

OPERATING MANUAL

08.26

TTW-700 Resistance Welder

ORIGINAL INSTRUCTIONS



Micro resistance welding machine

Congratulations on your new micro-resistance TTW-700 welding machine. We hope the machine will be of benefit and joy. Benefit and joy demand and require proper operation and maintenance of the equipment. Therefore, we recommend you read this manual carefully before using the equipment.

Tracytec

Smart solutions for welding and polishing of moulds



EU DECLARATION OF CONFORMITY

According to:

The Low Voltage Directive 2014/35/EU

The EMC Directive 2014/30/EU

Type of equipment: Welding power source

Model: TTW-700

Brand: TracyTec

Identification number:

Manufacturer's authorized representative established within the EEA:

Name, address, and telephone No:

Indsatsen ApS
Djeldvej 62
7830 Vinderup
Denmark
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The following harmonized standard in force within the EEA has been used in the design:

EN IEC 62135-1, Resistance welding equipment
EN IEC 62135-2, Resistance welding equipment (EMC)

Additional Information:

Restrictive use, Class A equipment, intended for use in locations other than residential.

By signing this document, the manufacturer's authorized representative established within the EEA agrees that the equipment in question complies with the safety requirements stated above.

Date:

Denmark
2020-12-09

Signature:

Jes Valdemar Willumsen

Position:

CEO



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Safety warnings

Welding can through misuse be dangerous to the user and the surroundings. The equipment should only be used in compliance with relevant safety regulations. Special attention should be paid to the following:

Electric shock

- Welding equipment must be installed properly (power regulations and the common regulations).
- Avoid contact with live parts in the welding circuit or electrodes with bare hands. Never use defective or wet welding gloves.
- Insulate yourself from the ground and the workpiece (e.g. use shoes with rubber soles).
- Ensure proper maintenance of welding equipment. In case of damaged cables and insulation, work must be stopped to carry out repairs.
- Repair and maintenance of the equipment shall be performed by a person with requisite technical knowledge.

Welding light

- Protect the eyes as even a brief exposure can cause permanent damage to the eyesight. Use the supplied welding screen or other protection alike.
- Protect your body against the light from the arc as the skin can be damaged by radiation. Use protective clothing covering all parts of the body.
- Work should be screened if possible, and people in the area is advised to be warned against the light from the arc.

Welding fumes and gases

- Smoke and gases emitted during welding is dangerous to inhale. Provide appropriate exhaust and ventilation.

Fire

- Radiation and sparks from the arc can cause fire. Flammable objects must be removed from the welding site.
- Work clothes must also be protected from sparks and spatter from the arc.

Noise

- The arc generates acoustic noise according to welding task. Use earplugs or other ear protection accordingly.



Electromagnetic noise

The TTW-700 multifunction ultrasonic polisher is designed for professional use and complies with the European standard EN50199. The standard aims to ensure that equipment does not disturb or interfere with other electrical equipment due to electromagnetic noise. The electric spark welding operation emits noise and must be used without interference while taking precautions for installation and use. The user must ensure that other electrical equipment in the area is not disturbed.

The following must be taken into account in the surrounding area:

1. Supply and signal cables in use in the area of the TTW-700 that are connected to other electrical devices.
2. Radio and TV transmitters and receivers.
3. Computers and electronic equipment.
4. Critical safety equipment. Monitoring and process control.
5. Pacemaker and hearing aid users.
6. Equipment used for calibration and measurement.
7. Time of day when welding and other activities are taking place.
8. Building structure and use.

This machine is intended for use solely by professionals!

Read this instruction manual carefully
before the equipment is installed and in use!

General description

The TTW-700 operates using a micro-resistance welding process. Heat is generated by the passage of electric current. The heat is precisely controlled to be high enough to melt the material locally,

while remaining low enough to avoid damaging the workpiece. This welding technique is superior to conventional repair methods in many applications.

