Meeting the Customer's Needs with Zinc-Alloy Plating

CAPSCO added zinc-cobalt plating to keep its cadmium plating customers . . .

By
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Editor

When Bill Huffman started Carolina Plating and Stamping, Greenville, South Carolina, in 1946, it was in response to a need he saw in the textile industry. He and his brother developed a process for reconditioning drop wires in the machinery used to weave fabrics. This was a godsend for the textile industry, because replacing these parts was quite expensive.

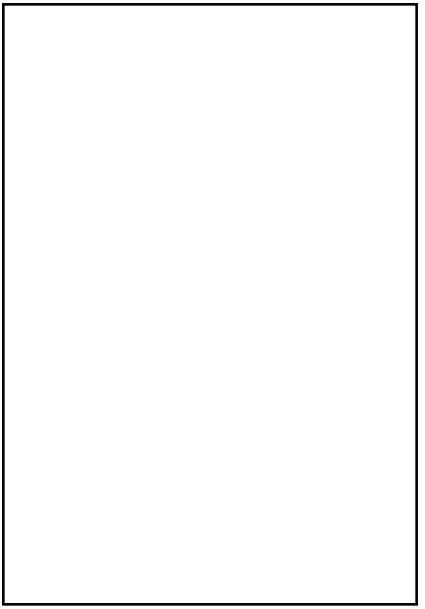
As part of the reconditioning, Carolina Plating and Stamping copper plated the drop wires. This was the mainstay of its business for several years until the company decided to expand. In the late 1950's the Huffmans started Carolina Plating Works to provide plating for industries outside of the textile industry. The new division provided copper plating as well as zinc and chromium plating.

Eventually the two companies combined to form CAPSCO, Inc. In the early 80's the company added cadmium plating to its list of services, because of customer demand. However, that was phased out in the early 90's due to hazards associated with cadmium and cyanide. Even though, CAPSCO did not want to lose its "cadmium plating" customers, particularly the automobile industry, which required cadmium plating on many parts because of its corrosion resistance.

To try to satisfy its customers' need for a highly corrosion resistant finish and the company's need for a less hazardous process, CAPSCO began working with a German com-

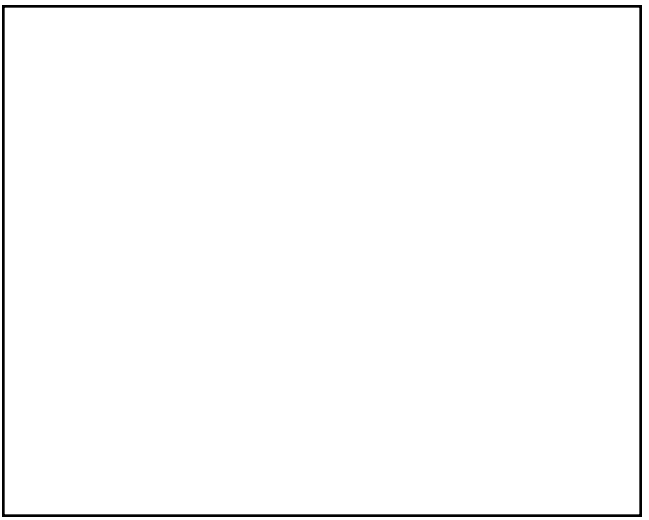
pany on a new plating process, zinc-cobalt. CAPSCO helped the company develop a zinc-cobalt process for high-volume production of automotive components.

CAPSCO then went to its customers and asked them to consider zinc-cobalt as a replacement for the cadmium plating. These customers in turn went to the automotive industry and asked. Most of CAPSCO's customers supported the switch from cadmium to acid zinc-cobalt plating. CAPSCO and its customers found that the zinc-cobalt from Enthone-OMI provided better corrosion protection in addition to excellent ductility, which is necessary since the power steering and transmission lines are bent after plating. The parts also receive a black or gold chromate following plating.



PARTS MOVE into the zinc-cobalt plating tank on the automatic carrousel hoist line

The acid-zinc-cobalt bath has many advantages. It is easily applied and operates similarly to acid zinc, which CAPSCO had experience with, having plated zinc since the 1950's. Zinc-cobalt also has 95 to 98 pct cathode efficiency. As far as waste treatment is concerned, it is easily waste treated



SOME PARTS must be racked prior to zinc-cobalt plating

TABLE I—Zinc-Cobalt Carrousel Rack Plating Line

Operation	Control Characteristics			Times
	Method	Frequency	Parameter	All proprietary
1. Part Inspection	visual			
2. Racking	manual			
3. Soak Cleaner	titration	daily	proprietary	
4. Electroclean	titration	daily	proprietary	
5. Rinse			tap water	
6. Acid dip				
7. Rinse			tap water	
8. Zinc-cobalt	titration	3 times weekly	proprietary	
	Hull cell	weekly		
9. Rinse			tap water	
10. Rinse			tap water	
11. Rinse			tap water	
12. Acid dip				
13. Chromate	titration	daily	proprietary	
14. Rinse			tap water	
15. Sealer				
16. Dryer				
17. Unrack	visual	random	uniform	
Inspect	Perma-scope	5 pieces/ 30 min	customer specification	
18. Final Inspection	visual	random	uniform	
	Perma-scope	5 pieces per lot	customer specification	

since it contains no chelators or ammonia and has less than one pct cobalt in the deposit.

The finish itself also has advantages. It is highly corrosion resistant, harder than zinc, with better ductility, and it accepts many final finishes.

Limitations also exist. Plating thickness distribution favors high-current-density areas. The black finish on barrel-plated parts requires equipment modifications and tight solution control.

Modification was not a problem for CAPSCO, since the company buys most of its equipment used and then modifies it.

