TechnoCoat®

Infinite possibility

Electro-Spark Deposition

Depo

Coating and Overlay

Depo Series

SparkDepo
MicroDepo
Digital SparkDepo
Ultrasonic Depo

Best Solution for Preventive Maintenance & Overlay Repairing of Machine Parts, Molds & Dies

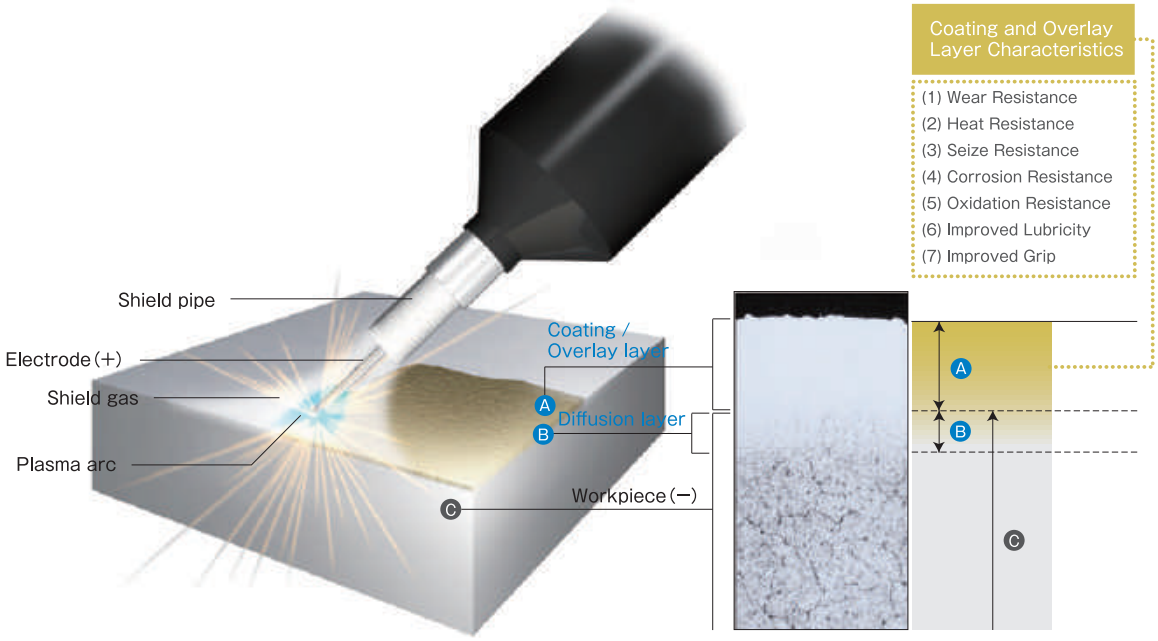
Depo Series are Newer Coating & Overlay Device depositing a consumable electrode to a work surface by Arc Sparking

Preventive Maintenance and Overlay Repair of Mechanical Parts and Dies

Depo Series are a newer Coating and Overlay method applying EDM (Electrical Discharge Machining) principle.

Principals of Depo Series - High Bonding Strength Mechanism -

A Depo series device discharges direct current charged in the capacitor inside the main unit for a very short time of 10^{-6} to 10^{-5} seconds with a period of 10^{-3} to 10^{-1} seconds. Electrode material heat portion in contact with the workpiece is heated from 8,000 to 25,000℃. Then, the heated electrode material turns into plasma and metallurgically transfers to the workpiece surface. Next, the electrode material alloys with the surface, accumulates on it, and then spreads and enters under the surface, resulting in strong bonding.

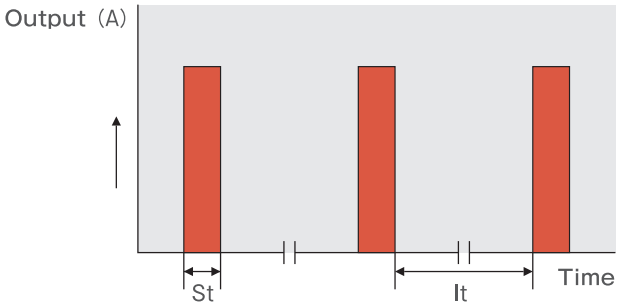


Features of Depo Series - High Bonding / High Quality / High Efficiency -

Low Heat Input by sufficient heat diffusion time

No distortion, shrinkage, pin-holes, or stress occur

The Spark time is extremely short compared with the interval time so that no heat accumulation occurs during diffusion and deposition periods.



