



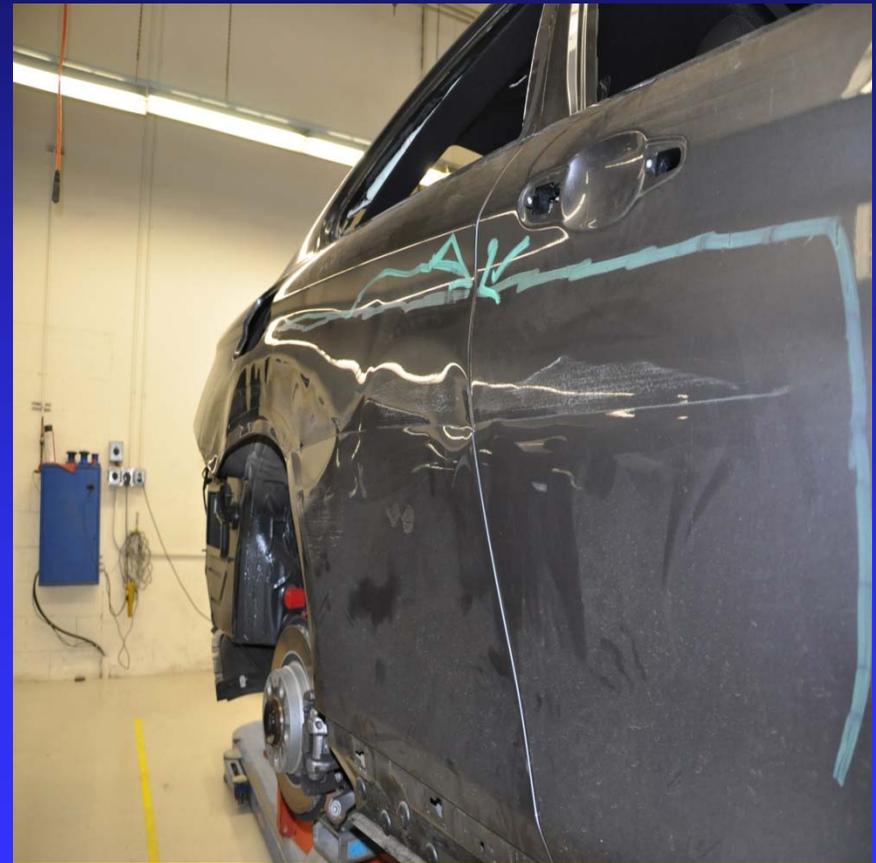
Technical Committee

November 2016

Las Vegas NV



Damage to the right quarter panel on a 2016 BMW 4 Series.





Why Rivet Bonding & Not Welding

There are several reasons that BMW has made the transition from conventional welding and STRSW to bonding and rivet bonding. One of the main reasons is the use of heat-sensitive steel. With bonding and rivet bonding, there is no heat generated that would weaken the steel, allowing the steel to retain its strength.

Another reason for bonding and rivet bonding is the increased corrosion resistance of the repair joints. Corrosion protection is extremely important during repairs because BMW offers a 12-year corrosion warranty.



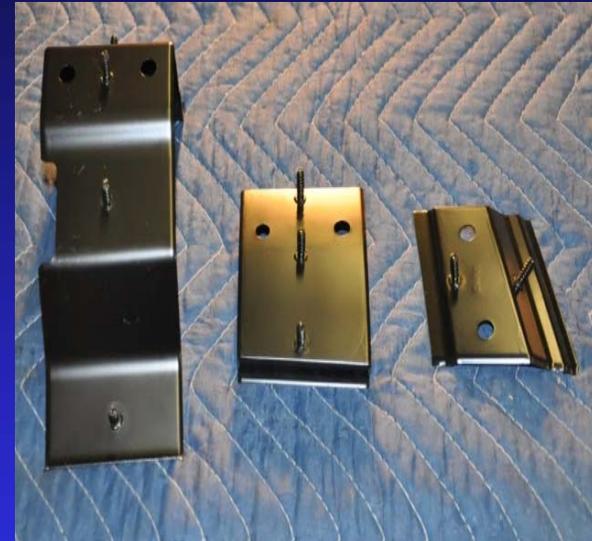
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What items are necessary to complete the proper repair





Applying the Adhesive & Self Piercing Rivets (SPR's)





Adhesive primer is applied to the replacement quarter panel as outlined in the BMW Repair Bulletin.



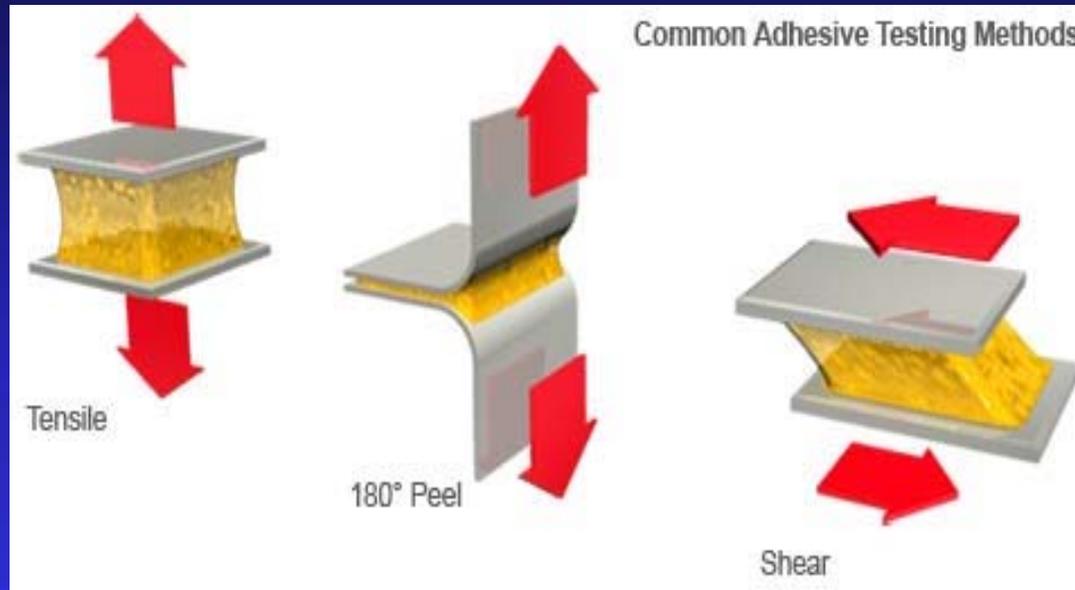


Why Adhesives?

- Adhesives can bond different types of materials to each other.
- Adhesives do not destroy the properties of the metal like what welding does
- Adhesives offer better corrosion properties
- Adhesives are offer better noise reduction
- Adhesives offer a weight reduction of the vehicle
- Adhesives allows for less welding in the manufacturing process
- Adhesives helps with energy management (energy absorption)



Adhesive Strengths and weaknesses



Adhesive is very strong, shown when using the peel test
Adhesive is not strong, shown when using the shear test

