



# PS&T Run Card

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Before starting any mechanical plating or mechanical galvanizing process, a run card should be prepared. PS&T offers a manual version (which follows) and an electronic version, the "PS&T Electronic Run Card" which will run on any PC. The run card calculates the amounts of each component to be used in the process in order to assure good quality in each run. This run card covers PS&T's most popular products and processes. For other products as well as those used below, refer directly to the Operating Data Sheets; for all chemicals, read and understand the Material Safety Data Sheets before using any PS&T Product.

## PART INFORMATION

Part Number \_\_\_\_\_ Customer \_\_\_\_\_ P.O. Number \_\_\_\_\_  
Pounds of Parts to be Added to Barrel \_\_\_\_\_ Date \_\_\_\_\_  
Specification \_\_\_\_\_ Thickness Target \_\_\_\_\_ Post-Plate Finish \_\_\_\_\_  
Other Important Information \_\_\_\_\_

The barrel should be loaded with the glass impact media and an equal live load volume of parts for mechanical plating (i.e., not over one mil (0.001") or 25 um of plate; for galvanizing use 2 volumes of media per volume of parts. The temperature of the media/parts/water mix should be 70° to 75° F. at the beginning of the process.

Take care to determine the surface area of the parts in the barrel. PS&T has a large data base of surface area information that may be consulted. For approximate work, wire forms have a surface area (in square feet per hundred pounds) of 10 divided by the diameter in inches; threaded forms have 75% more surface area than wire forms, and stampings have a surface area (in square feet per hundred pounds) of 5 divided by the thickness in inches.

## SURFACE AREA AND PROCESS INFORMATION

Surface Area of these parts in ft<sup>2</sup> per 100 pounds \_\_\_\_\_ Total ft<sup>2</sup> in barrel \_\_\_\_\_  
(Multiply the pounds by the square feet per 100 pounds and divide the result by 100)

Media Mix \_\_\_\_\_ Barrel Speed \_\_\_\_\_ Water Level \_\_\_\_\_

There should be neither too much or too little water in the barrel - about 1 inch in front of the water/media/parts is one checkpoint; another checkpoint is that the water should go about halfway across the barrel at the "puddle's" widest point. The barrel should be operating at the correct speed. Speeds that are too fast tend to abrade the coating off edges and speeds that are too slow tend to produce poorly consolidated or spongy coatings unless the parts are heavy. There should be no zinc contamination from previous runs in the barrel - if there is, coppering will be difficult or impossible.

## CLEANING

Starter to be added \_\_\_\_\_ Amount \_\_\_\_\_

Usage Factor: 201 – 17 fl. oz./100 ft<sup>2</sup> or 500 ml/100 ft<sup>2</sup> (Plating) or 21 - 34 fl. oz./100 ft<sup>2</sup> or 620 - 1000 ml/100 ft<sup>2</sup> (Galvanizing) - (Multiply the surface area in square feet by the usage factor and divide the result by 100).

If you are using a Starter Concentrate, you will need to add both the Starter Concentrate and either Sulfuric Acid or Hydrochloric Acid. (These products should not be mixed prior to putting them in the barrel.)

Starter Concentrate Liquid to be added \_\_\_\_\_ Amount \_\_\_\_\_

Usage Factors: 206 or 212 – 4.2 fl. oz. (125 ml)/100 ft<sup>2</sup>, or 213 or 214 – 2.1 fl. oz. (62.5 ml)/100 ft<sup>2</sup> (Multiply the surface area in square feet by the usage factor and divide the result by 100).

Acid to be added \_\_\_\_\_ Amount \_\_\_\_\_

Usage Factors: Sulfuric Acid (66°) – 6.8 fl. oz. (200 ml)/100 ft<sup>2</sup> (Plating) or 8.4 - 13.6 fl. oz. (250 - 400 ml)/100 ft<sup>2</sup> (Galvanizing), Sulfuric Acid (50%) – 17 fl. oz. (500 ml)/100 ft<sup>2</sup> (Plating) or 21 – 34 fl. oz. (625 – 1,000 ml)/100 ft<sup>2</sup> (Galvanizing); or Hydrochloric Acid (22°) – 20 fl. oz. (588 ml)/100 ft<sup>2</sup> (Plating) or 25 - 40 fl. oz. (735 - 1176 ml)/100 ft<sup>2</sup> (Galvanizing) - (Multiply the surface area in square feet by the usage factor and divide the result by 100).

After the parts have run a few minutes in the Starter solution, they should be both clean and free from any oxide or scale. To check for freedom from oxide films, make a test solution with about 5% Starter and about 3% BIC 303. Dip the parts in this solution to test them; if they do not copper quickly, they need additional pickling.

## Run Card for Mechanical Plating and Mechanical Galvanizing – Page 2 of 2

### COPPERING

Copper Formulation to be added \_\_\_\_\_

Amount \_\_\_\_\_

Usage Factors: 301 – 17 fl. oz. (500 ml)/100 ft<sup>2</sup>, 303 – 4.2 oz. (119 g)/100 ft<sup>2</sup>, 307 – 4.2 fl. oz. (125 ml)/100 ft<sup>2</sup>, 308 – 2 fl. oz. (59 ml)/100 ft<sup>2</sup>, or 309 – 1 oz. (28 g)/100 ft<sup>2</sup>. (Multiply the surface area in square feet by the usage factor and divide the result by 100).