St (spark time) : 10^{-6}～10^{-5}
It (interval time) : 10^{-3}～10^{-1}
Output (A) : Capacitance (μF)

Extremely High Bonding Strength by Strong Diffusion Layer Formation

Therefore, no removing after the process.

Electrode Material is deposited and alloyed to work surface with forming a diffusion layer with penetration like grown roots. This provides Strong Boding Coating and Overlay deposition without removing. (referring to a previous page photo)

Applicable Substrates

Low and medium carbon steels, Tool steels, Die and Mold steels, Cast steels, Stainless steels, Aluminum alloys, Copper alloys and the majority of alloys and composites having sufficient electrical conductivity.

Alternatives

Plating, Thermal spray, CVD, PVD, TD treatment, Nitriding, Carburizing, Quench hardening, Welding, Carbides, Diamond, Lining etc.

Tremendous On-site Workability

No required to dis-assembling large works, and processable only to nessary part

Portable and best fitable for On-site working.
No pre or post heating required. Significantly improve work efficiency.

Depo Series Application Examples & Usages

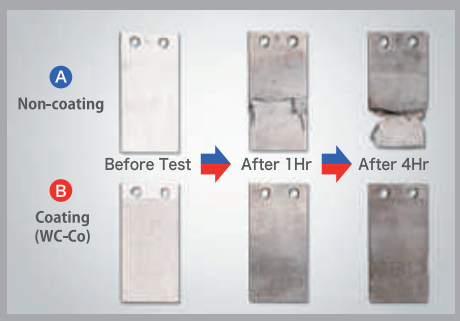
Coating - Longer Service Life by Preventive Maintenance

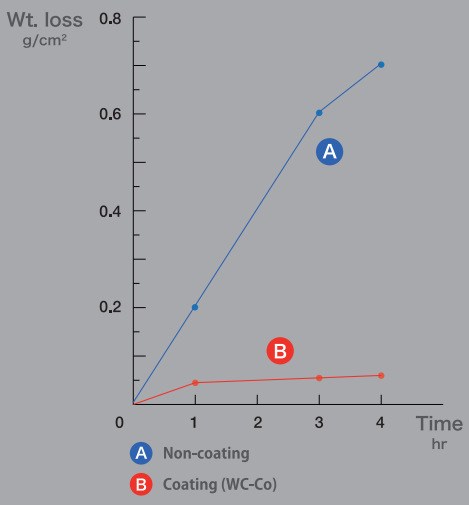
Longer service lives of Mechanical Tools, Molds & Dies, and Tools to apply Coating layer of WC, TiC, Cr3C2, VC etc. that resists to wear, heat, seizing, corrosion, oxidation etc.

Application Example 1

Preventive Maintenance and Defective Percentage Reduction by Coating for Al (Mg) Die Casting Dies

Erosion by molten aluminum, abrasion damage and heat checks in aluminum die casting dies are common problems. The damage can be reduced dramatically by applying tungsten and or titanium carbide in the problem prone areas to new or repaired dies using the electro-spark process. The coating protects the die surface due to its extremely high anti-wetting property against molten aluminum and maintains high hardness at operating temperatures. The coating minimizes erosion scoring and heat checks and extends the die life. As an added benefit the coating increases product quality by providing excellent release properties, liquid flow and gas release.



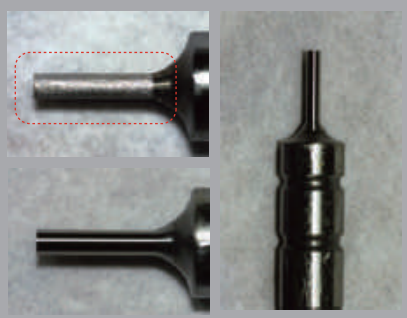


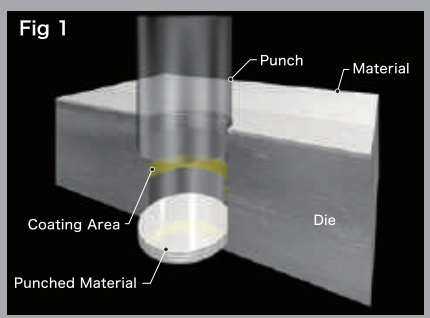
Erosion test of coating in molten aluminum
Comparison of liquid metal erosion between coated & non-coated sample
■Test method / Sample : SKD61 Molten Al : ADC12 (680℃) rotated at 30rpm
The weight loss of the coated sample was less than 10% of the non-coated piece.