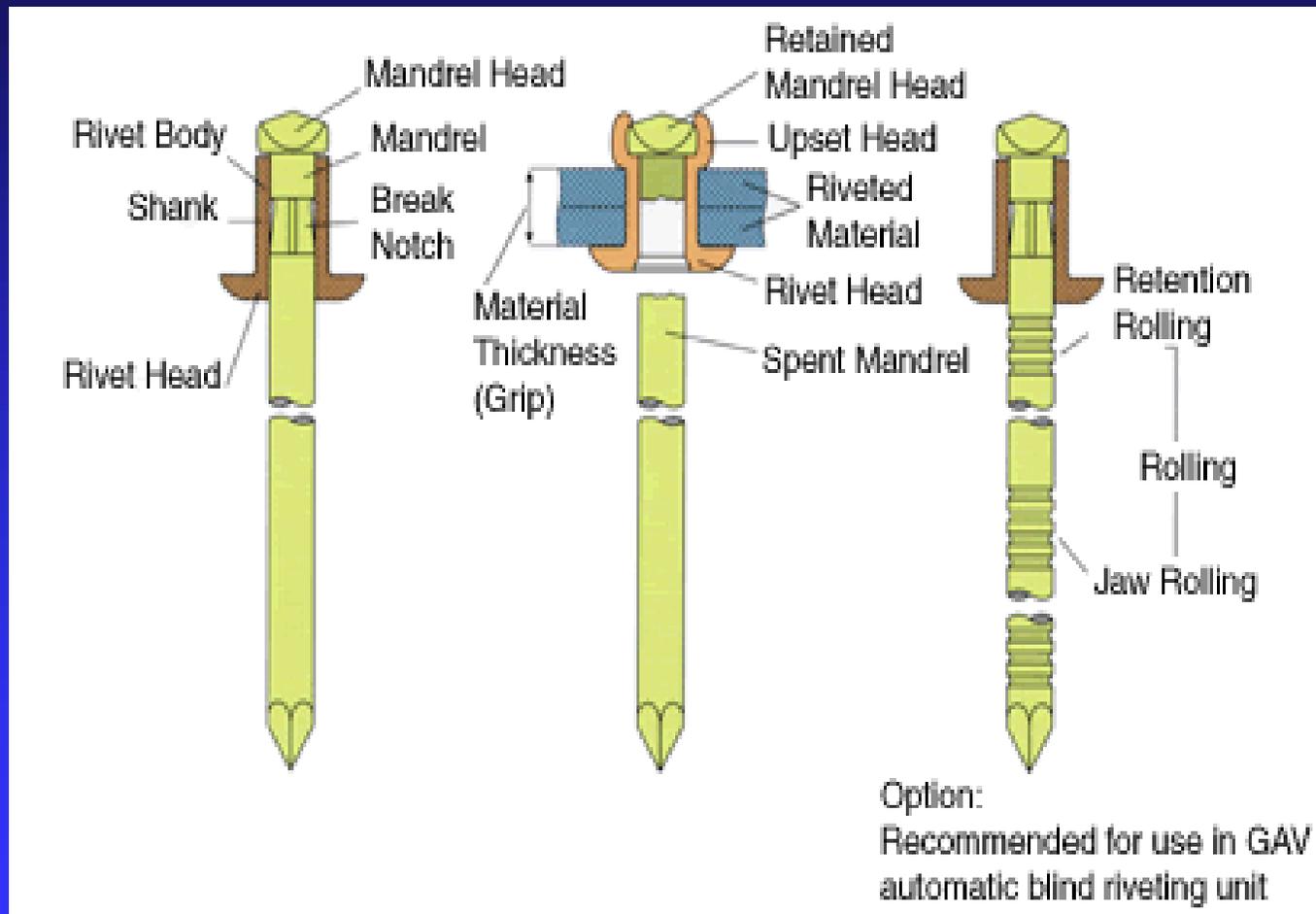
That is why rivets are used in conjunction with glue, to stop the panels sheering apart

For more information on
Adhesives, attend I-CAR ADH01





What makes up the blind rivet

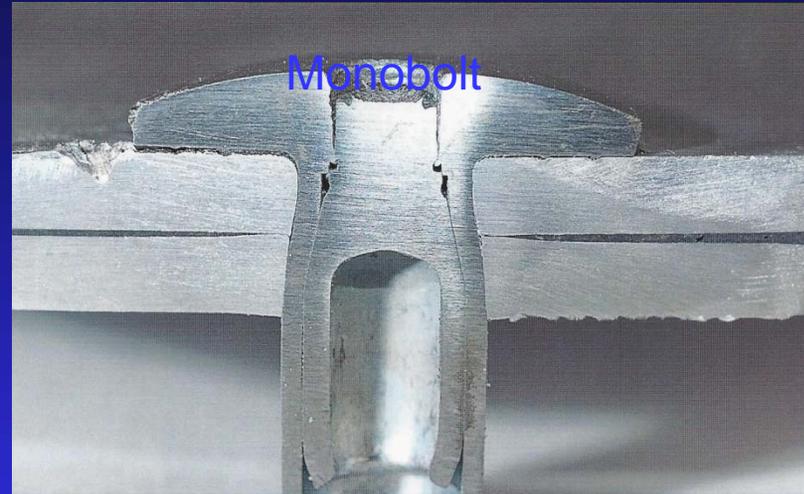




Vehicle Rivet Types



Self Piercing Rivet



Monobolt



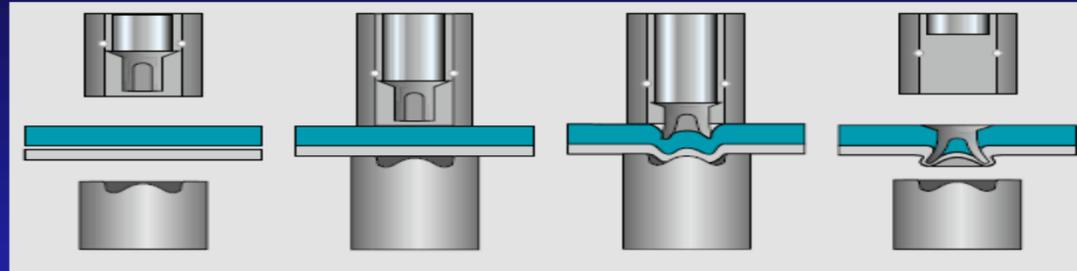
Solid Rivet



Hemlock Rivet



SPR's

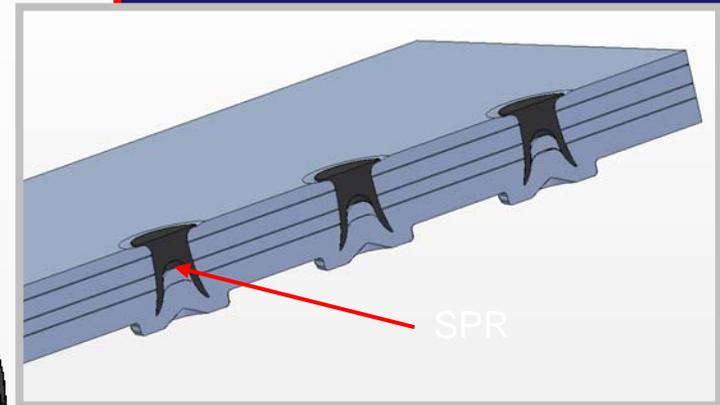
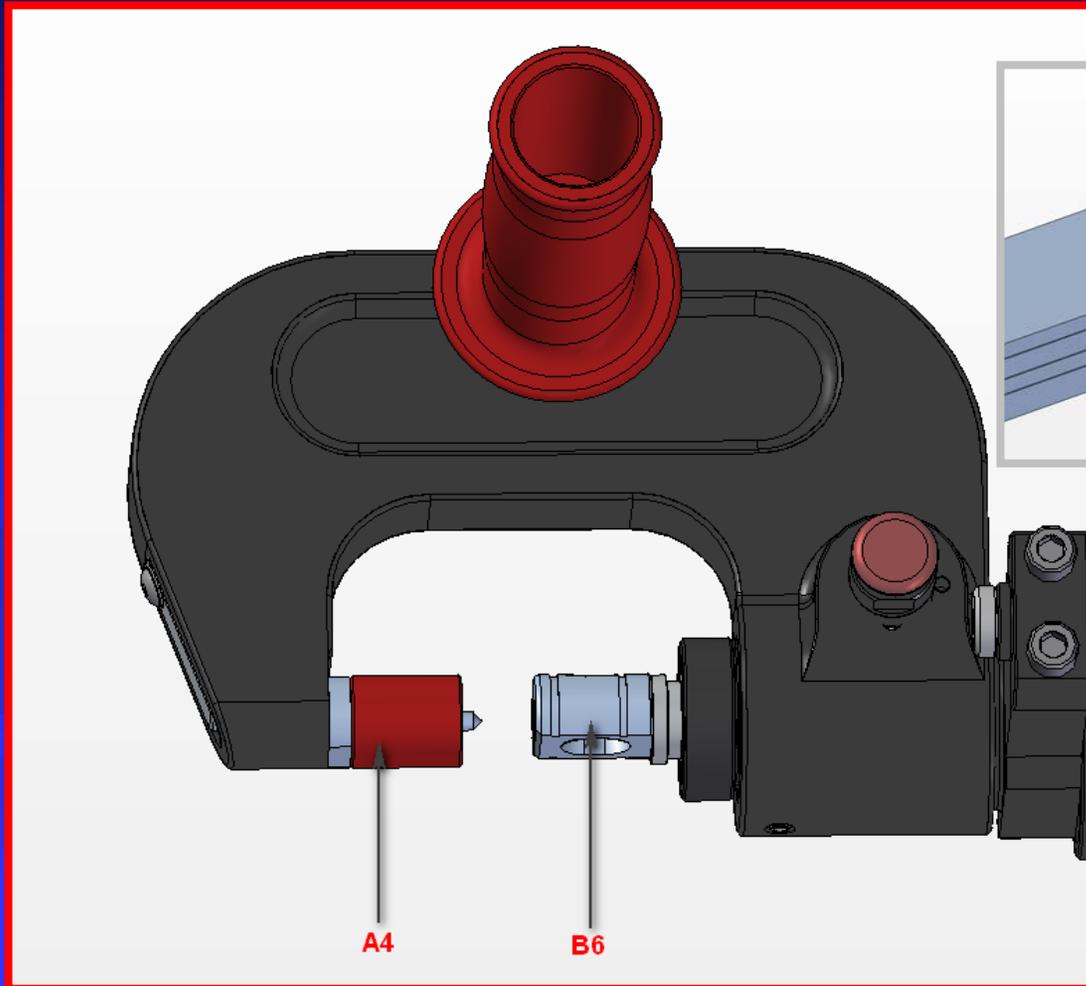


