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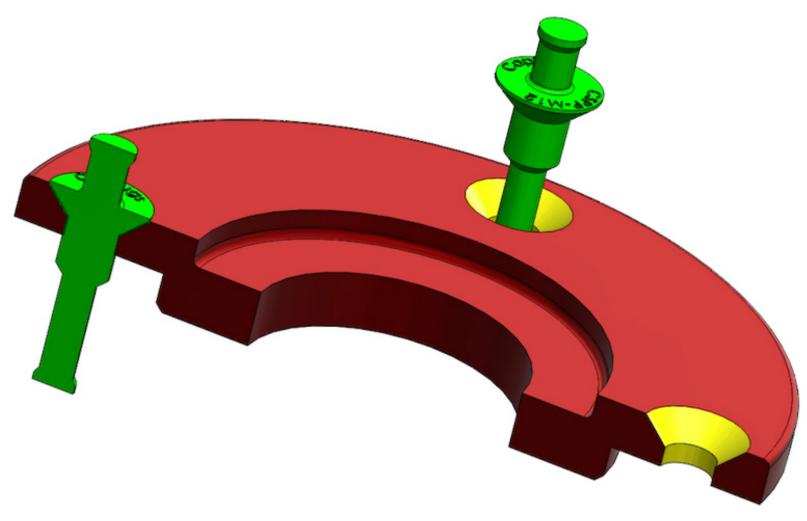
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Masking Countersunk Holes

BU JOHN GILL, CAPLUGS . **POWDER COAT** . 22 JULY 2020

Countersunk holes are everywhere, and they can be difficult to mask. Standard straight pull plugs don't mask the angled face and tapered plugs are too long to mask the hole and the angled face completely. Thankfully there are plugs available that are specifically designed to mask countersunk holes.

Countersunk holes are used in aircraft panels, medical equipment, robotic equipment, and information technology equipment. They can be in welded fabrications, sheet metal assemblies and a variety of machined components. As they are so common, it is natural that powder coating shops and painting shops see a lot of countersunk holes on the parts they finish. Designers specify a countersunk hole and screw to hold two components together, when they want the screw head to sit flush with the outside face of the component or surrounding material. This can be for aesthetic reasons, safety reasons or aerodynamic reasons.

Countersunk holes are a through hole with a large funnel shaped area at the top, which the screw locates on. Naturally, for the screw to create a strong bond between



components, the designer does not want any surface treatment, such as paint, on the funnel shaped area of the hole. Any paint between the screw and component will interfere with the metal to metal contact between the screw and the hole. Paint in that area could also cause the countersink screw to stand proud of the outside face of the component. It is also important to keep paint away from the through hole portion of the hole, as a buildup of paint in that area can interfere with inserting the screw.

Countersunk holes are made to standard dimensions to suit the screws that will be used in them. The standard controls the through hole diameter, the maximum diameter and angle of the funnel area. The angle of the funnel area can be different depending on the application. Typically, countersunk funnel area angles are as follows, 82° (standard imperial), 90° (metric) and 100° (aerospace) holes.

A common trick to mask countersunk holes is to put a masking disc over the countersunk hole and push it down. Unfortunately, that doesn't always mask the hole in the correct manner. The disc may not center itself correctly in the hole, leaving an area exposed to unwanted surface finishing. The disc may crease as it is pushed into the hole, again leaving an area exposed. The same size disc will not work for different angles of countersunk hole as it will cover a different region depending on the angle of the hole. The disc may not stick down correctly due to the angled faces and so it may come off during the finishing process.

To eliminate all those problems there are standard countersunk hole masking plugs available which make masking countersunk holes quick and consistent. Two types of countersunk hole plugs are available, a simple push-in style plug or a pull plug style that is pulled into the hole. Both styles have some common features in that they mask both the angled area and the through hole portion. Both styles can work for the common angles of countersunk holes, 82° (standard imperial), 90° (metric) and 100° (aerospace) holes. Both styles have a shaped handle to ensure the plug can be installed and removed quickly. Usually the plugs are color coded and engraved to identify size.

To explore masks for countersunk holes further, contact a masking company such as Caplugs, and ask them for samples so you can test the plugs in your finishing process.

*John D. Gill is an Engineer with **Caplugs Inc.** John has experience in masking and surface finishing throughout the UK, Europe and USA. He works with Caplugs manufacturing facilities in the USA, Europe and China.*

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