Key features / Technical data

Matching metallurgy

The welded area has the same metallurgy as the base material and can be processed by milling, turning, grinding, and hand finishing.

Precision

Weld thickness down to 0.03 mm.

Wide application

All kinds of molds, dies, castings, and hardware made of ferrous metals can be welded.

Intelligent power distribution

Microchips automatically assign the optimal power settings for different applications.

Minimal heat input

The workpiece remains at a normal temperature during welding.

User-friendly design

The TTW-700 is designed for simple and intuitive operation.

Multi-function

Four operating modes for different precision requirements.

Wide voltage range

Stable output with input voltage fluctuations of up to $\pm 20\%$.

Protection function

Protects the workpiece from accidental damage during welding.

Magnetic connectors

Convenient attachment to any ferrous metal surface.

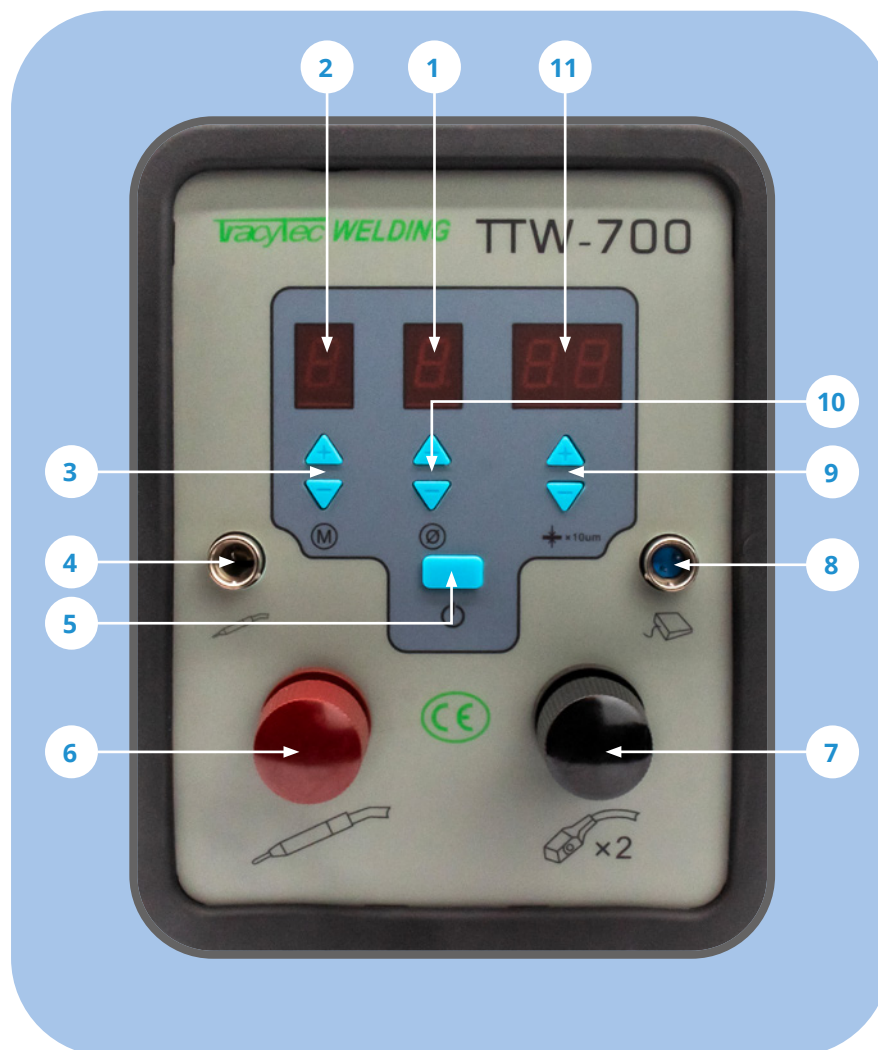
Compact design

The compact design and low weight make the TTW-700 easy to transport and position on a workbench.

