Deposition/Coating

MOLD DOCTOR
OPERATION MANUAL

Electro-Spark surface Hardening &

Micro welding Machine

LOOKTECH Co., Ltd.

Contents

LIMITED WARRANTY

Your Mold Doctor Surface Deposition & Hardening Machine is warranted against defective material or workmanship for a period of **one(1) year** from date of purchase. In the event of a failure of a product to confirm to this written warranty, Please take the following action.

1. DO NOT return your machine or accessories to us.
2. Call or e-mail to local agency or LOOKTECH Co., Ltd. Customer Service Department.
3. When you return, we're commend that the package should be insured against loss or in transit damage for which we cannot be responsible.

• This warranty applies only to the original registered purchaser. **DAMAGES TO THE PRODUCT RESULTING FROM TAMPERING ACCIDENT, ABUSE, NEGLIGENCE, UNAUTHORIZED REPAIRS OR ALTERATIONS, UNAPPROVED ATTACHMENTS OR OTHER CAUSES UNRELATED TO PROBLEMS WITH MATERIAL OR WORKMANSHIP ARE NOT COVERED BY THIS WARRANTY.**

• No employee, agent, dealer or other person is authorized to give any warranties on behalf of **LOOKTECH Co., Ltd.** If our inspection shows that the problem was caused by workmanship on normal condition within the limitations of the warranty, **LOOKTECH Co., Ltd.** will replace the machine or accessories free of charge.

• **LOOKTECH MAKES NO OTHER WARRANTY OF ANY KIND WHATEVER, EXPRESSED OR IMPLIED AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED THE ABOVE MENTIONED OBLIGATION ARE HEREBY DISCLAIMED BY LOOKTECH AND EXCLUDED FROM THIS LIMITED WARRANTY.**

• This warranty gives you specific legal right and you may also have other rights which vary from state to state. The obligation of the warrantor is solely to replace the product. The warrantor is not liable for any incidental or consequential damages due to any such alleged defect. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusion may not apply to you.

• For prices and warranty fulfillment in the continental United States, Europe,
Canada and Mexico, contact Customer service or the **LOOKTECH** sales representative in your area.

LOOKTECH Co., Ltd.
718 Shin Hyun-Ri, Opo-Eup, Kwang Ju-City, Kyung Gi-Do
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● Introduction of Electro-Spark Surface Deposition/Coating Technology

In most cases, molds and dies are made after various finish processes such as heat treatment, quenching, tempering etc. However, there is a growing need for harder and more delicate material, which has better durability and easier processing. Every mold maker seeks ways to reduce costs using a surface hardening method over a cheaper material rather than using more expensive harder material.

There are several surface treatment processes that have been widely used, such as Nitriding heat treatment, PVD, CVD, Electro- Plating, TD and etc., which can improve anti-wear, anti-corrosion, anti-heat and anti-softening of mold material by forming a lubricious film over the metal surface. However costly equipment, lengthy processing time and pollution have been a few of the disadvantages of these methods. The Electro-spark surface deposition/Coating process can eradicate these problems using electro-spark technology.

Since the instantaneous spark temperature of 25,000 degrees C ionizes the electrode, you can attain high density bonding with no heat input or transformation to the base material. By virtue of this technology, mold life can be extended by improving anti-wear and anti-heat and increase productivity and save cost by maintaining and repairing mold surface with deposition of our electrodes.

We believe you can benefit from using the **MOLD DOCTOR** in various applications and reduce costs while increasing productivity consequently. Please read this manual thoroughly to you take full advantage of this machine and to operate safely and efficiently.

● General Information about MOLD DOCTOR

THANK YOU FOR PURCHASING MOLD DOCTOR.
READ THIS MANUAL THOROUGHLY BEFORE YOU ATTEMPT TO OPERATE YOUR MOLD DOCTOR.

Please check the packages thoroughly. If there are any missing or damaged accessories, please call the customer service dept. of **LOOKTECH Co., Ltd.**. Tel : 82-31-719-0780

Package 1 of 2

1. Control Box
2. Rotation applicator
3. Power cable
4. Ground cable with magnet
5. Argon gas regulator with hose
6. Protective goggle
7. 10 ea LT-01 electrodes
   2 ea TC-01 electrodes
   10 ea AL-01 electrodes
8. Tools :
   Small wrench, Small Punch

Small hammer, Chuck Key & 5pcs Gas Holder
9. Applicator holder
10. Operation manual

Package 1 of 2
Tool box

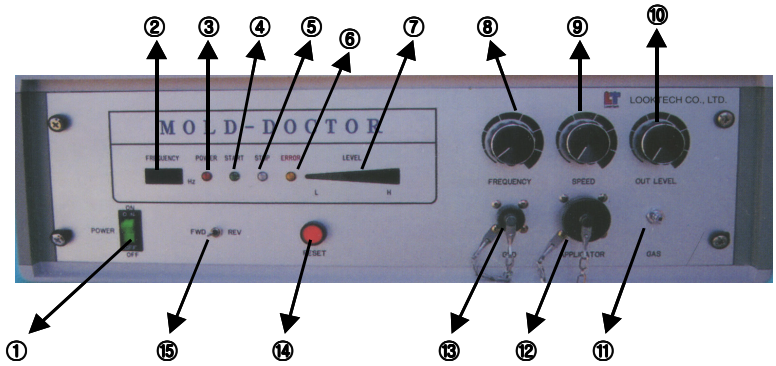
- **Note : If you need to purchase other electrodes applicable to your treatment please call LOOKTECH Co., Ltd. Please refer to Appendix A for electrode selection.**

