



# TIFOO

## ZINC ELECTROLYTE & E-ZINC-SET

# MANUAL

### ZINC ELECTROLYTE



### Security

For your own safety, please wear gloves and safety glasses while working with the electrolyte and follow the safety indications on the label. On request, we will send you a safety data sheet.

### Special indications for the preparation

In order to nickel-plate iron, it's essential to remove the rust. For that, we recommend using our flash rust remover and the mechanical preparation or polishing with appropriate tools. When polishing iron, there can be tinder and blackened parts. You have to remove these black parts with a degreaser or with a mechanical follow-up treatment. Otherwise, please read the general course of action for metal preparation.

### Application fields

Suitable material for zinc-plating:  
**iron, steel, brass, copper**

Unsuitable material:  
**chrome, aluminium, titanium**

### Using the zinc electrolyte with tank plating

#### General indications:

After zinc-plating, the treated object is of a matt grey colour when taken out of the immersion bath, but that is normal. On request, you can also acquire brighteners. (The plating solution does not include the brighteners because after some time, they will decompose and render the plating solution unusable). You can make it gleam by polishing it with steel wool and Tifoo PowerPolish. In order to protect the zinc layer permanently from oxidation and zinc rust, we absolutely recommend treating the deposited zinc layers with the Tifoo Blue Chromate Conversion Coating (see corresponding manual). This guarantees a permanent protection of the zinc.

## Current strength and voltage

It is difficult to indicate an exact value here because the decisive parameter is the "current density". This density depends on the surface and the electrode position. The guideline is a surface of 2.5 A/dm<sup>2</sup>. For the current regulation, it is recommended to adjust the current at 0 amperes with maximum voltage. The current is slowly increased afterwards.

### Important specifications:

**pH-value:** < 7

**Current density for tank plating:** 2.5 A/dm<sup>2</sup>

**Zinc content:** > 25 g/l

**Deposition speed when tank plating:**

40 µm/hour with 2.5 A on a surface of 1 dm<sup>2</sup>

**Deposition speed when pen plating:**

1.5 µm/dm<sup>2</sup> with 1 A and 5 min duration

**Anode material:** zinc

As soon as hydrogen is produced on the object (visible by bubble formation), you should lower the current strength. If this strength is correctly regulated, a greyish layer will be formed on the workpiece.

## Electrodes

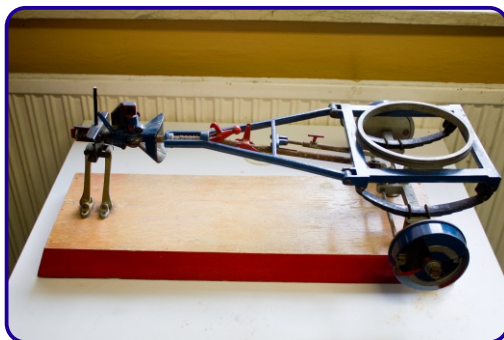
You should absolutely work with zinc electrodes. Other electrode material causes formation of chlorine (that affects the already deposited zinc) or often undesired discolourations. Furthermore, the electrodes first have to be thoroughly cleaned and polished before being used.

## Distance between the electrodes

The distance between the object and the anodes should be as big as possible. Furthermore, the electrodes have to surround the object in question evenly in order to obtain the most homogeneous metal deposition as possible. A current course of action for more or less flat objects is the 2-anodes-arrangement (see pictures of the following application example). For round or cylindrical objects, it is also advisable to use an arrangement in form of a cylinder (bent zinc electrodes), if possible.

## **Application example for zinc-plating by immersion**

In the following application example from the modelling field, a component of a truck coupling device has been zinc-plated by using tank plating.