Technical specifications	
Power supply	220V $\pm 20\%$, 50Hz
Frequency range	3-10Hz, automatic adjusted
Power consumption	5-600W
Maximum instantaneous output	30kW
Operating modes	5 modes (0-4). Precise, Normal, Single, Continuous
Dimensions	360×150×200mm
Weight	8kg

Front of the machine / Main functions

1. Display for electrode diameter
2. Display for selected mode
3. Mode selection buttons
4. Precision output connection
5. Power button (start/pause)
6. Welding electrode (Positive) connection
7. Ground (Negative) connection
8. Foot pedal connection
9. Foil thickness adjustment buttons
10. Electrode diameter adjustment buttons
11. Display for foil thickness



Rear of the machine

1. Fan
2. Nameplate
3. Protection switch
4. Power cable connection
5. Fuse
6. Main switch



Installation diagram



Check cables for any damages before use!
Use protective clothing e.g. gloves etc.

Preparation

Frontpanel

1. Attach the magnetic connectors to the negative pole.
2. Connect the pedal switch.
3. Attach the thicker electrode (for normal welding) to the positive pole.

4. Connect the thinner electrode (for precise welding), whose delicate area to be repaired.

Backpanel

Connect the machine to 220v AC. Make sure the power source has a good grounding.

Operation

1. Select the On switch on the rear panel. The machine enters standby mode. The indicators on the front panel display two small red dots.
2. Wait 30 seconds, then press the Power button on the front panel. The machine is now ready for operation. The displays will show "1208". If the Power button is pressed before the full 30 seconds have elapsed, the displays will flash "1208", and the function indicator will display "-". If this happens, wait a little longer before pressing the Power button again. **Important:** Always wait 30 seconds after switching on the machine before pressing the Power button.
3. Select the electrode diameter and foil thickness. The electrode diameter can be set from 1 mm to 5 mm. Setting 1 corresponds to Ø1 mm, 2 to Ø2 mm, and so on. The foil thickness can be set from 30 µm to 220 µm. Setting 3 corresponds to 30 µm, 4 to 40 µm, and so on.
4. Select the welding mode. The TTW-700 has five welding modes: 0, 1, 2, 3, and 4. Each mode is designed for a different surface finish.

Mode 0: For rough surfaces. This mode provides the strongest bond but causes the greatest deformation of the welding material.

Mode 4: For smooth surfaces. This mode causes the least deformation and provides the highest precision. In this mode, the foil thickness

is automatically limited to 120 µm, and only settings 1–12 can be selected.

Modes 1, 2, and 3: These are the most commonly used modes. In most applications, Mode 1 and Mode 2 are recommended.

5. Select the foil thickness using the buttons (9). The values are shown in 1/100 mm. For example, a setting of 10 corresponds to 0.10 mm (100 µm).
6. Connect the workpiece using the magnetic ground clamp. For a reliable electrical connection, attach the magnetic clamp to a clean, smooth surface close to the welding area. If the workpiece consists of several separate parts, attach the clamp to the same part that is being welded.
7. Clean the foil, the workpiece and the RHE electrode. Remove all oil, rust and dust before welding.
8. Place the foil over the damaged area and hold it in place with the electrode. Press the foot pedal to start welding. Move the electrode slowly to create a continuous weld. See Figure 4. If one layer of foil is insufficient, apply additional layers. Make sure each layer is thoroughly welded before applying the next. We recommend wearing the supplied safety glasses to protect your eyes from metal splatter.

9. The protection function is activated by setting the protection switch to On.

When the protection function is enabled, the machine emits an audible warning if the electrode is not in contact with the workpiece when welding starts, or if contact is lost during welding.

This function helps prevent damage to the workpiece caused by accidental arcing or overheating.