Chapter 1. Function

1) Name and function of switches

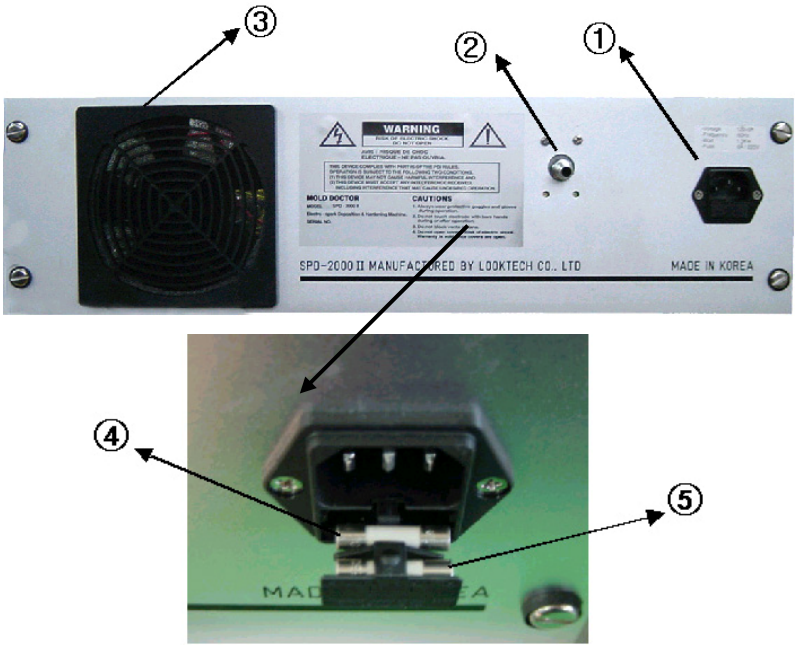
You can operate **MOLD DOCTOR** using various switches. The following will serve to provide an explanation of each of part.

Front Panel



1. Power Switch : Power on-off switch. Green light indicates power is on.
2. Frequency Indicator : Spark Frequency level.
3. Power Lamp : Red light will illuminate when power is on.
4. Start Lamp : Applicator light. Green light will be on when applicator is in operation.
5. Stop Lamp : Applicator light. White light will be on when applicator is stop.
6. Error Lamp : Indicates troubles. Yellow light will illuminate in case of circuit malfunction.
7. Level Indicator : Spark Current level indicator.
8. Frequency Volume : Adjusts Spark Frequency.
9. Speed Volume : Adjusts Rotation speed of Applicator.
10. Out Level Volume : Adjusts Spark current.
11. Gas Connector : Connects Argon Gas supply to Applicator.
12. Applicator Connector : Connects Control Box to Applicator.
13. GND Connector : Connects Ground Cable.
14. Reset Button : Resets Control Box.
15. FWD, REV Switch : Changes rotation direction of Rotation Appllicator. (Forward, Reverse)

Rear Panel



1. Power Supply : Connects Power Supply 120V or 230V.
2. Gas Connector : Connects Control Box and Argon Gas Regulator.
3. Fan : Cooling fan, Radiates heat generated in the Control Box.
4. Main Fuse : Protects circuit in control box.
5. Spare Fuse

● **Note : How to change fuse in Plug Box.**

ⓐ Put the pincette or small flat screw driver in the key groove and then, open the fuse box drawer.

ⓑ You can find two fuses : one is main fuse and the other is spare fuse.
Spare fuse is located in inside holder case, so you can distinguish easily.

ⓒ Pull main fuse out upward and discard.

ⓓ Push the spare fuse from one side to the other. After that, pull the spare fuse out completely with your fingers.

ⓔ Put the spare fuse in the main fuse seat.

ⓕ Close the Fuse box drawer until you hear “click” sound.

Chapter 2. Installation

2-1 Front Panel & Rear Panel

Place MOLD DOCTOR on an even surface and connect components as follows;

1. Front Panel : Connect Applicator, Gas, and Ground connectors to the matching connector ports and tighten.

Ground

Applicator

Gas

* When you connect gas connector, push the connector smoothly until you hear “click” sound. (When you disconnect gas connector, pull the disconnect cover ring smoothly)

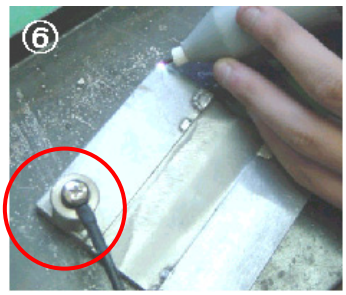
2. Rear Panel : Connect power Cable and Gas Regulator hose. When connecting the Argon Gas hose, do not use excessive force. Connect horizontally. You will know that the hose connector is in place when you hear a click.

Gas Regulator hose

Power Cable

Now you are ready to operate **MOLD DOCTOR.**

3. Attach ground magnet to the base metal which you need to repair or treat. It will be better to attach the magnet to the repair spot as close as possible. Make sure to remove foreign materials, such as oil, stain, dirt, dust, etc., from the surface.



4. Select an electrode, either for deposition or coating, and install in the applicator. Refer to chapter 4-1 for electrode installation procedure. Leave Argon gas cylinder and regulator valve closed.

Warning : Do not place any objects near the back of the machine which might block ventilation fans. This may cause machine malfunction.

2-2 Applicator

1. For Coating (Hardening) and Deposition (Overlaying)
2. On-Off by one touch switch attached
3. Speed and direction of electrode controlled by switches on control box

● Caution

1.For cooling the applicator, it is recommended that **20 minutes operating & 5 minutes rest.**

2. Appropriate Rotation Applicator speed is required. If the speed is too slow electrode may stick to base metal. Use proper speed level 3～4.

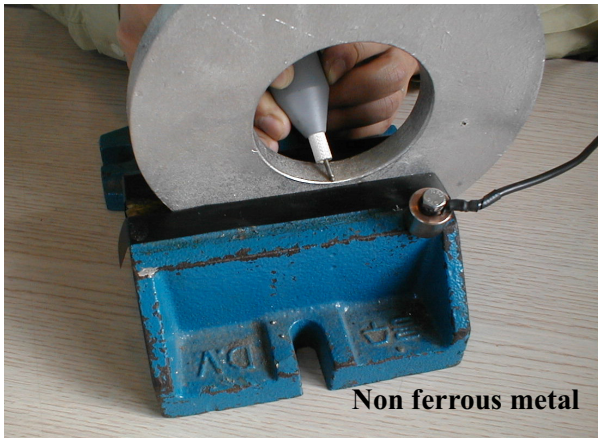
3. Electrode must fit into the applicator. Loose electrode may cause electro-spark on spots other than base material or electrode. Unless applicator rotates evenly, you may not obtain good coating or overlaying results.