**Model of a truck coupling device**



**Close-up**



**After removal**



After the removal of the component, the latter has been treated with a precision drilling-grinding machine and its following removable top parts:

- approximate grinding with the corundum grinding stone of 15.9 mm; the whole surface

has been grinded once (time needed: about 3 minutes)

- smoothing with a wire brush of 13 mm (time needed: about 1 hour)

- grinding with one of the grinding wheels for polishing and the polish product 421 or

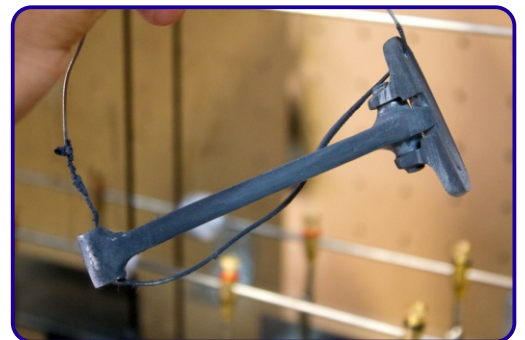
grinding with a high-performance grinding brush (1 to 2 minutes, depending on condition)

After this treatment, the object has been degreased with the Tifoo Degreaser. The following step was the actual electroplating. To do so, the tank plating equipment "deluxe" has been stocked with two zinc anodes and the object has been fixed to the cathodic bar in the middle (negative pole, lower socket of the tank plating equipment "deluxe" by using titanium wires. Make sure to guarantee a good

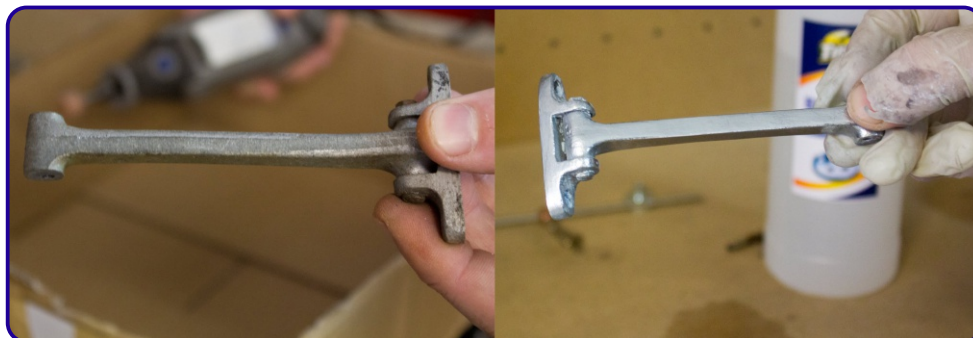


contact. For the surface of the component, we have calculated an approximative surface of  $50 \text{ cm}^2$  ( $0.5 \text{ dm}^2$ ). As the approximative guideline for the current density is  $2.5 \text{ A/dm}^2$ , we consequently and slowly increased the current (with maximal voltage) up to 1.25 A.

If you already can observe a gas formation on the object when using lower current densities than the one we calculated, adjust the current to the lowest possible point (until there is no more gas bubble formation). With increasing operation periods, we obtained a matt dark grey zinc layer on the object (don't worry: afterwards, you can easily polish this dark layer). After that, the object has been polished with Tifoo PowerPolish and steel wool. The result was a gleaming zinc layer. In order to protect the



object permanently from zinc rust and corrosion, it has been dipped in the Tifoo Blue Chromate conversion coating. The following images show a comparison of the zinc-plated component before and after:



**Before**

**After**

## Using the zinc electrolyte with pen plating

### General indication

When using pen plating, it's better to electroplate surfaces as small as possible because on bigger surfaces, it is difficult to obtain a sufficiently thick layer. Furthermore, it can happen on bigger surfaces that the zinc layer dissolves during the deposition. That's the case when the surface is not united and find itself too much time under the influence of the electrolyte (this almost creates a galvanic electrolyte). That's why we recommend electroplating of surfaces of only 2 dm<sup>2</sup> with the Tifoo Zinc electrolyte. On bigger surfaces, the deposition gets constantly more difficult.

### Current strength and voltage

When zinc-plating with pen plating, it's important to work with current strengths as big as possible in order to apply as many zinc as possible. It is therefore advisable to adjust the voltage to the maximum and to increase the current slowly afterwards. If the current is too strong, the deposition will be dark, even if the electrode is moved quickly. In this case, lower the current until the deposition is of silver colour and doesn't cause "burns" anymore. Eventual light blackenings can be removed afterwards with our metal polish product.

### Electrodes

You absolutely have to work with zinc electrodes. Other electrode material causes formation of chlorine that affects the already created zinc layer. Besides, the electrodes have to be cleaned thoroughly and grinded before using them.