A self piercing rivet as the name implies does not need pre-drilled holes for installation. The process starts by clamping the sheets of materials between the die and the blank holder. The rivet is driven into the materials to be joined between a punch and die in a press tool. The rivet pierces the top sheet and the die shape causes the rivet to flare within the lower sheet to form a mechanical interlock. The rivet may be set flush with the top sheet when using a countersunk rivet head. The die shape also causes a button to form on the underside of the lower sheet. In the repair process, it is necessary to have access to the back side of the material. It should be noted that SPRs are made from high strength steel and coated with a tin-zinc coating to prevent galvanic corrosion. Moreover, the install gun must have enough pressure to set the rivet

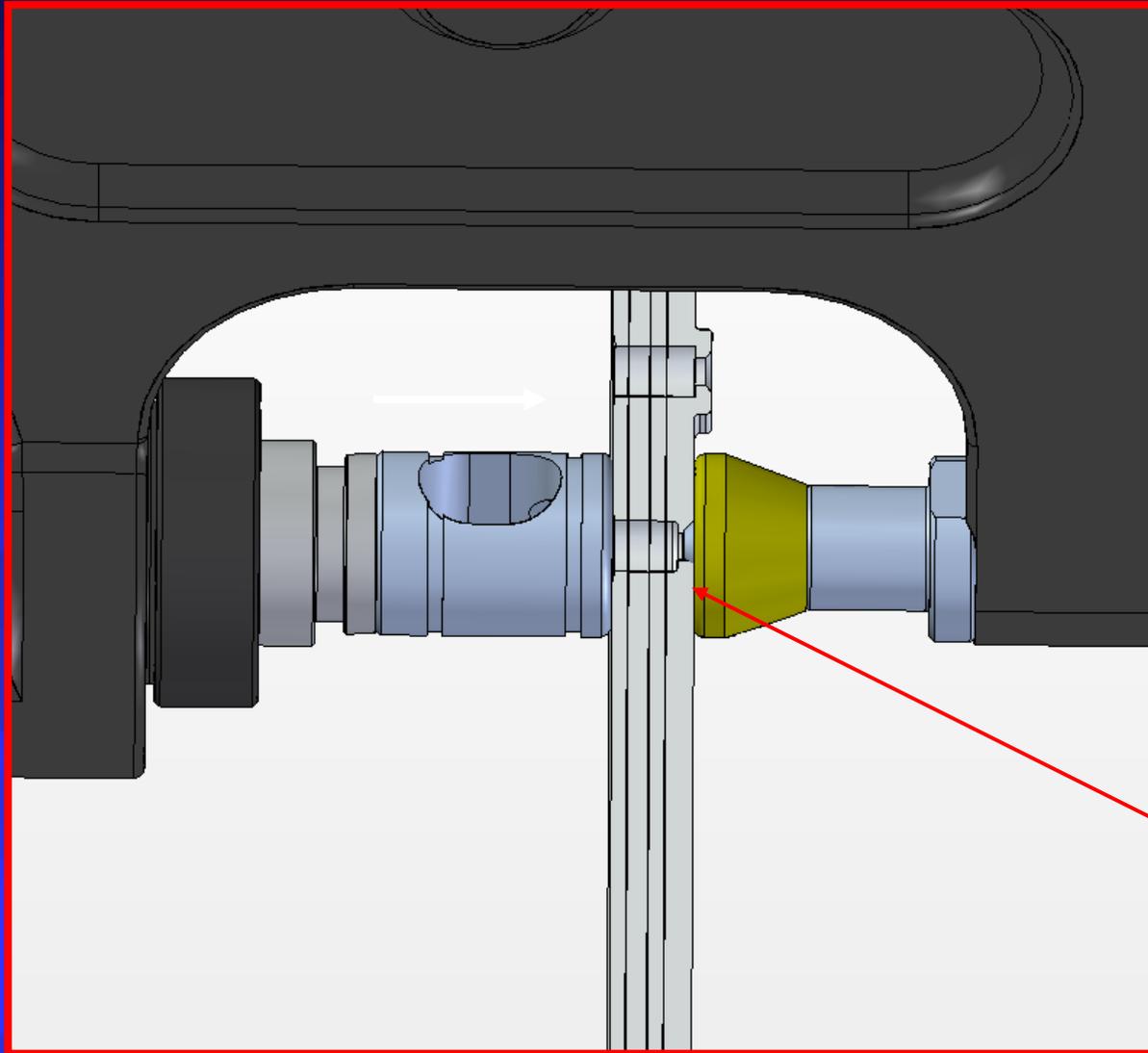


Removing a SPR

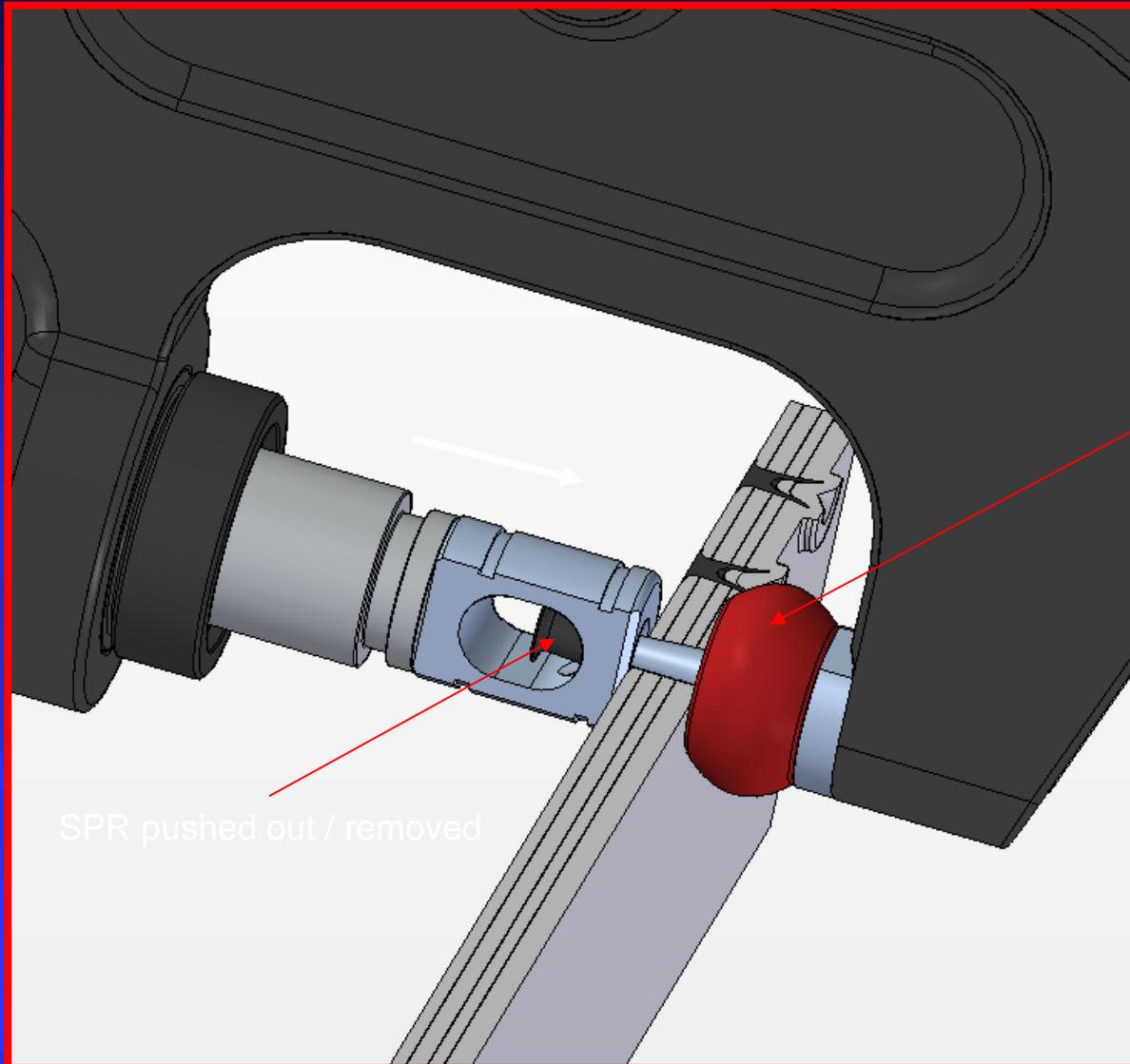




A4 – punching die
B6 - matrice



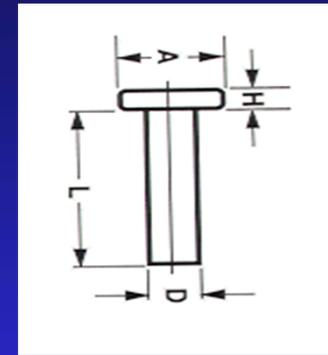
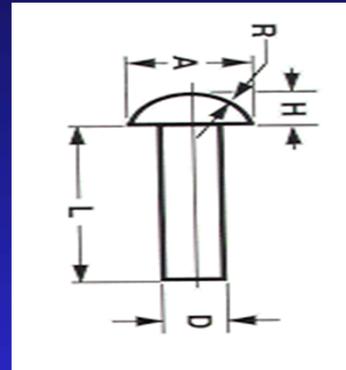
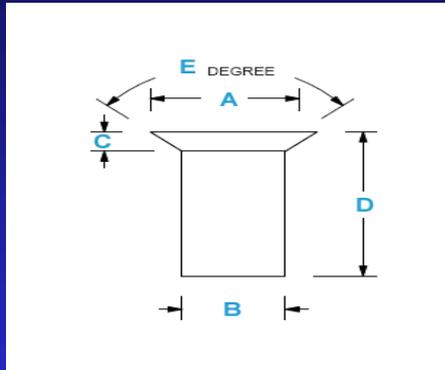
SPR back side flat