Warning : In case of trouble with applicator, do not attempt to dis- assemble or repair. Contact LOOKTECH Co., Ltd. (TEL : 82-31-719-0780) for replacement or repair.

2-3 Ground

1. Applicator is positive(+) and base material is negative(-). Ground is necess- ary to make base material negative. For better spark effect good contact between base material and electrode is essential.

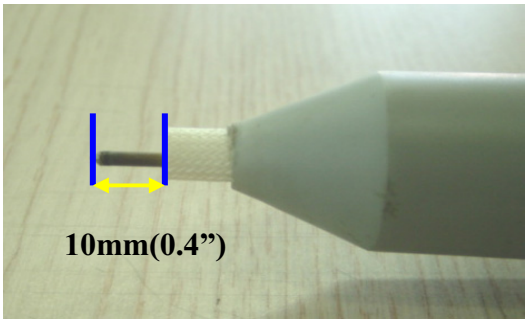
2. MOLD DOCTOR uses the magnet as a ground clamp for easy attachment to the ferrous metal. For non-ferrous metal, use ferrous metal as ground and put non-ferrous metal base material on top as shown.



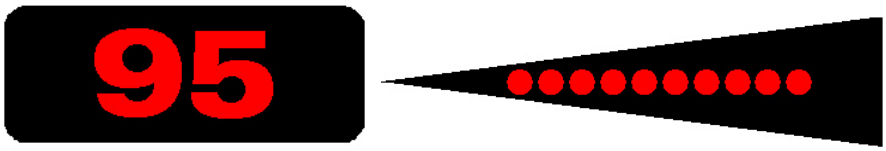
Chapter 3. Operation

Basic operation method is following ;

1. Install Mold Doctor as you see in Chapter 2.
2. Choose suitable electrode (refer to Appendix A) and put the electrode in the applicator. (refer to 4-1 electrode installation procedure) The appropriate electrode length is 10mm from the gas holder.



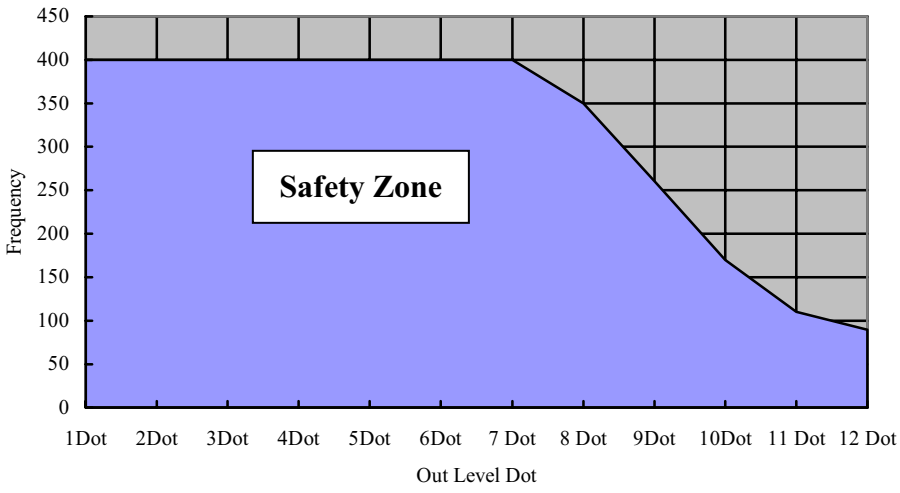
3. Operate according to the coating & deposition conditions in appendix A.
   ► For example, when you deposit with LT-01, adjust FREQUENCY to 90~100, OUT LEVEL to 9~11 dots and SPEED to middle(this can be adjusted according to operation condition) and then, you can start to deposit.



Frequency **Level**

4. Do not connect or disconnect any connectors to or from Control Box when power is on.
5. Basic tip of applicator operation.
   ► Do not disassemble applicator when it does not start.
   ► Do not change rotation direction while applicator is in use. Always turn off applicator before changing directions.
   ► If applicator is getting too hot, rest for a while to cool the applicator.

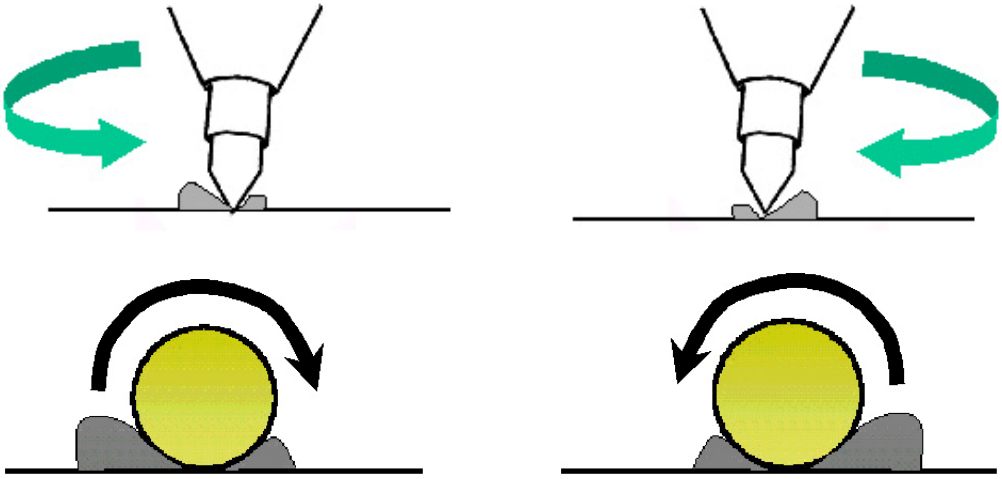
► **Caution :** In normal application, you can follow instructions in this manual. However, in special working situation, following condition should be applied to prevent from over-heat the machine.