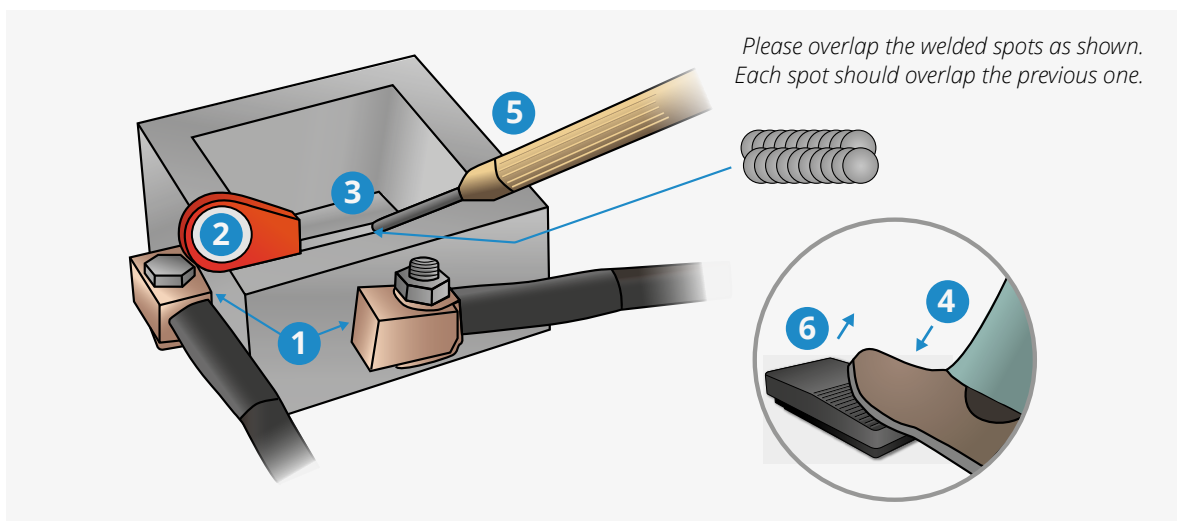
When the protection function is enabled, Mode 0 cannot be selected. To use Mode 0, disable the protection function. When the protection function is activated, the machine will give a beep alarm if the electrode either do not have contact before you start welding or if you lose the electrode during welding. This helps to protect the subject against incineration. When the protection function is activated, weld function 0, cannot be selected. If you need to use the welding function 0, turn off protection function.

10. Use the precision electrode when the standard electrode is too large for fine work. Connect the precision electrode to the precision connection. The machine will automatically switch to Precision Welding mode.

When using precision welding, the maximum foil thickness is 120 µm, the maximum electrode diameter is 4 mm, and the pulse frequency is reduced to approximately one quarter of the normal welding frequency.

Ensure that the precision electrode is connected correctly. Otherwise, the machine will operate in normal welding mode, which may damage the precision connection.

When precision welding is not in use, disconnect the precision electrode. If it remains connected, the machine will operate with significantly reduced output power.



1. Connect the workpiece to the machine using the magnetic clamp.
2. Place the welding foil over the area to be repaired.
3. Hold the foil in place with the electrode.
4. Press the foot switch.
5. Move the electrode steadily to create overlapping welds.
6. Release the foot switch.

Repair techniques

A) Select a suitable welding foil

Several types of welding foil are available for repair applications. We supply a range of commonly used steel foils, while many additional grades are commercially available. As a general rule, select

a foil with material properties that match those of the workpiece. Available foil types include alloy steel (H08Mn2SiA), stainless steel (1Cr18Ni9Ti), spring steel (70 high-carbon steel), T10 tool steel, and low-carbon steel.

Alloy steel (H08MnSiA)	Good compatibility with most tool steels. Hardness after welding: approximately 30 HRC. Easy to finish after welding. Similar colour to the base material, resulting in less visible repair marks.
Stainless steel (1Cr18Ni9Ti)	Good compatibility with most steels. Good ductility. Hardness after welding: approximately 20 HRC.
Spring steel (70 high-carbon steel) / T10	High hardness. Hardness after welding: >50 HRC. The welded area is more brittle.
Low-carbon steel	Low hardness after welding: approximately 15 HRC. Especially suitable for repairing castings.