One way the company modifies its systems is to program in its own sequencing. Bill Huffman, company president, designs a program and passes it along to Everett Duckett, who sets up the program for the plating line. “When we purchase a system it usually has a 15- or 20-year old programming system with it. When we replace it with our program, we eliminate a large piece of equipment and get a program that fits our needs,” noted Mr. Huffman.

TABLE II—Zinc-Cobalt 10-Ft Rack Plating Line

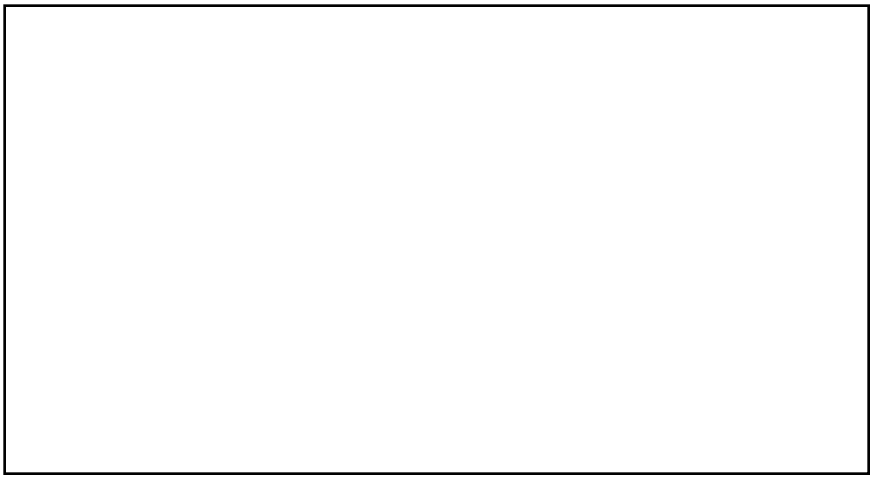
Operation	Control Characteristics			Time
	Method	Frequency	Parameter	All proprietary
1. Part Inspection	visual	per order		
2. Rack parts	manual		surface area	
3. Soak Cleaner	titration	daily	proprietary	
4. Electroclean	titration	daily	proprietary	
5. Rinse			tap water	
6. Rinse			tap water	
7. Acid	volume		proprietary	
8. Rinse			tap water	
9. Zinc-cobalt	titration	daily	proprietary	
	Hull cell	3/week		
10. Rinse				
11. Rinse				
12. Rinse				
13. Chromate	titration	daily	proprietary	
14. Rinse			tap water	
15. Rinse			tap water	
16. Rinse			tap water	
17. Sealer				
18. Dryer				
19. Unrack/Inspect	visual	random	uniform	
	Perma-	10 pieces	customer	
	scope	per hour	specifications	
20. Final Inspection	visual	random	uniform	
	Perma-	5 pieces	Customer	
	scope	per lot	specification	

Presently the company has two zinc-cobalt rack lines and one zinc-cobalt barrel-plating line. One rack line is an automated double-hoist system that handles parts up to 10-ft long. The other rack line is an automated carrousel-type line. The barrel line is run manually, but the company plans to automate it when it moves the line into the new 11,000-sq-ft addition it finished earlier this year.

The addition will also house a new automated double-hoist zinc-nickel line. Two manual black oxide lines will also be moved into the new section as well as the electrocoating line. Room will be left for a second electrocoating line if CAPSCO's customer demand warrants.

CAPSCO is adding the zinc-nickel line in response to customer need. Zinc-nickel has its own advantages. It has the greatest salt-spray resistance of all the zinc alloys. The plating is harder than conventional zinc plating and has the best alloy performance in cyclic heat/corrosion tests.

The recent building addition was designed with no underground pip-



RACK LINE handles ten-ft-long pieces. The line is automated except for chromating.

ing or trenches. This addition was built so that rinse water flows through pipes to a containment area and is then pumped to waste treatment. Also, the floors of the addition, areas around holding tanks for acid and alkaline liquids and the waste treatment area are painted with a special epoxy coating. The paint keeps the corrosive chemicals from "eating up" the concrete floor.

Sammy Huffman, son of founder Sam Huffman, tested the paint before application. He poured acid and caustic used in plating and cleaning operations on a painted concrete sample and left it for 72 hours. The paint held up and did not chip, peel or allow any chemicals to pass through.

Waste treatment consists of typical pH adjustment, precipitation, clarifier, polishing filter and filter press. The sludge is shipped to Horsehead Resource Development Company where metals are reclaimed and the waste is rendered non-hazardous and landfilled.

Clean water from the treatment system is pumped to holding tanks where it is held for lab approval before it is discharged to the sewer. Chemists check the water for hazardous materials as it enters the holding tanks and before it is discharged. CAPSCO is investigating the possibility of reusing some of the 86,000 gallons it discharges each day. The company would like to be able to use the water for rinses and as makeup water for plating tanks.

The company's testing lab is one of the few product finishing facilities with a state-certified lab in South Carolina. It performs tests for other companies as well as tracking its own plating solutions, cleaners, electrocoating and wastewater. The

lab also does thickness, adhesion, ductility, salt spray and composition testing on plated parts.

After each shift, a lab technician takes a portable computer to the various finishing lines and records the data, which is then entered into the main computer and stored. This allows the company to keep records of operating parameters at all times. If a customer comes back to them with a problem, CAPSCO can go back to the exact time the part was run and check the parameters to see if anything was abnormal.

CAPSCO strives to meet the needs of its customers. It started back in 1946 when the Huffmans saw the need for reconditioning parts for the textile industry and continues today with the addition of zinc alloy plating for the automotive and other industries. And it will continue its dedication to its customers with the addition of more zinc alloy plating systems in the near future. **PF**

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