

Technical Brief: Plating / Finishing of Solid Zinc Strip

General Plating/Finishing Information

The technology for electroplating on zinc based die castings is well developed and can be directly applied to projects involving stamped, drawn, or roll formed parts formed from Jarden zinc strip. As in all systems designed to plate over zinc based alloys whether it be rack, strip, or barrel, a copper cyanide strike is required. Over this copper strike any other plating finish may easily be applied.

Normal care should be taken to avoid potential plating problems in the design stage of new projects where zinc strip is to be considered. These design precepts are well outlined in Chapter 11 of the Zinc Institute publication "Finishing & Electroplating Die Cast & Wrought Zinc." This section titled "Design for Electroplating" covered in detail the specific features required for quality and uniformity in an electroplated finish.

Owing primarily to the demands of the automotive and decorative plumbing industries, the technology needed to produce a quality corrosion resistant chrome plated surface on zinc strip has reached what many consider to be state of the art in electroplated finishes. Leveling acid copper and zinc tolerant nickel systems have further advanced both quality and economy. All of this technology is, however, rendered ineffective if care is not exercised in the preplating surface preparation of parts to be finished.

The parts made from solid zinc strip alloys can be cleaned using many of the traditional cleaning techniques. One guiding principle which should be kept in mind when cleaning zinc parts is that in general milder chemical conditions are used when cleaning zinc compared with steel or brass parts. This is the case because of zinc's higher reactivity when compared with brass.

- a. Solvent-Emulsion Cleaning Zinc parts can be solvent cleaned using neutral degreasing solvents.
- b. Soak-Spray-Electro Cleaners

There are many proprietary cleaners available from chemical suppliers which have been found satisfactory for use as cleaners for zinc parts. These would include soak, spray and electro cleaners which by design are generally mild alkaline cleaners and nonaggressive toward zinc. Examples of proprietary cleaners which have been used for cleaning zinc parts are outlined below:

Suppliers	Soak-Spray-Cleaners	Electro Cleaners	Acid Dips
MacDermid	TS40a (Soak)	EM1751	M-629
	P1777 (Soak)	EM340	M-165
M&T	ZA111 (Soak)	Electro CD	Acti-200N
Allied Kelite	1 SO Prep 40	1 SO Prep 55	1 SO Prep 192
Udylite	UDY Prep 180	UDY Prep 288	UDY Prep 312

Normally after soak and electro cleaning and in preparation for plating, zinc parts are dipped into a mild acid solution (0.5-1% sulfuric acid) for about 30 seconds. Alternately proprietary acid salts (e.g., sodium acid sulfate) can be used as the acid dip. Again, too aggressive or strong acid dips are to be avoided.

Over the years sufficient technical data has been developed on the buffing and polishing of zinc based die castings to give design engineers a yardstick for measuring cost and production rates for surface preparation of this type of casting.

In general, any electroplater equipped to finish zinc based die castings will have no problems with parts formed from zinc strip. There are, however, a few specific differences which the electroplater should be aware of.

Without trying to overstate what should be obvious, care should always be taken to minimize surface imperfections which are the direct result of poor handling procedures. Nicks, scratches, etc., are always more difficult and more expensive to remove than to prevent in the first place. Also, forming dies which are worn, nicked or improperly polished and trim dies which are not properly sharpened can impart surface defects which even the most elaborate plating system will be unable to hide.

The high surface quality of Jarden's zinc strip eliminates the need for any abrasive type polishing prior to buffing operations. The only exception to this might be the necessity to remove heavy burrs left by an improperly controlled trim operation. If the finisher finds it necessary to perform this type of material removing operation, a greased 240-300 grit aluminum oxide endless belt is recommended, and should be run at 4000-6000 SF/M. Other than burr removal, the finisher should avoid any abrasive "polishing" operation on

parts formed from zinc strip. (Polishing in metal finishing refers to a more severe abrading of the surface and usually precedes "buffing." The reasons for "polishing" are metal removal or as an initial smoothing of the surface before buffing).

Buffing of stampings formed from zinc strip requires less work and less strain on both man and machine than is required for brass and steel stampings. Though buffing of any product is largely trial and error and usually more art than science, the following information should be of value to anyone finishing zinc strip.