When you adjust level to outside of Safety Zone**, after 4 minutes operation, 10 minutes rest is needed.**

● **Basic tip of deposition**

1. The contacted area of electrode is deposited.
2. When electrode is rotating, the following side of rotating direction is more deposited than opposite side. (refer to following pictures)



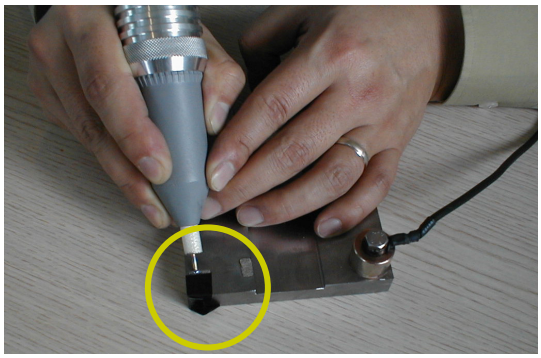
Regarding more detailed operating method according to specific application, you can refer to following instruction.

3-1 Hardening (Coating) Procedures

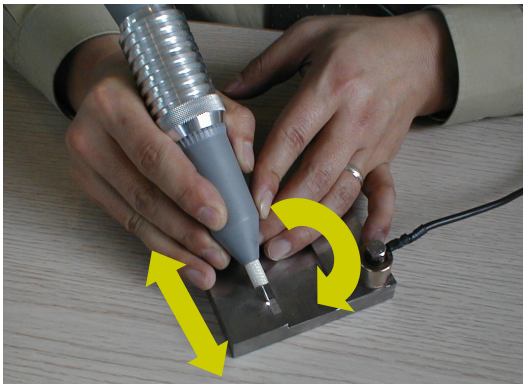
Coating ----------> Low Power

Repeat coating 2-3 times to form a coating layer. Coating should be applied to surfaces which would benefit from anti-wear, anti-heat and anti-corrosion. Coating layer will have a whitish silver color. You may use a little amount of argon gas for better surface appearances, but limit gas amount under scale " 1 " on the flowmeter.

1. Always wear goggles to protect eyes.
2. Use the Applicator for hardening and deposition.
3. Set Frequency at **50 -60 Hz** and Out level at **5-6 dots**. Increase Frequency and Out Level to high if you desire thicker coating.
4. Do not put excessive power on the electrode. Gently scrub electrode over the surface. You may get a better coating by making small circles with the electrode.
5. Coating should be done repeatedly from left to right or from right to left. Do not use too high of an Out Level since sparks may damage on edges or angles.
6. You may notice the electrode tip color is changing to red. Reduce Frequency and Out Level one notch down to avoid the electrode from being oxidized at the high temperature.
7. You may use insulation tape to cover the areas you do not want to treat.



◆ **Applicator Grip & Movement**

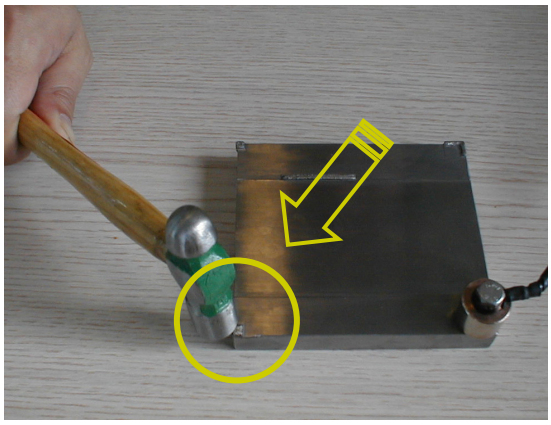


3-2 Deposition (Overlaying) process

Deposition ----------> High Power

Applicable base metals : H-13, D-2, P-20, S-7, Stavax, Inconel, Monel, Aluminum and etc. **(Note : Refer to Chapter 3-4 for Aluminum deposition process)**

1. Preparations are same as coating process.
2. Make sure the electrode is inserted straight into the applicator. The most ideal length of electrode is approximately 10mm(0.4”) from the end of the gas holder.
3. Check gas connection for leaks. Make sure Regulator valve is open. Turn on the Applicator and check gas flow with hand at the end of the gas holder. Gas is under **scale “ 3** ” on the flow meter. (Only when turn on the Applicator, You can check gas level.)
4. Coating on the deposition area (Frequency **40 - 50Hz**, Out Level **5 - 6 dots**) and increase frequency to **90 - 100Hz** and Out Level to **9 - 12 dots.** Repeat deposition.
5. Do peening from time to time with the small hammer on the deposition surface with **a proper power**. There may be not an even deposition surface since the deposition is done manually. You can obtain an even deposition after finishing by **a file or grinder**.



6. In the event that the surface turns into black color, check the gas is flowing properly and resume deposition after removing oxidized spots with grinding tools. (File, Stone and sand paper etc.)
7. Adjust applicator speed and direction to the most convenient and optimum level.
8. You may coat over deposited area with tungsten carbide for better hardness.
   - The most important process in deposition is peening and grinding. The reasons for peening are ;
     a. To attain even and hard structure
     b. To attain even deposition layer
     c. To attain desired shapes
   - Certain areas may be more deposited than other areas. You may grind those areas and continue even deposition.
9. If you notice the electrode color is changing to "Red" or the deposited area is turning black due to oxidation, reduce frequency by **10 -20 Hz** and Out Level by **20 - 30 micro farad (1-2 dots).** This could cause peeling and structure damage.

Deposition Process Summary -- Repeat these steps.

1. Coating (priming) after removing foreign materials from the surface
2. Deposition
3. Peening
4. Filing
5. Deposition
6. Peening
7. Grinding or Filing

3-3 Detailed deposition tips by areas

1. Pin holes

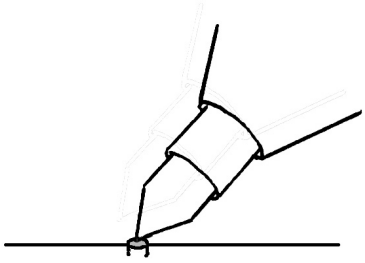
   Causes : By worker's mistakes, welding aftermath, or structure Problem in die casting

- For Holes smaller than 1mm in diameter

  Put electrode onto the hole and deposit. **Do not move the applicator**.

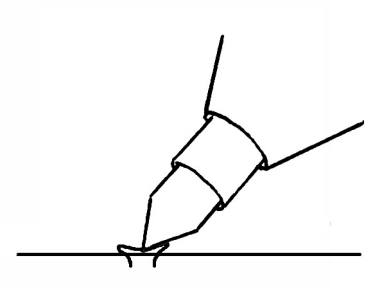
  The metal will be deposited either around the edges or in the center of the

  Hole as shown in the sketch.



