



## **TechGuide for Fastener Users**

### **Dip-spin Finish Compatibility**

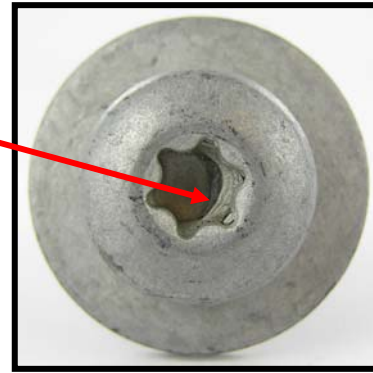
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**Acceptable Recess**

**Recess fill**



**Suspect Filled Recess**

These photos show two screws coated by the dip-spin process. The one on the left is an acceptable recess which will accept a driver after coating and the one on the right is filled with coating, which can interfere with the insertion of a driver.

#### **Dip-spin-finishes have many benefits for fastener end-users.**

The development of dip-spin coating materials and processes have provided fastener end users finish options which have dramatically increased corrosion protection and improved the consistency of the torque-tension relationship, while at the same time contributing to the elimination of the use of hexavalent chrome. Dip-spin finishes are bulk processed, as are electroplating and mechanical plating making them practical and economical for use on fasteners.

#### **Dip-spin finishes are applied by a multi-step process.**

Dip-spin finishes are applied using several steps. After pre-treatment, the fasteners are loaded into perforated or mesh baskets and submerged into the coating material. To remove excess material from the fasteners the baskets are removed from the coating material and spun in alternate directions at high rotating speeds. To further facilitate the removal of excess material some processes also tilt the baskets to various angles while rotating. After dipping and spinning is complete, fasteners are cured in ovens to dry and develop hardness in the coating material.

#### **Dip-spin finishes are more compatible with some fastener designs than with others.**

The many benefits of dip-spin fastener finishes have made their adoption grow dramatically in recent years. The finishes are compatible with most fastener sizes and styles, but some compatibility issues have become apparent. One such issue is the possibility that a low percentage of recessed fasteners may have excess fill in the recess after the finish has been applied. The source of this condition is a combination of fastener design, the coating process, the number of applied coating layers, and the nature of the materials being used.

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**Recess fill becomes more of a concern as fasteners and their recesses get smaller.**

In some fastener configurations the 'spinning' process can not sufficiently remove all of the excess coating from the recess while maintaining the required coating coverage. Although the material properties, process parameters, and equipment can minimize the severity of these conditions, they will always be present to varying degrees in most recessed fasteners.

**It is critical to agree on acceptance procedures and criteria prior to production.**

When end-users consider specifying dip-spin finishes on recessed fasteners they need to meet with their supplier to review the fastener design carefully and come to an agreement on product acceptability relative to recess fill prior to the fasteners being manufactured and coated. If the end user will not accept a percentage of partially filled recesses, an alternative fastener design and/or coating should be selected.

If the end user will accept a percentage of partially filled recesses, a formal agreement should be established between the end user and the supplier defining acceptance criteria and acceptance limits. The acceptance criteria should clearly define the evaluation method and acceptance levels to avoid unnecessary quality disputes and their associated costs.

**Sorting may not remove 100% of all partially filled recesses.**

The expectation that detection methods, such as sorting, will completely remove products having recess fill is not realistic. It is not economically practical to remove 100% of all filled recesses from a production lot of screws. In addition, to not being effective in removing all filled recesses, the sorting processes may adversely affect the coating and its performance.

**Fastener coating technology continues to evolve and develop.**

New materials and processes may further reduce the percentage of fill in fastener recesses in the future. Until such materials and processes become available, both fastener users and suppliers will benefit greatly from discussing these issues prior to the production of recessed screws specified with dip-spin finishes.

**A note about the dip-spin coating process.**

This IFI TechGuide for Fastener Users should not be considered a condemnation of the dip-spin coatings or the processes used to apply them. Each year billions of fasteners are successfully processed using dip-spin coatings.

**Conclusion:**

**Fastener users requiring high performance finishes should consult with fastener suppliers during the joint and fastener design phases of product development to become aware of any potential fastener style and finish compatibility issues.**

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