Equipment requirements are minimal and are standard in the finishing industry. A variable speed buffing lathe is desirable as more precise control of surface speed is obtainable. A soft, sewn or stitched muslin buffing wheel is desirable. Loose or ventilated buffs are also acceptable. The most suitable buffing compounds for finishing zinc strip are also the most common. Tripoli, a mixture of amorphous silica and 30% by weight of a saponifiable or emulsifiable grease, is applied to the buff either manually in stick form or automatically.

The technique for finishing zinc strip varies from that of finishing die castings in the following respects. Though the equipment required is the same, the speed of the buffing operation in surface feet per minute (SF/M) is considerably less than that needed for most other metals. Recommended speeds vary from 2500-4000 SF/M and the most economical procedure will have to be established for each product. It is suggested to start at the lower speeds and increase only if necessary. [Table 4](#) will be of value in computing SF/M. The smoothing or leveling effect in buffing is caused by the flow of material from micro-projections to micro-depressions in the surface.

Available information indicates that this effect is best facilitated in zinc strip at temperatures below 250°F at the buffing surface. The amount of time a given area on a part is in contact with the buffing wheel is referred to as "dwell" time. Here again is a major difference in finishing between parts formed from zinc strip and other materials.

The elongated grain structure of zinc strip and the relatively low melting temperature by comparison to other materials necessitates that dwell time in buffing operations be kept to a minimum. If a localized heat build-up is allowed to occur, excessive metal flow will result and the buffed surface will appear to be warped or wavy. It is necessary then to keep a stamping formed from zinc strip in motion at the buffing surface. This holds true even for the removal of surface imperfections such as scratches and dents. It is also recommended that thin gauge stampings or stampings with wide areas unsupported by structural ribbing be fixtured for added stability.

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Table 4 -- Buffing Guidelines

R.P.M. at Arbor of Spindle	Diameter of Buffing Wheel in Inches										
	4	6	8	10	12	14	16	18	20	22	24
	Surface Speed in Feet Per Minute										
800	837	1255	1575	2094	2513	2932	3351	3770	4189	4608	5025
900	942	1413	1885	2356	2627	3298	3770	4241	4712	5184	5555
1000	1047	1570	2094	2618	3141	3655	4189	4712	5236	5760	6283
1100	1152	1727	2304	2880	3455	4031	4608	5183	5760	6335	6911
1200	1255	1884	2513	3142	3769	4398	5927	5555	6283	6912	7540
1300	1351	2042	2723	3404	4084	4764	5446	6126	6807	7488	8168
1400	1455	2199	2932	3555	4398	5131	5855	6597	7330	8054	8795
1500	1571	2355	3142	3927	4712	5497	6284	7069	7854	8640	9425
1600	1675	2513	3351	4189	5026	5864	6703	7540	8378	9216	10053
1700	1780	2570	3550	4451	5340	6230	7121	8011	8901	9792	10581
1800	1885	2827	3770	4713	5854	6597	7540	8482	9425	10368	11310
1900	1989	2964	3979	4975	5969	6963	7959	8954	9948	10944	11938
2000	2094	3141	4189	5236	6283	7330	8378	9425	10472	11520	12566
2100	2199	3298	4398	5498	6597	7696	6797	9895	10995	12095	13194
2200	2304	3455	4608	5760	6911	8063	9215	10357	11519	12672	13822
2300	2408	3512	4817	6022	7225	8429	9634	10839	12043	13248	14451
2400	2513	3770	5027	6284	7540	6796	10053	11310	12566	13824	15079
2500	2618	3927	5235	6545	7854	9162	10471	11781	3090	14400	15708
2600	2722	4084	5445	6807	8168	9529	10890	12253	13613	14976	15335
2700	2827	4241	5555	7069	8482	9895	11309	12724	14135	15552	16954
2800	2932	4398	5854	7331	8795	10262	11728	13195	14650	16128	17592
2900	3037	4555	6074	7592	9110	10629	12147	13657	15184	16704	18221
3000	3141	4712	6383	7854	9425	10996	12566	14137	15708	17280	18850