B) Select an appropriate foil thickness

Select the foil thickness according to the surface finish of the workpiece and the type of repair. For mold repair or polishing, use a foil thickness of 120 µm or less. If the workpiece is made of hardened steel and the hardness must be maintained, use a foil thickness of 80 µm or less.

use a round-tip electrode (typically Ø3–Ø5 mm). Select the electrode diameter according to the size of the hole. Insert the electrode into the hole without foil, press the foot pedal, and melt the upper edges of the hole until a smooth, rounded recess is formed.

C) Preparation before welding

1. Cleaning

Clean the workpiece, magnetic clamp, electrode and foil before welding. Remove oil and grease using ethanol or acetone. Remove the oxide layer using sandpaper or a grinding stone.

2. Enlarge small deep holes.

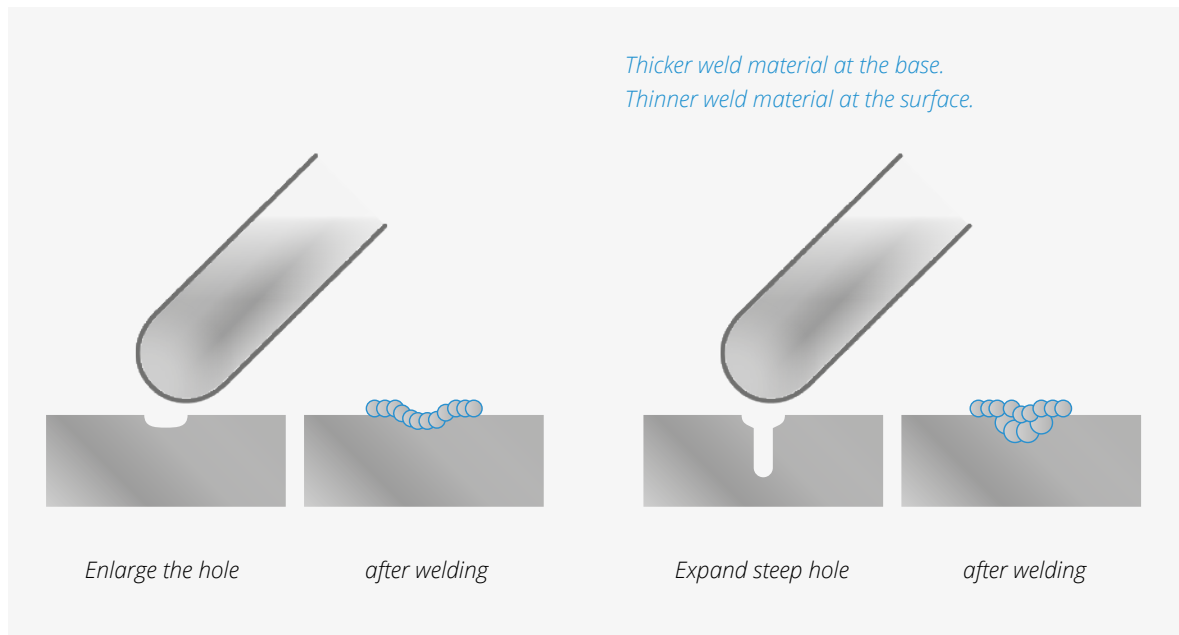
Small, deep holes (such as pinholes) and narrow cavities should be enlarged before repair. Select a foil thickness of 0.06–0.09 mm and

3. Grind the workpiece.

If the repair area contains several closely spaced small holes, grind approximately 0.1 mm from the surface before welding.

4. Remove the nitrided layer.

A nitrided surface often reduces weld quality and should be removed before welding. Remove the nitrided layer by grinding. Alternatively, weld the nitrided surface once before the repair to release part of the nitrogen before the actual repair is carried out.