PU-spring
under tension

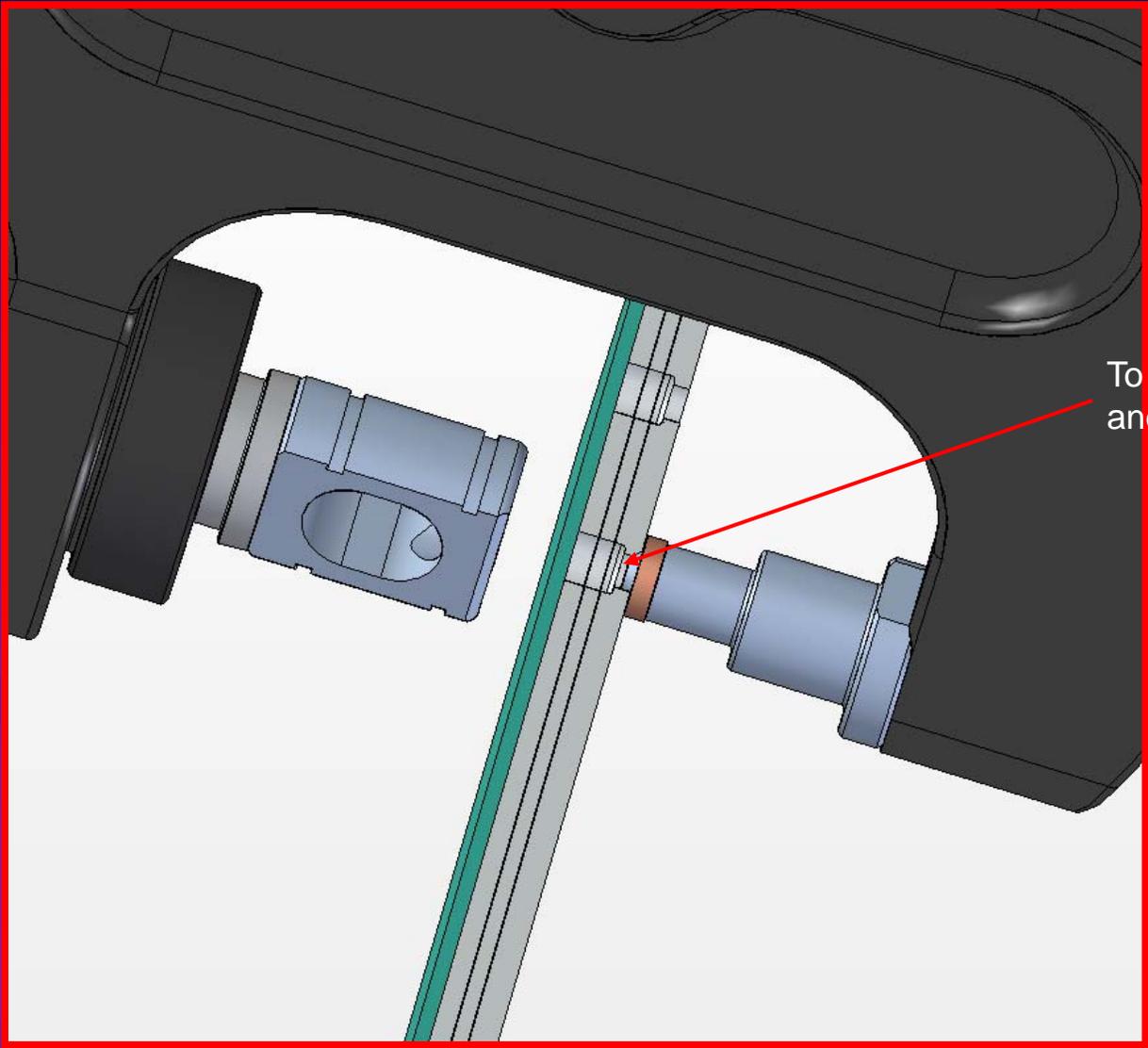
SPR pushed out / removed

Solid Rivet



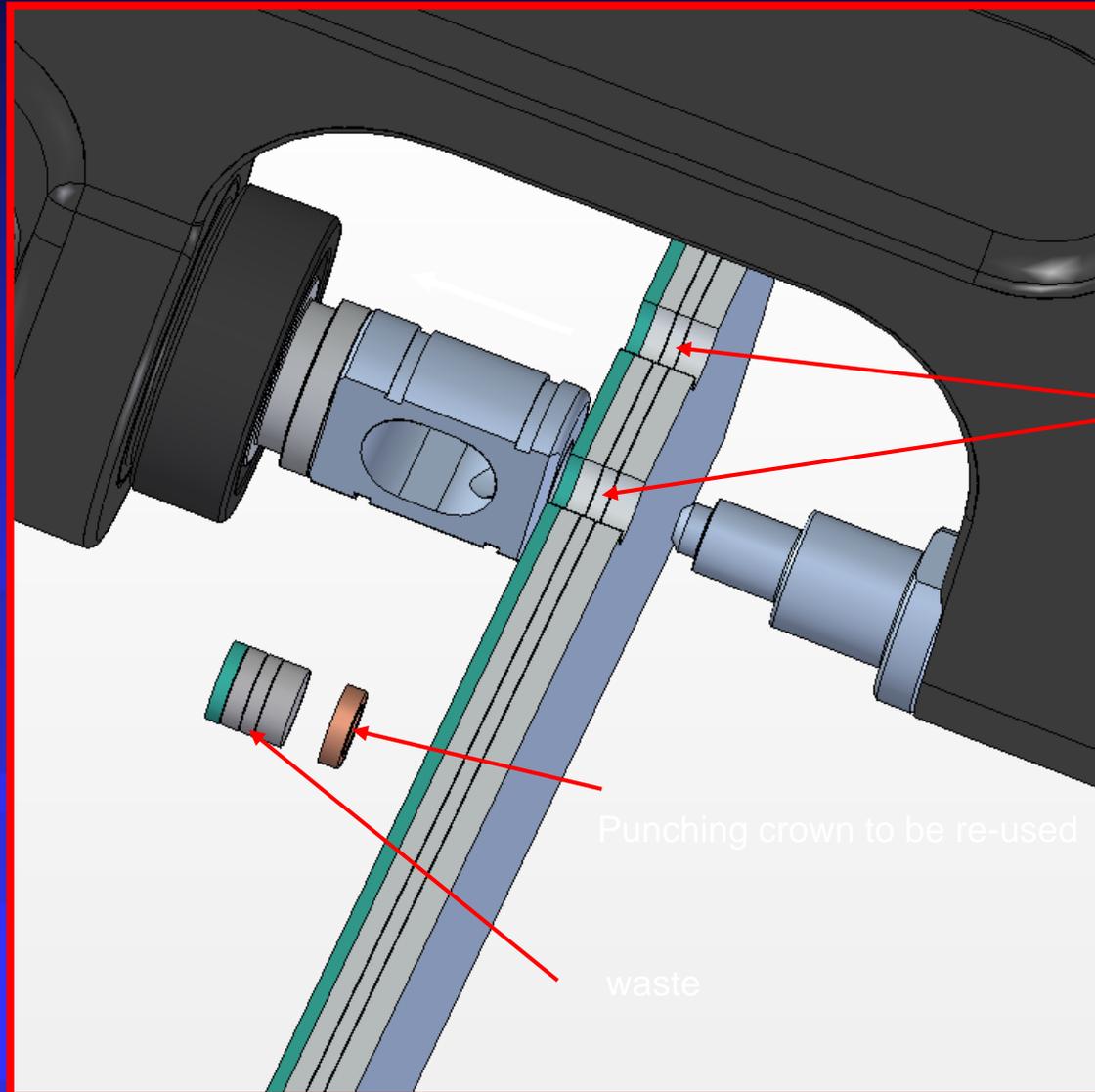
you will see that the rivet is solid. Like the SPRs, solid rivets need to have access to the backside of the panel. Unlike