### The right swabs

For the work with zinc electrolyte, we recommend a microfibre swab with a high absorbency because it can store a lot of electrolyte for a lot of time, so that you don't have to "recharge" it that often.

### Follow-up treatment

The zinc layer can contain black parts whose majority can be removed by grinding with steel wool or a polishing product. Furthermore, after zinc-plating, there can be a formation of white rust. In order to avoid that, the zinc has to be protected after the treatment. In order to achieve that, you can use blue chromate conversion coating with which you can achieve a passivation of the zinc, but the treatment causes an erosion of 2 µm, which can cause problems in case of layers that are not thick enough. Another possibility is the treatment of the surface with a sealing or a rust-protection.

## Application example for zinc-plating by pen plating

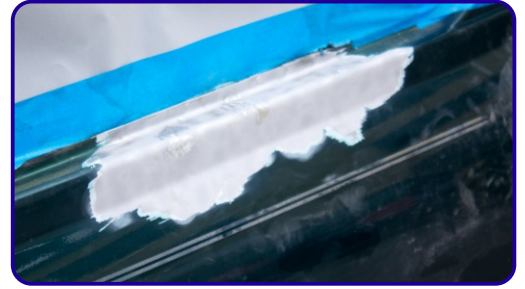
A part of a MiniCooper affected by strong rust has been restored with the Tifoo Zinc electrolyte and permanently protected from an eventual return of the rust.

### What was needed:

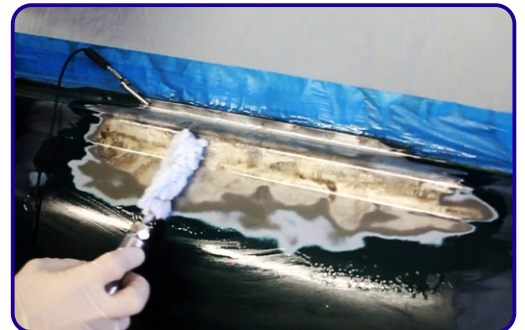
- 50 ml of zinc electrolyte
- Tifoo Pen plating equipment "basic"
- Ethanol
- Some cloths
- Tifoo PowerPolish
- Polishing cloth (optional)

## **Execution**

**Preparation.** The rusty part has been treated mechanically and cleared from all the rust with an abrasive wheel and an angle grinder. The polished steel surface first was pretty (see opposite picture), but the rust would quickly return at the moment when there is a new damaged part in the painting. That's why the application of a zinc interlayer is essential for a permanent rust protection. Just before electroplating, it was also important to remove all of the residues of dust and grease. In this example, it was enough to rub the surface in an intensive way with a piece of cloth that was soaked with ethanol or spirit. According to the surface condition, other methods may be necessary (don't hesitate to ask us).



**Electroplating.** After that, we poured the zinc electrolyte in a suitable receptacle and put the new microfibre swab on the zinc anode of the plating pen. A conductive zone of the bodywork has been connected to the negative pole (see black cable in the picture). The plating pen has been connected to the positive pole (red cable). After that, the swab is dipped in the electrolyte solution so that it soaks itself and in order to guarantee a good conductivity. Afterwards, it has been brushed on the zone in question, while paying attention to the voltage that should be between 1.5 and 2 amperes. With that, it was possible to cover the surface of the shown size with a sufficiently thick layer for a corrosion protection in 8 to 10 minutes. After an increased operating period of the zinc-plating, a grey-yellowish layer with stains / black discolourations could be observed.



**IMPORTANT:** Those black parts are no problem and are normal when working with this electrolyte when using pen plating. It is zinc that has been deposited in a spongy way. However, these blackenings can easily be removed with Tifoo PowerPolish.

**Follow-up treatment.** The zinc layer has been polished with Tifoo PowerPolish and freed from black parts. Afterwards, we were able to prime the treated zone before painting it. After that, the MiniCooper looked as new.



## Promotion

Our company is officially sponsored by the European Union.



## European Union

European Regional  
Development Fund

**TIFOO - a brand of**

**MARAWE GmbH & Co KG**

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