D) Select an appropriate welding electrode

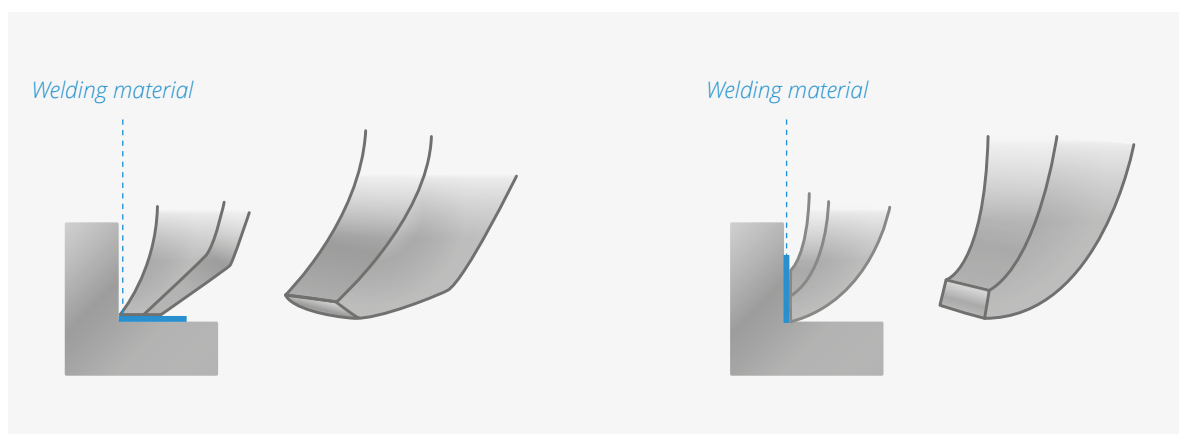
The machine is supplied with two electrode shapes: round tip and flat tip.

The round-tip electrode can be moved continuously during welding while maintaining stable contact with the workpiece. It is the most commonly used electrode, as it provides consistent weld quality.

The flat-tip electrode is designed for repairing bottom corners and similar areas. The contact

area of the flat tip should be 1–2 mm². A contact area smaller than 1 mm² may cause arcing and damage the workpiece. A contact area larger than 2 mm² may result in poor weld quality due to insufficient power density.

Both electrodes should be maintained regularly to keep the contact surface smooth. A smooth electrode improves weld quality. Avoid using excessively sharp electrodes.



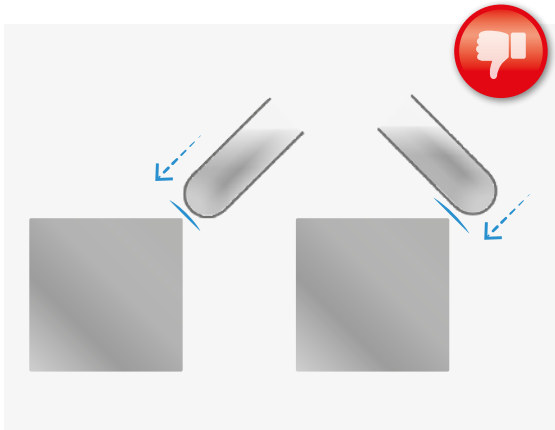
Flat-tip electrode for bottom corners.

Round-tip electrode for side walls.

E) Troubleshooting weld quality issues

1. Can NOT repair the edges.

Beginners can find an edge repair very difficult because they have to weld multiple layers of 0,1mm plate on top of each other just to repair a 0,1mm defect. This problem can occur when the effect is not correct for the area to be. Corner has a relatively small touching area, why normal welding power is too great to edge repair. To avoid such problems, lower welding power, and change the contact area and pressure directions. See illustration seven.