SPRs, a specific size hole is needed. Solid head shape for solid rivets comes in many forms.

Work process 04.1
Positioning of the tool



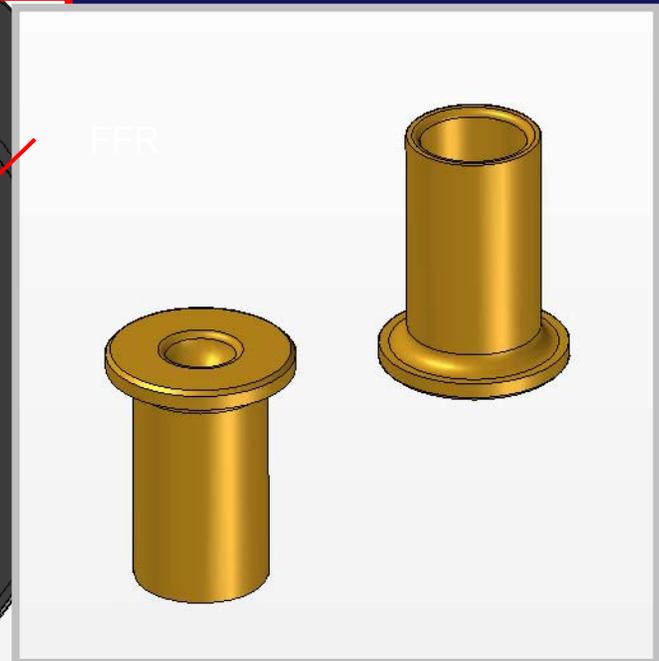
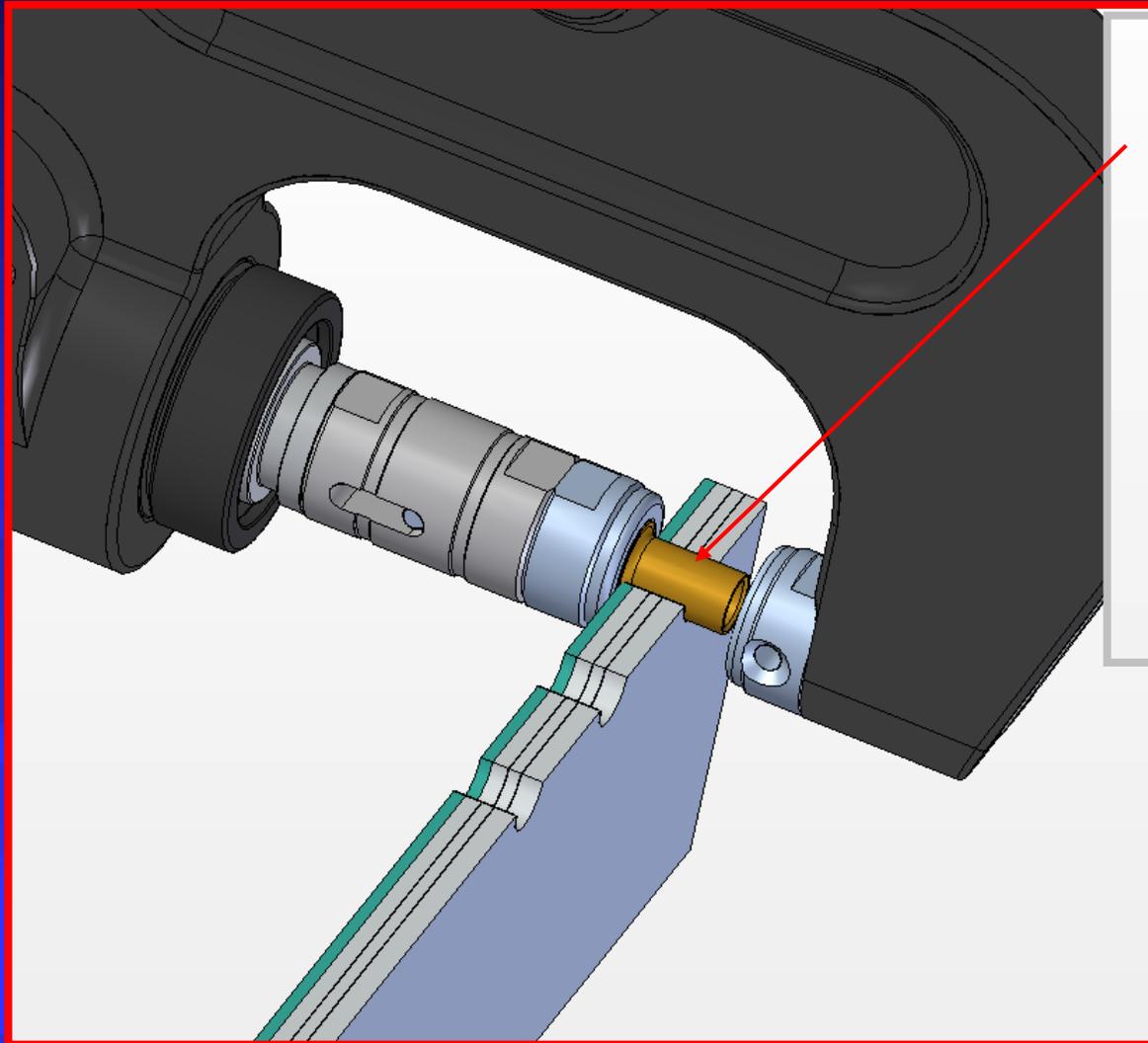
To center the punching
and calibration die