Application Example 2

Scum Riser Prevention for Press Dies

Fig 1 is a schematic of Depo Series Coating procedure. Punch's side and bottom face are coated by WC to grant wear resistance and seizure resistance, and may prevent punching material plate lifting during the punch removing and adsorption. Specially, it is very effective against sticky materials like SUS or Al etc..





Depo Series Application Examples & Usages

Overlay - Necessary Part Repairing at On-site

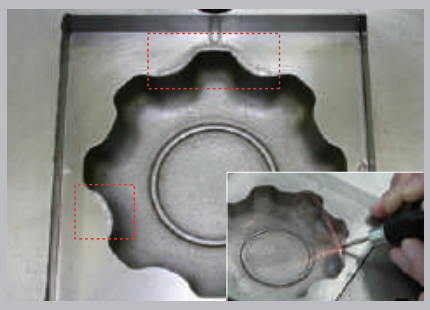
Repairing mechanical parts, molds, dies, jigs, and tools that are worn, corroded, pin-holes, or machined error by Overlay. Portable Depo Series may repair only to necessary part without dis-assembling large works

Application Example 1

Plastic and Rubber Injection Molds Overlay Repairing

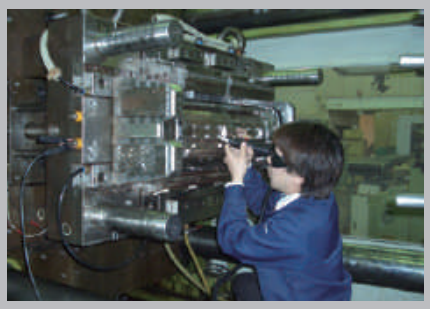
Plastic Injection Mold 01

The mold shown in the photo is processed with texture treatment on the whole cavity area in which very thin burrs occur on the parting line. For argon welding, the surrounding textured area also gets overlaid, then must be processed with texture treatment again. In addition, argon welding is likely to cause under-cut around boundary sections. Depo series devices do not cause defects caused by heat such as distortion and Under-cut because of its low heat input. That avoids the problems mentioned above.



Plastic Injection Mold 02

Depo series devices allow you to do overlay repairs in any position. And it's possible to finish the surface with hand grinder, files or oil stone because overlay can be controlled within 0.1mm of the height, meaning the overlaid part does not require a heavy machine finishing. Therefor you can do an overlay repair on a mold without removing it from the molding machine while the mold is still hot. This allows you to do a test molding then check for burrs and verify that the mold is fixed.



Rubber Injection Mold Repairing

It is difficult to do an overlay on aluminum mold and products by ordinary welding methods. Depo series can do an overlay repair without excessive melting of any protruding areas and make the finishing time shorter. Because the Overlay is more accurate.

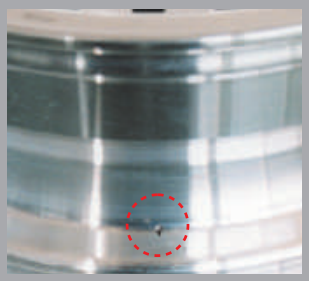
Depo Series Application Examples & Usages

Overlay - Necessary Part Repairing at On-site

Application Example 2

Aluminum Die Casting Product Repair

Easily repair porosities, pin holes, underfills, etc. on aluminum and casting products without distortion, under-cut or any other heat damages. This helps to decrease product defect rates.



Before Overlay

After Overlay

After Finishing

Application Example 3

Mechanical Parts and Equipments Repair

Overlay repair on an industrial shaft. It's very easy to repair only the required area of large workpieces without time-consuming disassembly. It's perfect for on-site repairs

Repairing damaged area (80mm L×30mm W×3mm D) of industrial shaft.

Depo Series Lineup

SparkDepo Standard Type

SparkDepo 200/300/500
SIZE : 323×420×410mm

High Quality Coating & Overlay by anyone

MicroDepo Compact & Light Weight Type

MicroDepo 50/100/150
SIZE : 255×320×290mm

Compact and Lighter Weight portable
Low Price model based on SparkDepo

Digital SparkDepo Higher Speed Type

Digital SparkDepo
SIZE : 500×600×850mm

Achieved double conventional speed
Next generation model.