● For Holes with smaller diameter than electrode's outside diameter

The deposited surface will be as shown in the sketch below. Make sure to deposit **along the border line**. Do peening when the deposition area is higher than mold surface.



● For Holes with larger diameter than electrode's outside diameter

Method 1

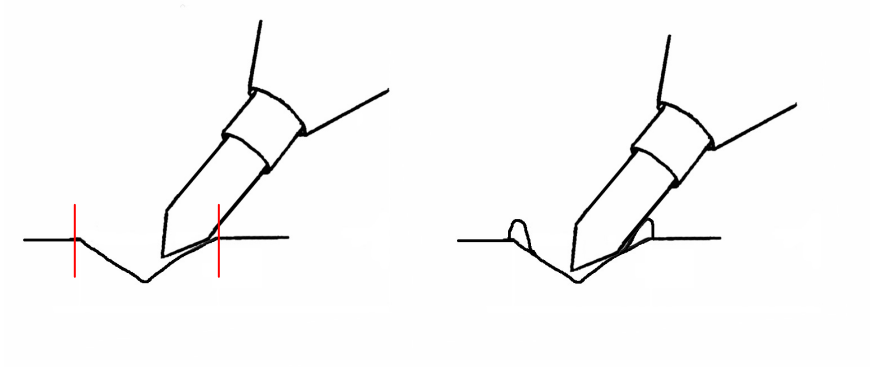
► Use only when you do not want to touch other areas.

► Coat inside hole only

► Deposit border first and move to inside hole gradually and fill up hole, More deposits should be applied on the edge.

► **Peening is very important**

► Note the applicator angle as in the sketch

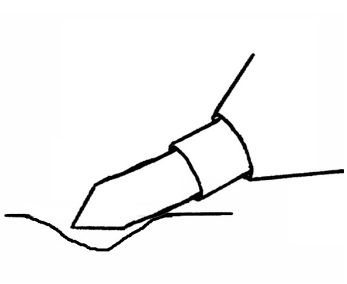


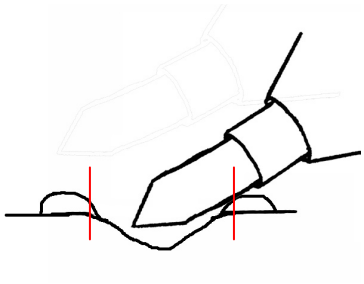
Method 2

► Use only when you are allowed to touch other areas.

► **Deposit border first** with applicator laying down as shown in the sketch and fill up hole gradually

► At times, you may notice the deposition comes from above tip





Caution : 1. Coat inside hole only before deposition.

2. Repeated peening is the most important step in hole repair.

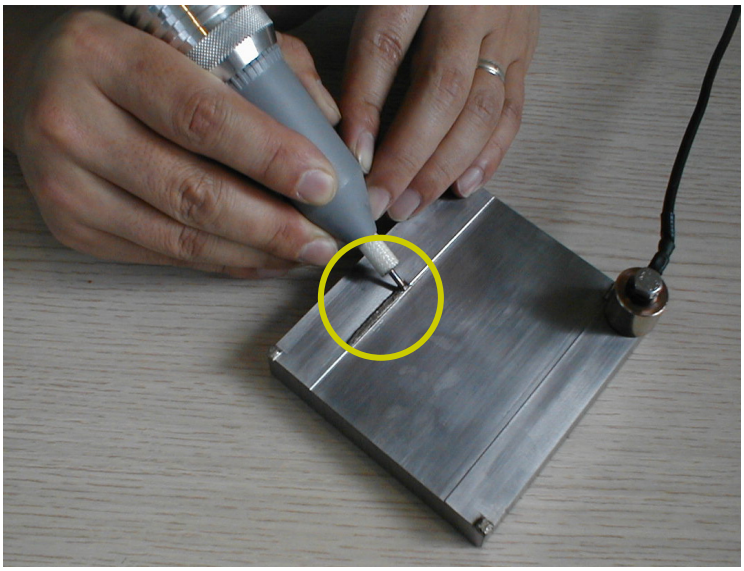
3. If you coated other areas besides the repair area by mistake, **make sure to deposit those areas to avoid pits**. Otherwise, pits may show up after finishing.

2. Edges and parting lines

Mark the area to be treated after examining wear size and contact shapes to molds.

- You may perform deposition outwards from base metal, inwards vertically, or horizontally.
- Move applicator with a circling motion with soft scrub and keep on deposition as you check the deposition height.
- For injection molds, deposit wear spots, grind and polish and then, have a test shot to see if defective area is removed. You may repeat deposition on unfinished spots.

Caution : If deposition is too high on one side of the mold, it may damage another side of the mold. Make sure you mark on the damaged area to avoid treating undamaged areas.



- To avoid pits at the edge

Photo. A

Applicator stays inside the repair area facing outwards. You can see the edge while working. Make small **circles** with applicator to make very dense deposition.

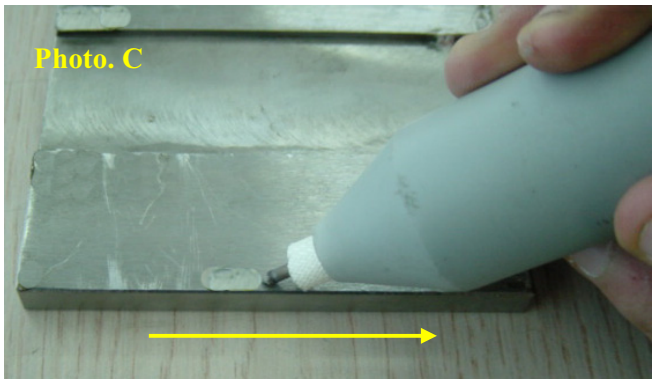
Photo. B

Applicator points inwards. You cannot see the border while working.

Choose this option when the mold position does not allow you to choose.

Photo. C

Deposit alongside edge putting applicator horizontal to edge. Rotate applicator clockwise. Grab applicator firmly with **two hands** to keep applicator alongside the edge, and to prevent it from moving left and right.