Work process 04.3 Producing calibrated hole for rivet

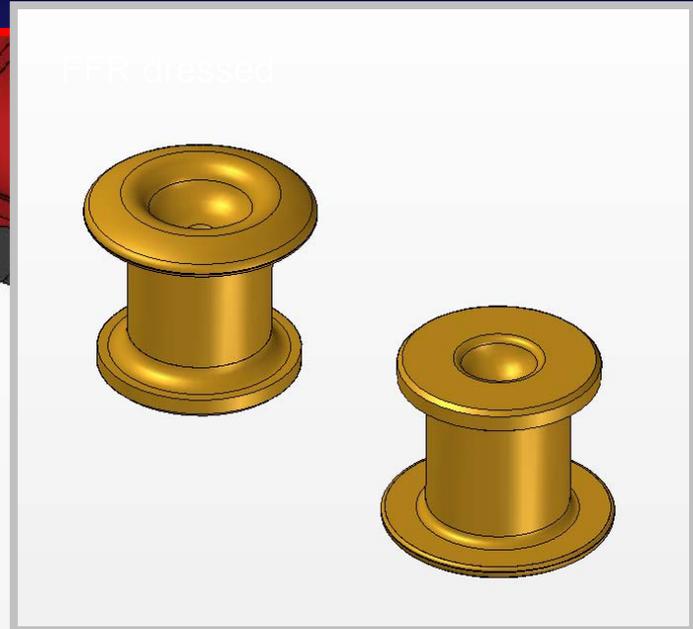
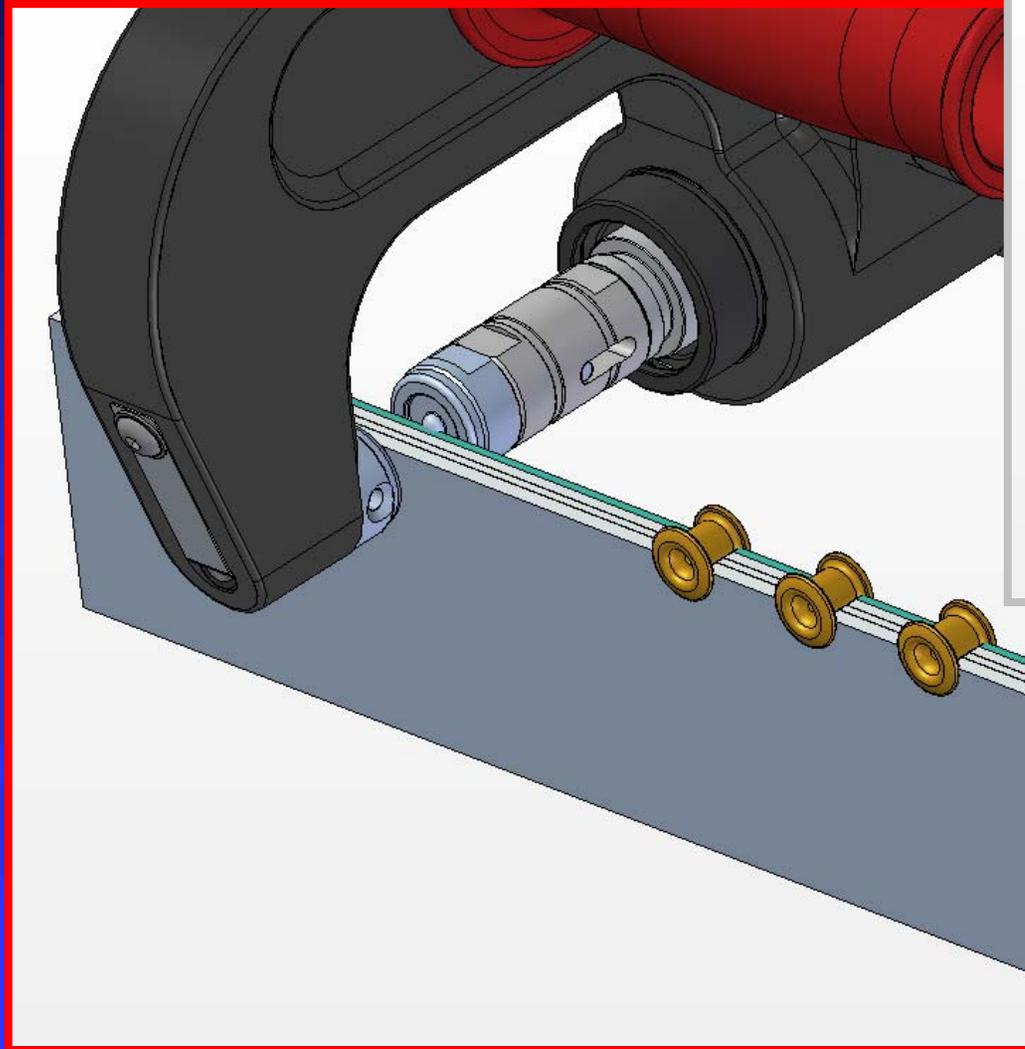


