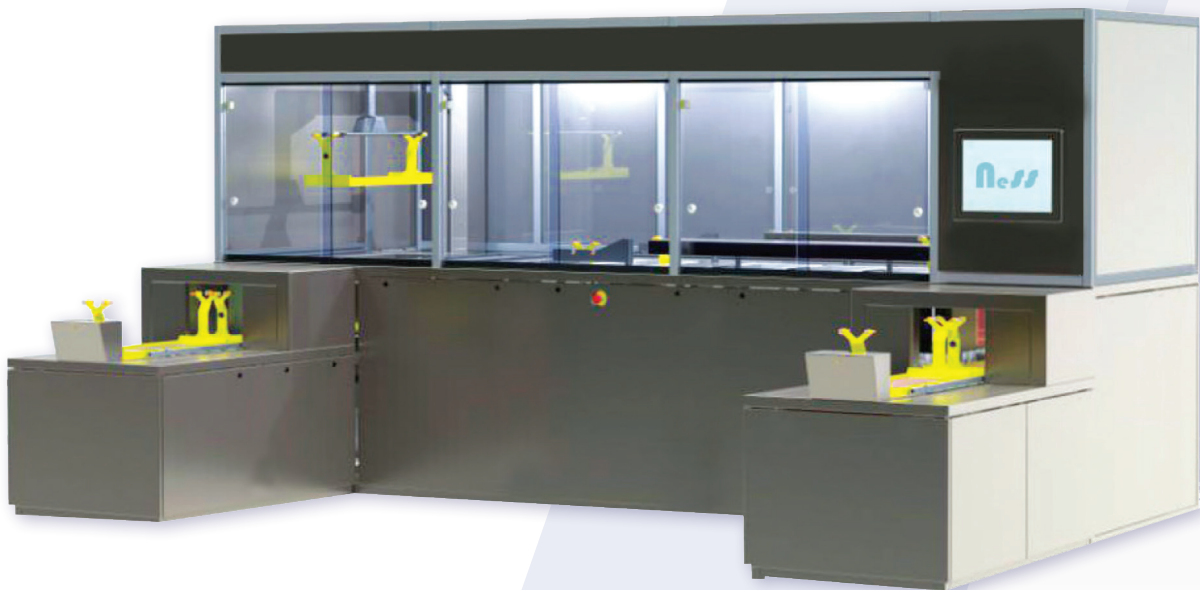
## Specifications

Application	Optical coating, Metal coating	TiO <sub>2</sub> , SiO <sub>2</sub> , Al, Cu, Ti, Cr etc.
Plasma source	Ion Beam Sputter source	Source size – 380 x 100 mm or 840 x 100 mm
Coating target	Muti-layer	Max – 4 kinds of target control
Uniformity	> ±3%	70% of Source size
Chamber size	Batch type	H 1000 x Ø1000 mm or H 600 x Ø800 mm
Product loading	Vertical type	Revolution and rotation
Product control	PC Window control	Full automatic process and process data store

# Ultrasonic Cleaning System

## / Ultrasonic system for pretreatment of surface of products to be coated with plasma

It is a system for pretreatment of surface treatment which removes impurities, oil, and organic components of the product by applying strong ultrasonic waves with various frequencies to the distilled water containing organic solution (alkali or detergent). It is used for cleaning pretreatment which prevents separation of the thin film and increases the bonding strength of the thin film.



## / Specifications /

Cleaning sequence	Ultrasonic with an Alkaline solution etc.
Process type	Continuous / Batch type
Tank size (LxWxH)	550 x 400 x 300 or Free dimensions
Ultrasonic Power, Frequency	900W, 28kHz & 40kHz or Customer order
Process control	PLC Program controller / Manual or Automatic

## Low-temperature Coating

with the Unique Technology of Ness!



In ordinary plasma coating equipment, the higher the temperature, the faster the reaction between the ions forming the plasma and the surface. The increase in the reaction rate positively affects the diffusion reaction and ion mobility. This effect was proved by various principles such as the Arrhenius equation.

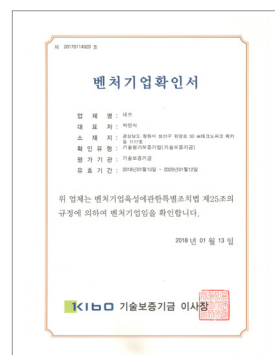
Due to such a principle, there are many cases where the vacuum deposition is performed by raising the ambient temperature by 400°C or more. However, high temperature coatings have the potential for deformation and fracture of the base metal. As a result, the coating base material is limited to metals.

In order to solve these drawbacks, Ness developed a process using an ion source to enable coating at low temperatures.

Coating Type	Temperature in Chamber during Plasma Coating
DLC / WCC / CrN	70°C ~ 110°C
TiN / TiSiN / AlCrN	200°C ~ 250°C

## Certificates

### Certificates



- 01 ISO 9001:2015
- 02 ISO 14001:2015
- 03 Patent Certificate
- 04 Company Affiliated Research Institute Certificate
- 05 Venture Company Certificate

# Ness creates happiness, not products

With endless efforts and challenges to the future,  
we are moving on to a better world where you can proceed.



## Directions



**Ness**

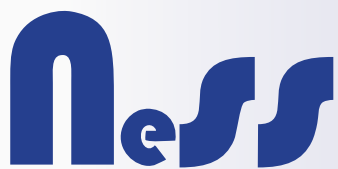
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