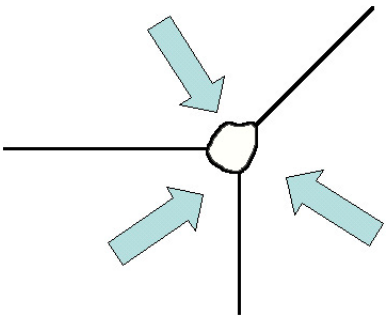


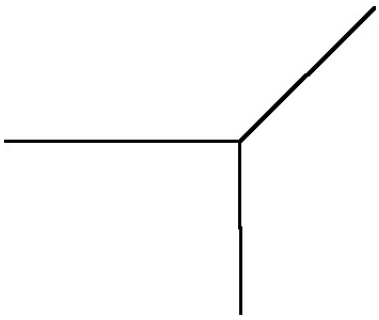
Caution :

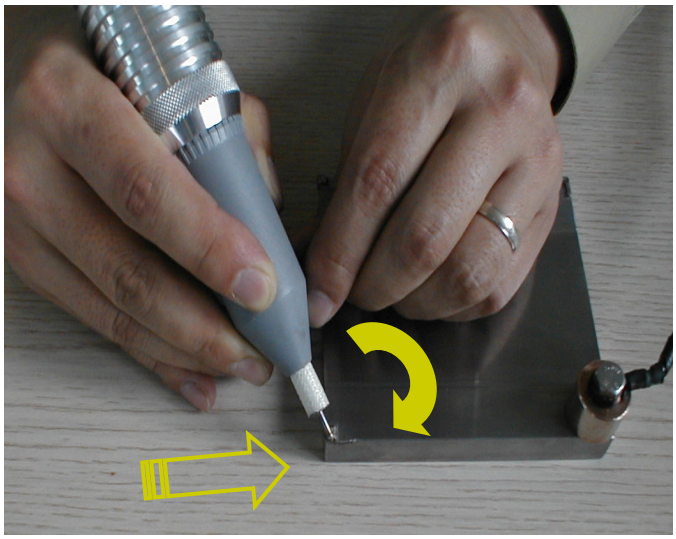
1. Coat on the repair surface only.
2. Deposit along the edge first to avoid touching other areas.
3. Make flat and smooth deposition with repeated peening.
4. **Grab applicator firmly with two hands** to prevent applicator moving outside of edge.
5. You may combine above options depending on the repair area and working condition.

3. Corner

Same as above. Need more deposition than desired level and peening is more important than any other applications. Deposit all angles and grind horizontally to the all sides and make angles.(Refer to sketch)





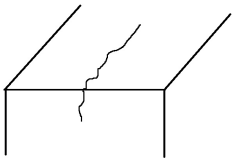


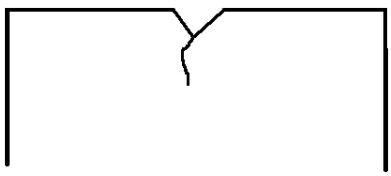
4. Crack

- For better repair results, remove foreign material such as grease, dust, stain and etc. from the crack area.

- Gouge out crack a little bit with a small grinder. (sketch 1)

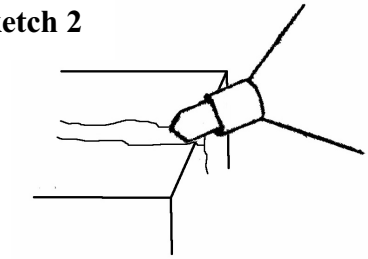
Sketch 1





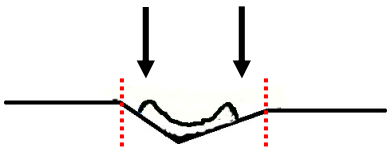
- Coat crack area parallel to crack line with low frequency and out level as indicated in the Appendix B. Deposit coated area only starting from border parallel to crack line. (sketch 2) Do peening border. (sketch 3)

Sketch 2



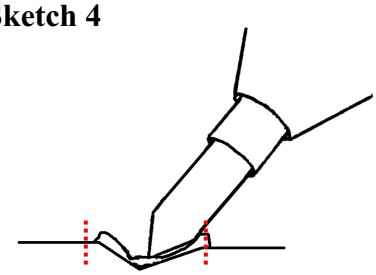
Sketch 3

Peening



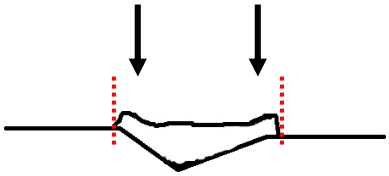
● Deposit with applicator perpendicular to crack line.(sketch 4).
Do peening as necessary. (sketch 4).

Sketch 4



Sketch 5

Peening

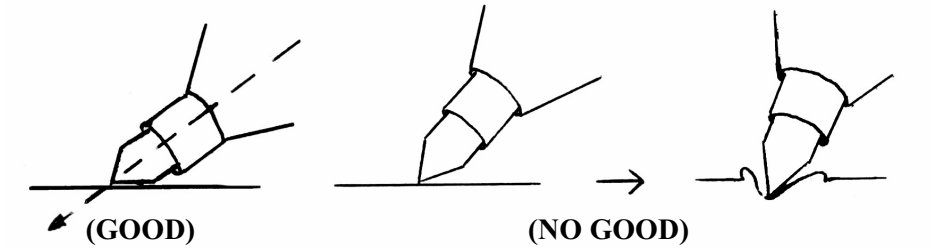


3-4 Deposition process for aluminum mold

● Aluminum deposition

1. Basics
   Since aluminum is soft material, it is necessary to keep more instantane- ous power on the spot to be deposited than harder material.
   Keep scrubbing electrode on the same spot for a while before moving to another spot.
2. Length of electrode should be less **10mm(0.4") from the gas holder.**
3. Initial setting : Coating – Frequency 50～60Hz, Out Level 5-6 dots
   Deposition – Frequency 100～130 Hz, Out Level 9-12 Dots.
   Argon gas – **Level "4" on the flowmeter.**
   Higher level may damage sharp spots.
4. Build Up techniques

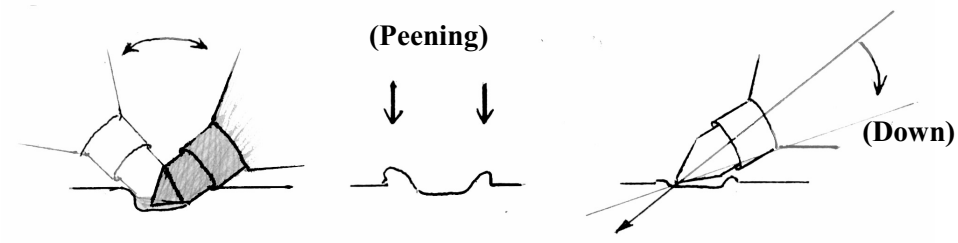
– Pin Holes
For Holes smaller than 1mm in diameter
Put electrode into the hole and deposit, Maintain applicator angle at
approximately 45-60 degrees as shown in the sketch below.