calibrated hole for
to place FFR



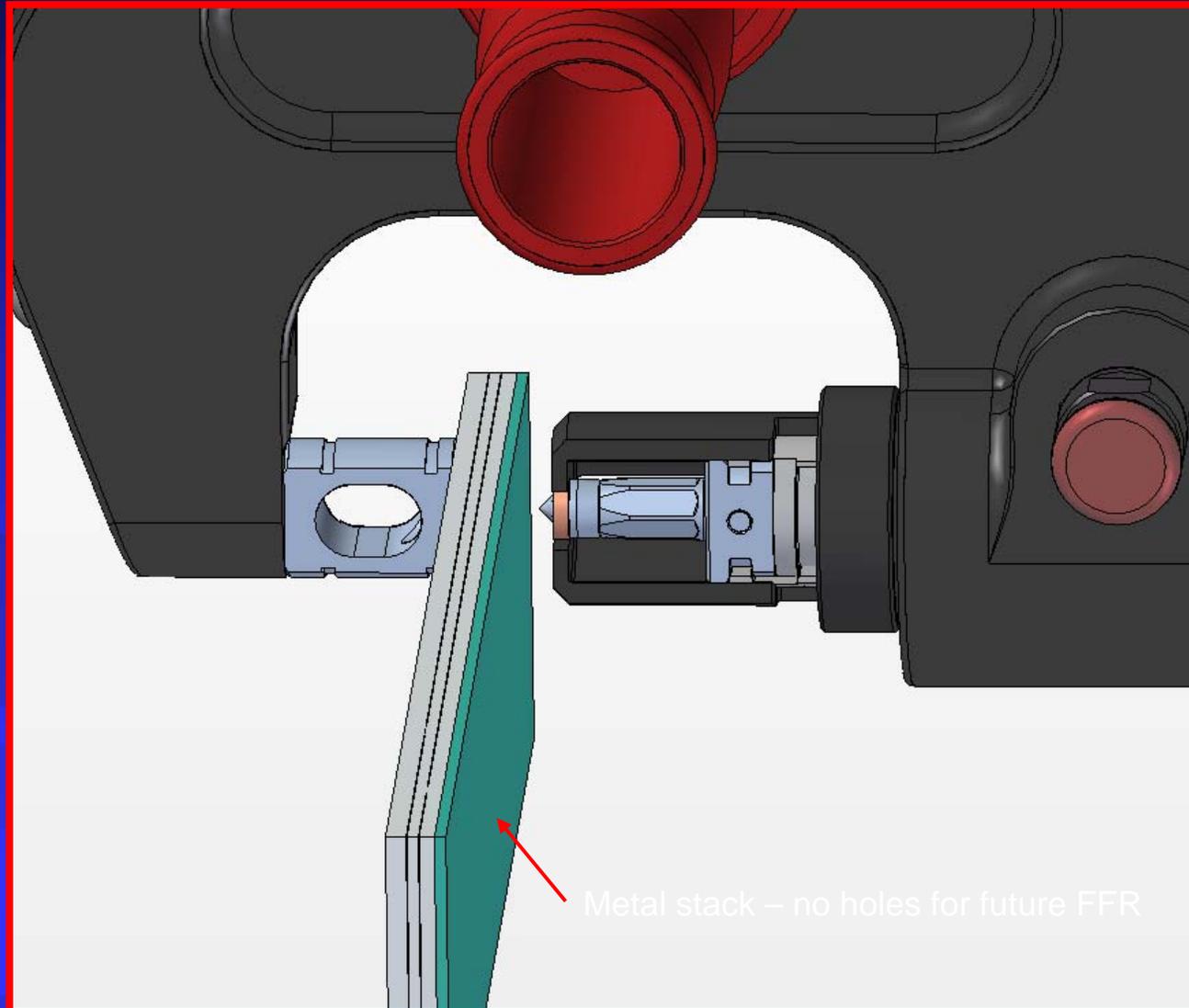


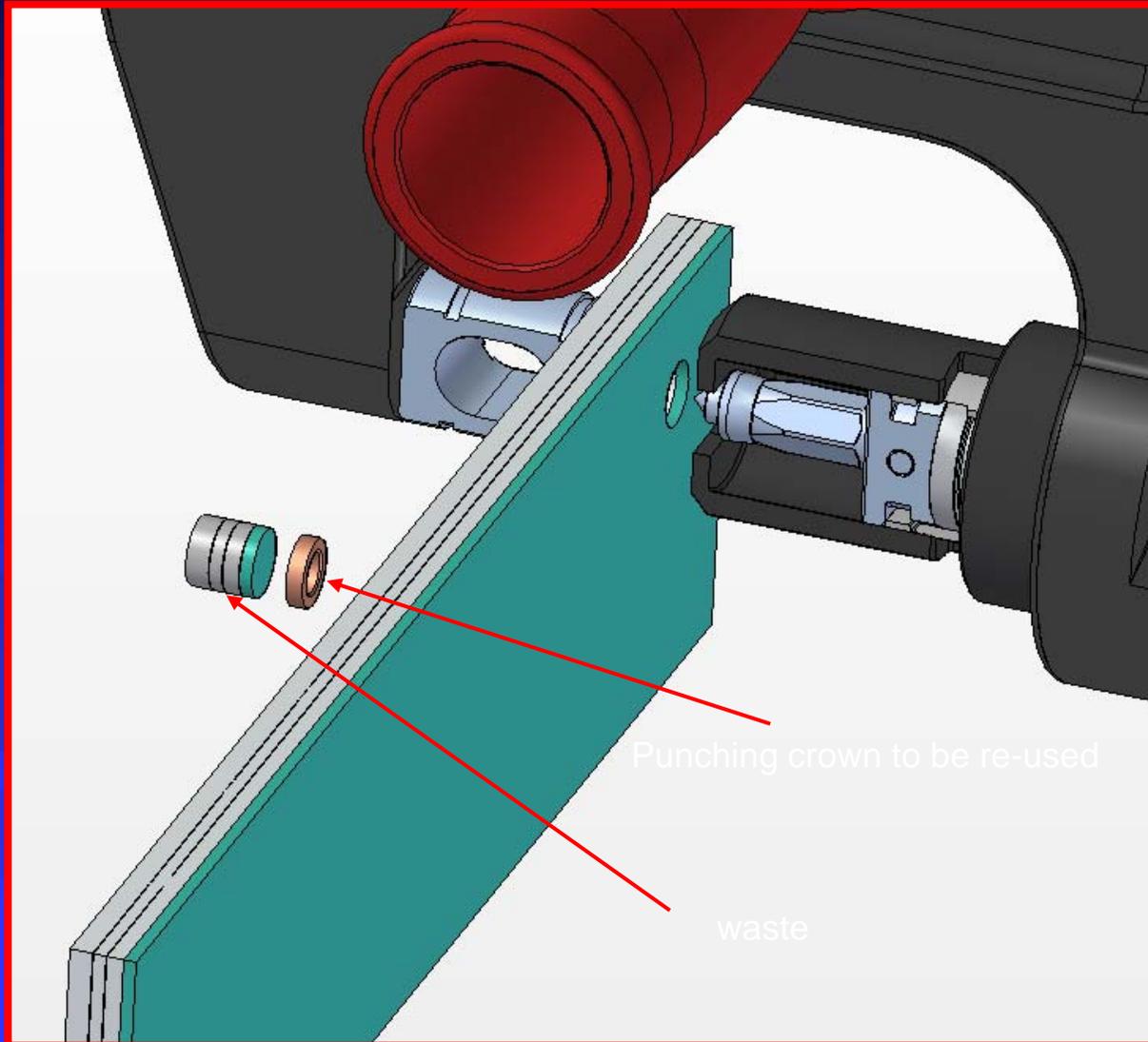
Work process 05.3
metal stack riveted with FFR



Work process 06.1

Positioning of the tools for calibration the holes





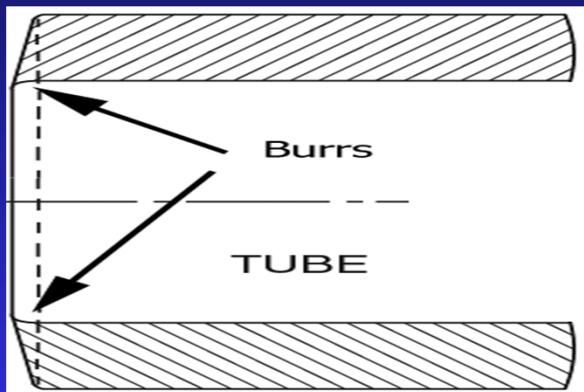


Countersinking the Rivet Hole

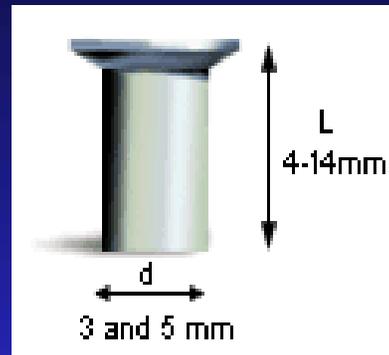




Deburring the Rivet Hole



If the lip or the burr is not removed, the head of the rivet will not make full contact with the panels that are to be joined. The rivet could become loose and overtime the adhesive could also loose some of strength due to vibration and movement. If the vehicle is again in another collision, this area could become a weak point in the distribution of the collision energy. Finally on solid rivets, the same tools for installing SPRs can be used for solid rivets, but you will need to change the madrels. The same holds true for removal. Moving on



Rivets must be matched to the job

(L) The length of the 'Body' is determined by the stack total thickness plus 2mm. Therefore if the stack is 4.5mm then add 2mm so the rivet length will be 6.5mm

Sizes range from 3.5mm – 8mm in length

The 2mm is for the correct depth in the stack and it ensures the correct profile ("mushroom") for the joint

(D) Two main sizes of the 'Head'

3mm and 5mm in diameter but there are other sizes. In repair Jaguar do use a slightly bigger head.

3mm is used on the Mini quarter panel for example whilst 5mm is used in Audi on certain parts of their repair sections Taken from Dave Grusko's presentation.

It is extremely important that when installing rivets, that you follow the OEM procedures. If the wrong size rivets are used, it could lead to a huge failure if the vehicle is involved in another collision. To all you shop owners and managers. How many of your techs have a caliper or a micrometer?



Replacement Pick up Bed Front Aluminum panel on 2016 Ford F150

FIGURE 1 RIVET LOCATIONS

- Black dots represent the location of nine (9) blind rivets (W707638-S900C). (Refer to Figure 1).
- Black squares represent the location of four (4) blind rivets (W702512-S900C). (Refer to Figure 1).
- Black triangles represent the location of one (1) blind rivets (W708777-S900C). (Refer to Figure 1).

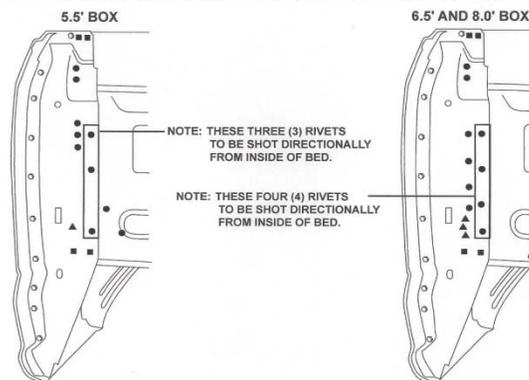


FIGURE 1

- Black dots represent the location of thirteen (13) blind rivets (W707638-S900C). (Refer to Figure 2).