The correct amount of PS&T Brand Copper Formulation is added to the barrel, and run until the parts have the copper color of a new penny. Failure to get a good copper coating may result in adhesion failures after the parts are plated and dried, particularly with heavier coatings. Failure to get a good copper is usually due to one of two things: (1) trying to plate dirty parts - either with oil on them or with oxide film on them, or (2) zinc contamination in the barrel. Under no circumstances should the operator proceed until the parts are correctly coppered.

### PROMOTER/ACCELERATOR

Promoter to be added \_\_\_\_\_

Amount \_\_\_\_\_

If Applicable, 2<sup>nd</sup> Part Promoter to be added \_\_\_\_\_

Amount \_\_\_\_\_

Usage Factors: 401 or 411 – 1.8 oz. (51g)/100 ft<sup>2</sup> (Plating) or 2 oz. (57 g)/100 ft<sup>2</sup> (Galvanizing), 415 – 1.5 - 3 oz. (43 - 85 g)/100 ft<sup>2</sup> (depending on how difficult the parts are to plate), 427 – 1.8 oz. (51g)/100 ft<sup>2</sup>, 421A – 4 fl. oz. (118 ml)/100 ft<sup>2</sup> and 421B – 3 fl. oz. (88 ml)/100 ft<sup>2</sup>, 428 – 2.0 oz. (57g)/100 ft<sup>2</sup>, or 429A – 4 fl. oz. (118 ml)/100 ft<sup>2</sup> and 429B – 3 fl. oz. (88 ml)/100 ft<sup>2</sup> (Multiply the surface area in square feet by the usage factor and divide the result by 100).

Weigh this out or measure carefully, since adding too much or too little has an adverse effect on the process. This should be allowed one minute to dissolve in the barrel.

### ZINC FLASH

Zinc to "Flash" \_\_\_\_\_

Usage Factor: 1.5 oz. (43 g) per 100 ft<sup>2</sup>

(Multiply the square feet by 1.5 or 43 and divide by 100)

This small add of zinc is added to the barrel in order to flash the parts. This, too, should be weighed carefully. Either too much or too little will give problems with adhesion.

Before proceeding, the parts should have achieved a silvery hue (the tin flash), with the copper base only slightly visible under the flash. Under no circumstances should the operator proceed until the parts are silvery in color. (If "Flash & Plate" chemistry is being used, the barrel should be rinsed with water to a pH of not below 5.)

### METAL ADD PROCESS

Total Plating Metal to be added \_\_\_\_\_

Weight Per Add \_\_\_\_\_

Number of Adds \_\_\_\_\_

Time between each Add \_\_\_\_\_

Total Time for Adds \_\_\_\_\_

Usage Factors:

For Zinc: 0.4 pounds (181 grams) per 100 ft<sup>2</sup> per tenth (0.0001")

For Tin: 0.42 pounds (191 grams) per 100 ft<sup>2</sup> per tenth (0.0001")

For 70/30 Zinc/Tin: 0.41 pounds (186 grams) per 100 ft<sup>2</sup> per tenth (0.0001")

For Galvanizing: 7 pounds (3175 grams) per ounce per square foot

For the number of adds, PS&T recommends 0.0001" per add for plating processes and 15 adds for galvanizing processes. The more adds, the less part-to-part variability. For the time per add, divide 15 minutes by the number of adds. For galvanizing, this may be increased to as much as 25 minutes if the deposit obtained in the shorter period is too soft.

It is important that the adds be made to the barrel using the correct procedure. The plating metal should be sprinkled slowly and carefully over the liquid part of the mix in the barrel, sprinkling it from the back to the front or vice versa. This allows the plating metal to become completely dispersed in the plating solution before it is deposited on to the parts by the impact media. If this is not done, the parts will have a rough deposit and greater part-to-part variability.

While these adds are being made, it is important to keep monitoring the pH. It should not be allowed to rise above 2. Add Starter or the appropriate acid (Sulfuric or Hydrochloric, whichever you started with) to keep the pH below 2 as required. (For the "Flash & Plate" process, the pH should be maintained below 3.5 using Flash & Plate Promoter (No. 405). The parts should not be removed from the barrel until the thickness specification has been met.

### TESTING

Plating Thickness Test \_\_\_\_\_

Results \_\_\_\_\_

Consolidation \_\_\_\_\_

Appearance \_\_\_\_\_

Adhesion \_\_\_\_\_

1 oz. = 28.35 g; 1 lb. = 453.6 g; 16 fl. oz. = 1 pint; 32 fl. oz. = 1 qt.; 128 fl. oz. = 1 gal.; 1 fl. oz. = 29.4 ml; 1 gal = 3785 ml;  
0.0001" = 1 tenth; 1 mil = 0.001" or 25.4 um; 1 oz. per sq. ft. = 2.1 mils