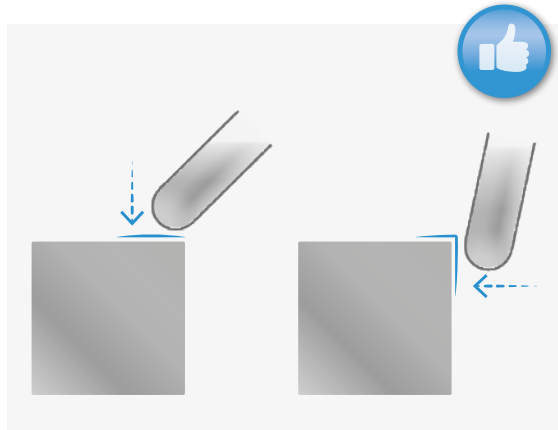
Improper touching the area, and pressure management.

2. Tiny holes appear after polishing the work-piece.

This problem may occur for one or more of the following reasons:

- The welding power is not suitable for the contact area.
- Air, rust or brass has become trapped in the welded area.

To avoid this problem, use a thinner foil and select an appropriate welding power. Before welding in such areas, grind approximately 0.1 mm from the surface.



Proper touching the area, and pressure management.

3. Small cracks or holes appear at the edge of the repaired area after polishing.

This problem can have two possible causes.

If the workpiece has a shallow recess before repair, the cracks or holes are usually caused by insufficient welding power. Increase the welding power or reduce the electrode contact area.

If the workpiece has a deep cavity before repair, the cracks or holes are usually caused by impurities such as rust or a nitrated layer. Remove the rust or nitrated layer before re-welding.

4. The repaired area is slightly below the surrounding surface after polishing.

This problem usually occurs when the weld material is softer than the workpiece material, especially if the workpiece has a nitrated surface. Use a harder foil material that better matches the workpiece.

5. The repaired area is slightly above the surrounding surface after polishing.

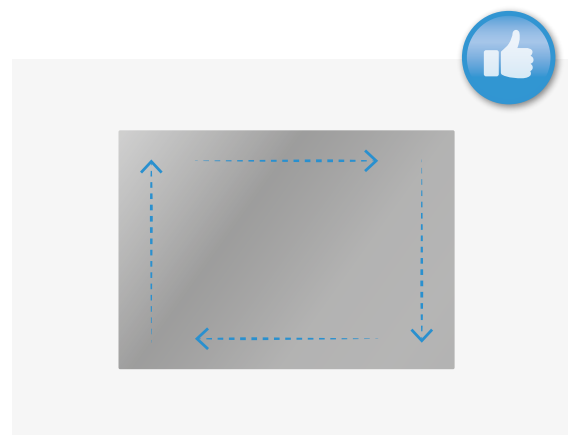
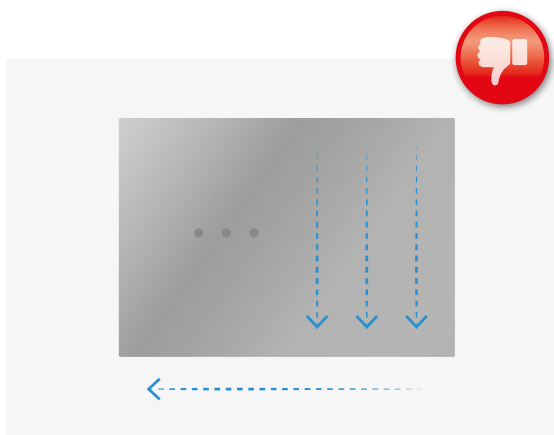
This problem usually occurs because the welding power is too low for the workpiece, particularly when repairing hardened steel.

Use a thinner foil (0.05 mm) for the first layer. Thinner foil requires less welding power and reduces the risk of excessive build-up.

6. Bubble-like spalling after heat treatment.

This problem can occur if air becomes trapped in the weld during welding. During subsequent heat treatment, the trapped air expands, causing the welded surface to blister or flake off.

To avoid this problem, use a proper welding sequence to prevent air from being trapped in the weld.



Dos and don'ts

Dos	Don'ts
Weld from one edge of the repair area to the other, one line at a time.	Weld the four edges first and then fill in the centre.
Try to complete each weld correctly the first time.	Skipping areas during the first pass and patching them later.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

The Toolmaker's Choice

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