► For holes with smaller diameter than the electrode's outside diameter.
The deposited surface will be as shown in the sketch on page 15.

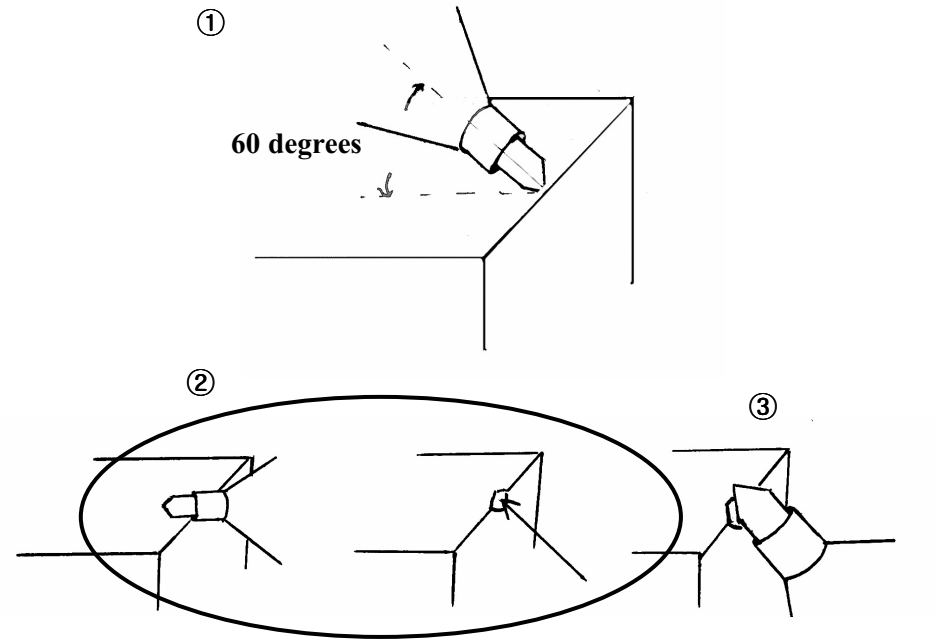
Make sure to deposit higher along the border line. Do peening when the deposition area is higher than mold surface.(Refer to Chapter 3-3)

► For Holes with larger diameter than the electrode's outside diameter.
Put electrode into the hole and deposit. Do not move the applicator.



► Edges and Parting lines

Mark the area to be treated after examining wear size and contact shapes to molds. When only one side of edge is damaged, it is better to perform deposition outwards from base mold, horizontal to the edge as shown in the sketch ① below. If the working condition dose not allow applicator to locate outwards from the mold, you may choose an option as shown in sketch ②. Make sure to keep the applicator horizontally.



When both sides of the edge are damaged, deposit on the damaged area with applicator flat to the damaged area (sketch ③)

Chapter 4. Replacing electrode and Trouble Shooting

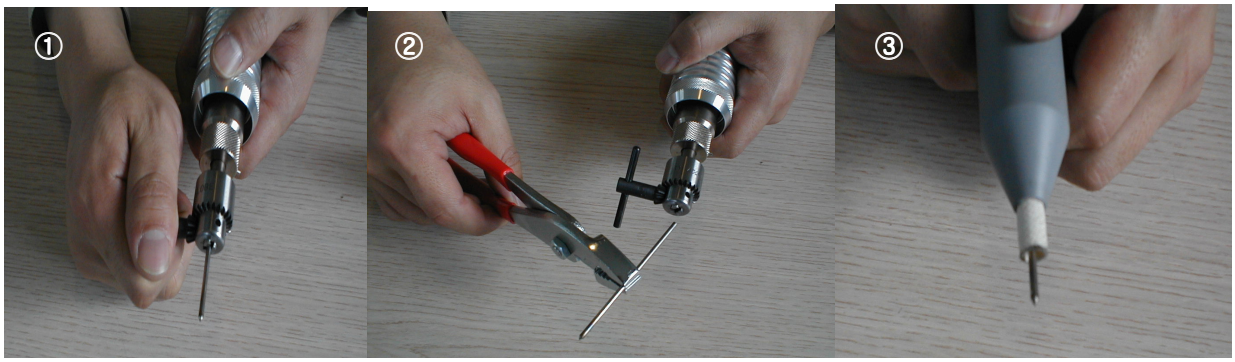
4-1 Replacing electrode

Electrodes are the key element of the coating and deposition process. Follow these steps to change or install electrodes.

1. Do not touch electrode with bare hand during or after applicator operation. Always place applicator in the applicator holder when not in use.

2. Check if you are using the right electrode. (Nickel for deposition and Tungsten carbide for coating) Insert electrode into applicator and tighten with chuck key. Tighten electrode with proper power.

3. Make sure electrode is installed straight.



Caution : Do not give excessive power to electrode when you tighten. It may result in damage.

4-2. Trouble Shooting

a. Control box

Always make sure all connections (power cable, ground cable, etc.) are made as instructed.

1) Power failure
- Check outside power supply
- Check fuse on rear panel (Refer to chapter 1 on page 7)

In case of any trouble, call LOOKTECH Co., Ltd. for service or replacement of Control Box

2) Error Light

When error lamp lights on by malfunction of circuit, push reset button. If the Error Light lights too often, service may be required.

b. Applicator

1) If you do not obtain Frequency Level, Applicator Start and Stop or Out Level is not indicated, push reset button, if these problem happen again, call for service.