Equips Rapid Charger, Voltage Detector, and Soft-Start Circuit.

Ultrasonic Depo Ultrasonic Type

Ultrasonic Depo
SIZE : 255×320×450mm

Achieved more smooth surface roughness
(Ra 1.2) Ultrasonic Coating Device

Depo Series Main Applications

Providing best solution for mechanical parts, molds, and dies
by preventive maintenance (Coating) and Overlay Repairing

Various mechanical parts, equipments, jigs, and tools on-site Overlay Repairing and Coating.

Molds and Dies Overlay Repairing / Coating	Die Casting Dies Surface Treatment	Prevention of Erosion, Seizing, Scuffing, and Heat Cracking
	Press Dies Coating	Scum Riser, Seizing, and Scuffing Prevention
	Plastic and Rubber Injection Molds Repairing	Burr formation and PL part Repairing
	Aluminum Molds and Casting Products Repairing	Pin-Holes and Underfills Repairing etc.

* Able to use for any other various applications

■Specifications of Power Supply Units

Category \ Model		MicroDepo			SparkDepo			Digital SparkDepo	UltrasonicDepo
		50	100	150	200	300	500	DSD	UD
Input: Alternating Current, Phase, Frequency		AC 100 – 110 – 200 – 220 V Single Phase 50 / 60 Hz							
Capacity	KVA	0.2	0.3	0.5	1.6	2.0	2.5	2.0	0.75
Dimension (W × D × H)	mm	255 × 320 × 290			323 × 420 × 410			500 × 600 × 850	255 × 320 × 450
Weight	Kg	11.5	12.5	14.0	31.4	31.8	32.6	50.0	21.0
Maximum Capacitance	μF	52.2	102.2	152.2	202.2	302.2	502.2	202.2	102.2
Variable Range of Frequency (spark freq. / sec.)	Hz	60 ～ 1,400			60 ～ 2,000			20 ～ 1,100	60 ～ 1,400
Coating Surface roughness	Ra	3 ～ 6	3 ～ 8	3 ～ 10	4 ～ 12	4 ～ 14	4 ～ 16	3 ～ 12	1.2 ～ 6
Max. height of profile ※1	Pt	65	75	85	135	160	220	160	65
Overlay Max. usable electrode diameter	mm	3.2	4.0	5.0	6.0	8.0	8.0	8.0 以上可	3.2 (Miniature AP)
Overlaying Speed Ratio ※2		1.0	1.4	1.7	2.0	2.4	3.2	5.0	1.4
Type		Compact, Lightweight			High Power, Wide Usage			High-Speed ※3	The Finest Coating

The specifications of the products are subject to change without prior notice to improve performance.
※1: Values based on in-house measurements ※2: Comparison based on maximum output (The rate of the MicroDepo 50 is considered to be 1.0) ※3: Coating speed more than double

■Comparison Between the Depo Series and Other Overlaying methods

Category \ Model	Depo Series	Thermal Spraying	Spot Welding		Welding	
			Sheet/Wire	Powder/Paste	Argon Welding	Laser Welding
Easy to Handle	5	3	5	5	2	5
Heat Input	5	3	5	5	1	5
Distortion, Undercut	5	3	5	5	1	5
Bond Strength	4	2	1	1	5	5
On-site Workability	5	3	5	5	5	2
Overlaying Speed	3	5	2	2	5	4
Equipment cost	4	3	4	4	5	2
Overlaying cost	5	3	4	4	4	3

＊Excellent, Satisfactory, or Inexpensive : 5 ↔ 1 : Poor, Unsatisfactory, or Expensive

■Comparison Between the Depo Series and Other Surface Treatment Methods

Category \ Model	Depo Series	Plating	CVD/PVD/DLC	TD Treatment	Nitriding/Carburizing/ Heat Treatment
Easy to Handle	5	1	1	1	1
Heat Input	5	5	1	1	1
Bond Strength	4	1	2	5	5
On-site Workability	5	1	1	1	1
Large Workpieces	5	4	2	2	4
Partial Treatment	5	2	2	1	1
Equipment Cost	4	1	1	1	1
Treatment Cost	5	5	1	1	4
Coating Thickness	< 100μm (Coarse Surface)	< 50μm	< 5μm	Impregnation	Impregnation
Coating Material	WC,TiC,Cr3C2,TiB2, etc	Cr, Ni, etc.	TiN, TiC, TiCN, etc.	VC	N Compounds, C Compounds

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