Catheter Pull Rings:
A pull ring is part of a medical catheter assembly. The pull ring allows for steerability and deflection of the catheter during a procedure. Typically to deflect the tip of a catheter a wire that runs the length of the catheter shaft is pulled, which is joined to the distal tip of the catheter. The pull wire is commonly installed by welding a stainless-steel wire to a stainless-steel ring, and then installing the ring within the distal end of the catheter through a reflow process or similar. When the wire is pulled from the proximal end of the assembly the ring location will determine the deflected shape. Oftentimes a catheter needs to deflect in two directions for a procedure, which requires two pull wires installed within the ring on opposite sides from each other. At the proximal end of a pull wire assembly is usually a handle, giving the operator of the catheter the option to contract and release the tip of the guidewire as the catheter is placed.

The Challenge:
A client required the stainless-steel ring of a pull ring plated assembly to be plated with ProPlate’s Vizi-Band radiopaque marker coating, for radiopacity brightness. The location of the ring during the procedure was critical to the application as location dictates the deflected shape, which is why the SS ring needed to be highly radiopaque. The alternatives are to use platinum iridium rings in place of the SS rings; however, these dissimilar metals do not join easily and often do result in a bond which has adequate tensile strength. The plating challenge was to selectively apply Vizi-Band to the ring and a very small section at the joined area where the distal tip of the wire connects to the pull ring, without coating leakage beyond this area and without bending or damaging the lead wires or damaging the fragile rings. Additionally, ProPlate needed to obtain good adhesion of the Vizi-Band RO plating onto the desired areas which had been welded and electropolished prior to plating. Due to the heat scale from the weld process, and a passive layer from an electropolishing process, plating would not readily adhere to the required areas with a standard plating process.

The Engineered Solution:
The solution ProPlate engineered required a tailored plating process, masking process and process fixture. ProPlate used a proprietary mechanical masking method to protect the wires during the plating process, while reducing handling of the parts to mitigate risk or damage to the parts. The fixture was in-part used to mask the pull wires and give an electrical connection close to the plated area for the best plating outcomes. Additionally, plating preparation steps needed to be tailored to the unique components in order to ensure adequate adhesion through removal of the heat scale oxide and passive layer created by the welding and passivation processes prior to plating. Plating gold (Au) Vizi-Band added radiopacity brightness to the critical area required for the catheter application, as well as created a stronger bond at the joined area of the ring and wire due to the bond being a SS to SS weld that is then plated over with gold (Au) for further bond strength.