2) Call for service if fan is not running. This may be caused by short circuits.

3) Out Level problem

Check ground first. When Out Level switch does not work properly. Call for service

5) Gas is not supplied into applicator

Check Gas Regulator valve. Check Applicator nozzle and hose and make sure it is open.

6) Odor

Odor may be detected due to excessive time of operation. Cool machine for a while.

7) Spark not generated

Check ground and short circuits.

Caution : Do not attempt to disassemble applicator. Call for service in case of trouble with applicator operation.

Chapter 5 Maintenance

To make the best use of the Mold Doctor, periodical maintenance, inspection and cleaning are recommended.

Caution

► The Mold Doctor generates a high voltage of Output150V (Input 120V or 230V). Never attempt to repair the Mold Doctor. Contact LOOKTECH Co., Ltd. for repairing.

5-1 Cleaning the Outer surface

When the panels of the Mold Doctor has become dirty, cleaning them with a moist cloth.

Caution

► Be sure to TURN the power OFF before cleaning.

► Never use benzene or other volatile detergent for cleaning.

5-2 Check the Cord and Gas hose

5-2-1 Check the Cord

Check the AC input power cable for broken sheath and plug cracking.

5-2-2 Check the Gas hose

Check the joint of gas regulator and coupler each time before using.

Be sure to check that there are no indications of tangled parts, broken sheaths or other signs of damage.

5-3 Cautions

5-3-1. The Mold Doctor generates high voltage. You have to handle it very carefully to avoid electric shock or other devices' damage.

5-3-2. Do not touch on the electrode directly. It is extremely hot during operating. Although you turn the power off, it is still very hot for a time being.

Attention signs on the Mold Doctor

These signs warn you that the area is charged up a high voltage and you must be careful to handle.

These signs warn you that the surface of applicator cover area is hot and you must be careful to handle.

5-4. Specification

MODEL	**SPD-2000II**	**FREQUENCY**	**50㎐**
DIMENSION	**535×300×175mm**	**INPUT**	**AC 230V**
WEIGHT	**13kg**	**OUTPUT**	**1.3kW**
FUSE	**6.3A/250V(Time Lag) : AC 230V-**		**-**

APPENDIX A . ELECTRODES & MACHINE SETTINGS

Electrodes	Materials	Hardness Rockwell C	**TIP (Inches)	Frequency Hz	Out Level Dots	Remarks
LT-01 2.4mm x 4"L	Nickel Alloy	40	0.4	C 50-60 D 90-110	C 4-5 D 9-11	Maximum deposition thickness : 1/8", For mirror face H-13, For mold materials repair (H-13, D-2, S-7…etc)
LT-02 3.2mm x 4"L	Co-Cr Alloy Stellite	62	0.4	C 50-60 D 90-110	C 4-5 D 9-11	D-2, O-1, A-2 Limit deposition to 40/1,000 inches
LT-03 3.2mm x 4"L	Co-Cr Alloy Stellite	55-58	0.4	C 50-60 D 90-110	C 4-5 D 9-11	S-7, H-13 Limit deposition to 40/1,000 inches
LT-04 2.4mm x 4"L	Steel Alloy	45-50	0.2	C 50-60 D 90-100	C 4-5 D 8-10	H-13 For etching surface repair
LT-05 2.4mm x 4"L	Steel Alloy	35	0.2	C 50-60 D 90-100	C 4-5 D 9-10	For etching surface repair and color match on P-20 mold only
LT-06 2.4mm x 4"L	Steel Alloy		0.2	C 50-60 D 90-100	C 4-5 D 9-10	1045 For etching surface repair
LT-07 2.4mm x 4"L	Inconel		0.4	C 50-60 D 90-110	C 4-5 D 9-10	For cast iron repair, such as starting valve, engine shaft
Al-01 2.4mm x 4"L	Al		0.2	C 50-60 D 100-130	C 4-5 D 9-12	For aluminum mold only, ditto Use gas level "4" for deposition
Cu-01 2.4mm x 4"L	Copper		0.2	C 50-60 D 70-80	C 4-5 D 9-10	For Cu-Be alloy mold only, ditto Use gas level "4" for deposition
TC-01 3.2mm x 4"L	Tungsten Carbide	90-95	0.4	C 90-100	C 6-8	Coating (Hardening) surface Maximum coating thickness : 2/1,000 inches
TC-02 2.2mm x 4"L	Tungsten Carbide	90-95	0.4	C 60-70	C 5-6	Coating (Hardening) surface Maximum coating thickness : 2/1,000 inches

Note : C : Coating **D** : Deposition **** TIP** is the length of electrode out of gas holder

For deposition, use gas sclae "3" on flow meter unless otherwise noted

APPENDIX B PARTS LIST

PARTS DESCRIPTION	P/N
CONTROL BOX	CB
POWER CABLE	PC
GROUND CABLE WITH MAGNET	GC
ROTATION APPLICATOR	APP-RT01
ARGON GAS REGULATOR WITH HOSE	GR
PROTECTIVE GOGGLE	PG
APPLICATOR HOLDER	AH
SMALL HAMMER	SH
SMALL WRENCH	SW
SMALL PUNCH	SP
CHUCK KEY	CK
GAS HOLDER (5PCS)	GH
TOOL BOX	TB
OPERATION MANUAL	OM

ELECTRODES

A) DEPOSITION

Ni-Cr 2.4mm dia.0.4”, HRc=40	LT-01
Co-Cr 3.2mm dia.0.4”, HRc=62	LT-02
Co-Cr 3.2mm dia.0.4”, HRc=55	LT-03
ETCHING 2.4mm dia.0.4”, H-13	LT-04
ETCHING 2.4mm dia.0.4”, P-20	LT-05
Steel Alloy, 2.4mm dia.0.4”, 1045	LT-06
Inconel, 2.4mm dia.0.4”, Cast Iron	LT-07
Al 2.4mm dia.0.4”, Aluminum	AL-01
Cu 2.4mm dia.0.4”, Copper	CU-01

B) HARDENING

TUNGSTEN CARBIDE 3.2mm dia.0.4”	TC-01
TUNGSTEN CARBIDE 3.2mm dia.0.4”	TC-02