# *Mechanical Plating is a Simple, Reliable Process*

*The mechanical plating process, according to PS&T's recommendations, is conducted as follows:*

*1. Parts are usually cleaned in a hot alkaline soak cleaner, then dipped in an acid pickle, then rinsed.*

*2. Clean parts which are free from oil and scale are loaded to a rubber-or plastic-lined plating barrel, usually hexagonal in shape. Plating barrels may have capacities as low as 1.5 cubic feet of parts and as high as 30 cubic feet.*

*3. Parts can also be cleaned in the barrel using one of PS&T's Descaler/ Degreasers specifically designed for cleaning parts in the barrel prior to mechanical plating. Some parts may be plated without cleaning, using the cleaning capability of the PS&T Starter chemistry to clean the parts.*

*4. With the parts, impact media is loaded to the barrel. Impact media is a mixture of varying sizes of spherical glass beads ranging from 4 mesh up to 60 mesh. Normally equal quantities by volume of glass beads and parts are loaded to the barrel, although heavier parts or heavier coatings of more difficult parts require a higher media-to-parts ratio.*

*5. The water level in the barrel is then adjusted to an appropriate level for the parts to be plated. For most parts, the water level should be approximately 1 to 2 inches ahead of the media/parts/water mix when the barrel is rotating at the proper speed.*

*6. The temperature of the media/parts/water mix should be $70^0$F. to $80^0$F., although PS&T's processes will operate somewhat outside this range. Lower temperatures result in slower plating; higher temperatures will result in more rapid plating.*

*7. Next, Starter is added to provide the correct chemical environment for the plating process. PS&T manufactures a variety of different Starters as well as Starter Concentrates, which are used with separate acid sources.*

*8. The barrel is allowed to rotate for approximately two minutes, allowing the complete distribution of the Starter into the mix.*

*9. Next, a proprietary coppering formula is added to the barrel. In combination with the Starter, this formula produces a tightly adherent copper colored coating on the parts, providing a uniform, predictable base for subsequent mechanical plating. PS&T manufactures a variety of coppering formulas. Usually this step requires from 4 to 8 minutes.*

*10. Once the coppering step has been completed, a proprietary Promoter chemical is added (PS&T makes a variety of Promoters for specific applications). This compound promotes the plating of the mechanical plating metal.*

*11. Next, a small quantity of metal is added to the barrel to produce a 'flash' coating that provides a sound base for the subsequent addition of plating metal.*

*12. Once the parts have achieved a silvery hue, plating metal is added to the barrel in an appropriate quantity for the surface area of parts in the barrel and the thickness of coating desired. Plating metal is extremely fine dust, 3 to 20 microns in diameter; the much larger size of the impact media 'cold welds' the metal plating powder to the parts. PS&T chemistry provides the correct chemical environment for this mechanical plating process to occur.*

*13. Normally, the metal to be plated is split into a number of separate additions. Increasing the number of separate additions provides a more uniform coating and reduces the part-to-part variation.*

*14. pH is monitored carefully by the plating operator during the process. The pH is not allowed to rise above a value of 2.0, since plating ceases above that value.*

*15. Once all of the metal additions have been made, the operator checks the coating thickness. It is important at this point to plate out the metal powder remaining in the barrel, providing for a more tightly consolidated coating and more efficient utilization of the plating metal.*

*16. Once the parts have achieved the target plating thickness, they are rinsed and separated from the plating media.*

*17. After the parts are rinsed, they may be treated with a conventional yellow, olive drab, or clear chromate or with PS&T Brand Hyperguard, a no-rinse clear chromate.*

*18. Following the optional application of chromates, Hyperseal may be applied to the surface of the parts. This can significantly extend the corrosion protection of the coating system.*

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# Specifications

*Knowledgeable specifiers are careful to insist on mechanical deposition processes when they want corrosion protection, freedom from hydrogen embrittlement, and the many other advantages mechanical deposition offers. Listed below are just some of the many current specifications.*

## American Association of State Highway and Transportation Officials (AASHTO)

*AASHTO M298-87 "Coatings of Zinc Mechanically Deposited on Iron and Steel"*

## American Society for Testing and Materials (ASTM)

*ASTM B695-04 “Standard Specification for Coatings of Zinc Mechanically Deposited on Iron or Steel"*

## Chrysler Corporation

*PS-Plating “Zinc - Mechanical and Electroplated”*

*PS-8956 “Conductive Plated Coatings for Electrical Connectors and Corrosion Protection”*

## Ford

*ESF-M1P67-A “Plating, Mechanical - Zinc"*

## General Motors

*GMW3044 "Zinc Plating"*

*GM4345M/GM4344M “Corrosion Protective Coatings - Zinc Plating"*

## United States of America

*MIL-C-81562B “Coatings, Cadmium, Tin-Cadmium and Zinc (Mechanically Deposited)"*
*(Replaced by ASTM Specifications)*

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