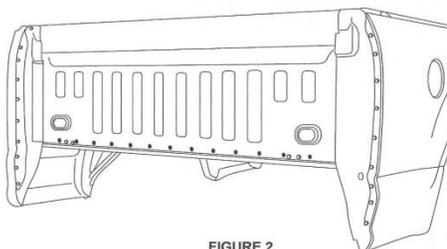


FIGURE 2

SKFL34-9900124-AA

SHEET 2 OF 2

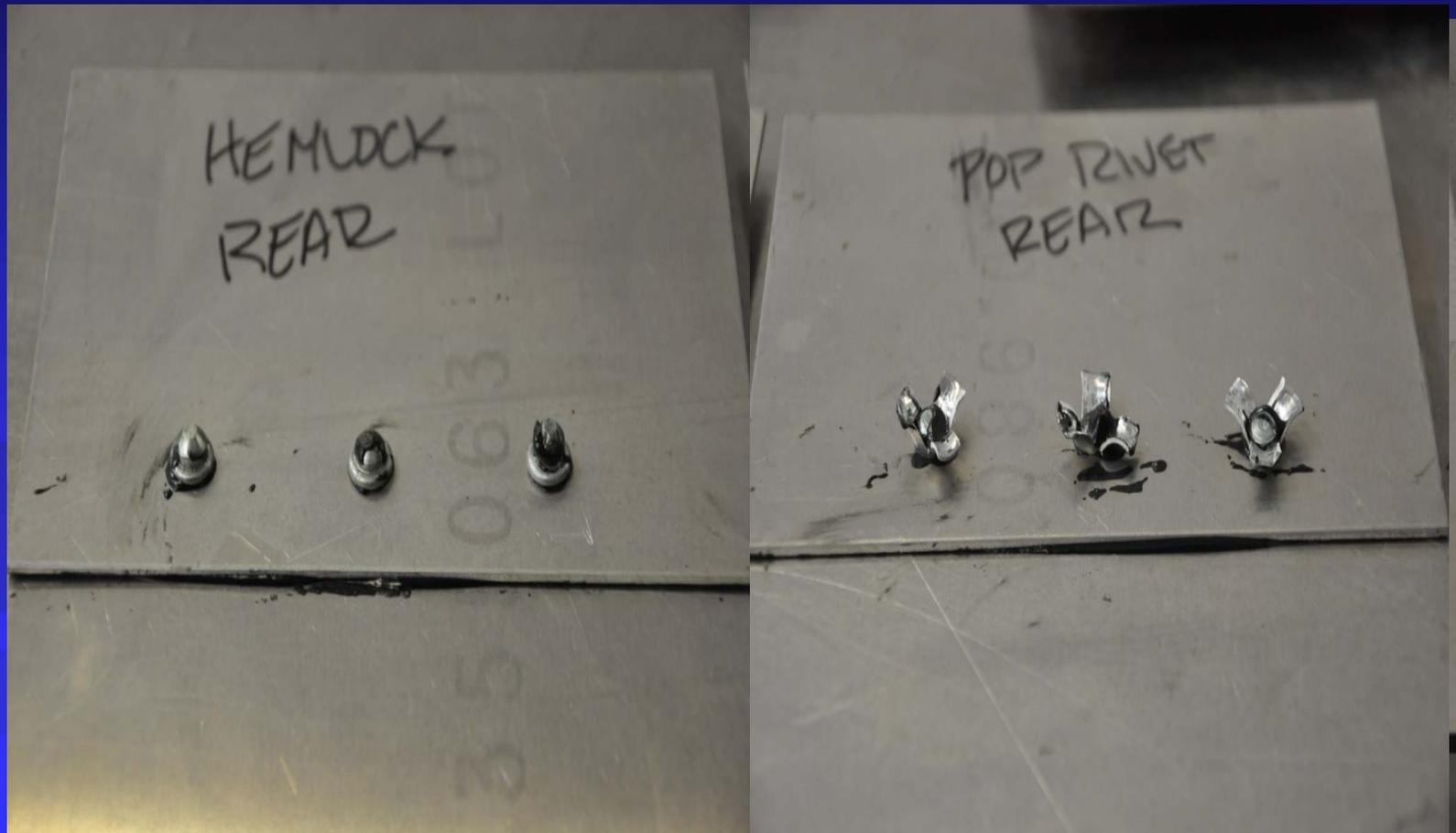


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10-14

F-SERIES BOX FRONT PANEL ASSEMBLY -
SERVICE KIT INSTRUCTIONS



Blind Rivet





OEM Instructions

It should be noted that a proper hole as specified by the OEM is needed for installation and it is not necessary to have access to the backside



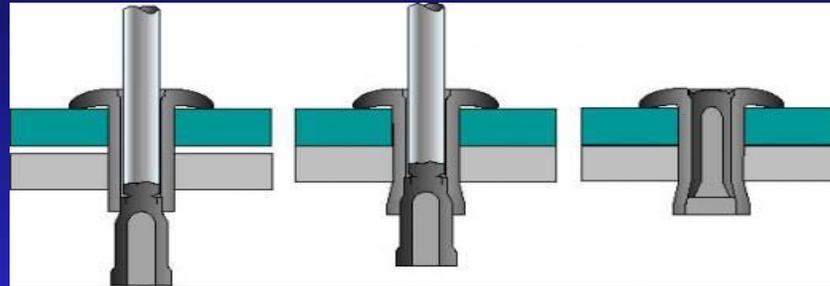
The Monobolt



The Monobolt® rivet is a hole filling, multi-grip, structural breakstem rivet available in steel or aluminum construction. Multi-grip means the rivet has the capability to join component parts having a broad range of thickness. Hole filling means the rivet will expand radially into the application hole to provide a strong, vibration resistant joint and compensate for irregular, oversized, slotted or misaligned holes. Also, it can stop sheet movement.



How the Monobolt Works



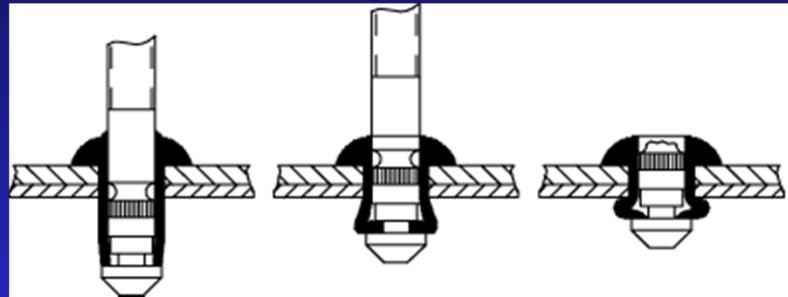
The main feature of the Monobolt® rivet is an internal, mechanical lock of the rivet stem. A special nose tip with a cutting ring (anvil) is required. During installation, when the mandrel head comes in contact with the nose tip, the anvil cuts into and folds material from the mandrel head (skive) into a ledge located in the inner diameter of the rivet head. This prevents the mandrel from falling back through the rivet. Additionally, the locked stem forms a weather tight seal and provides a very strong, vibration resistant joint without the damage, electrical problems or rattling due to loose stems.



Hemlock Rivet



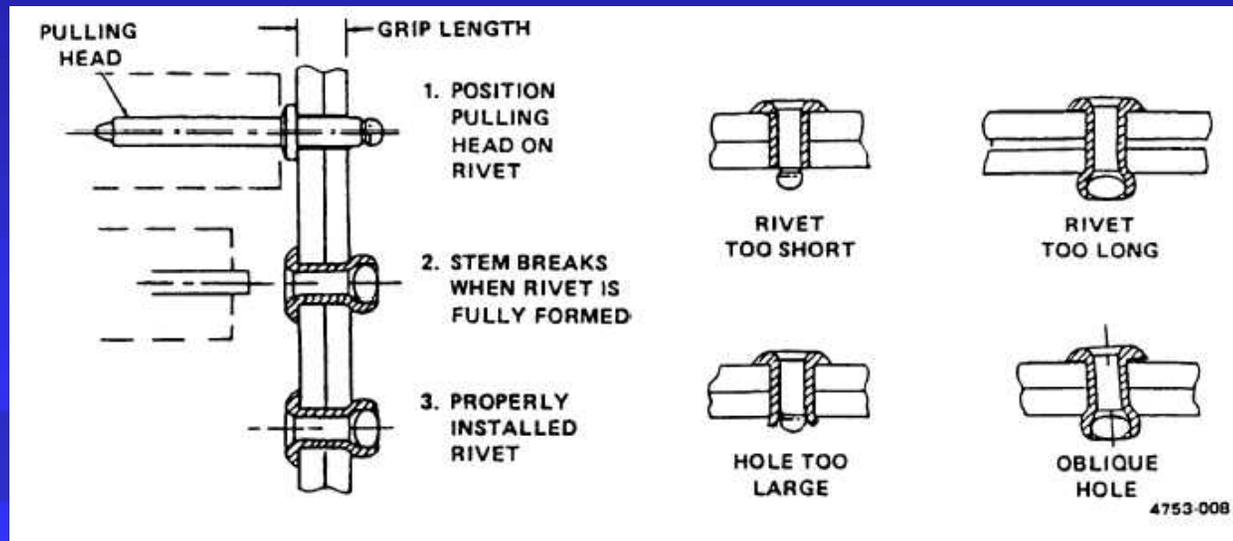
How a Hemlock Rivet Works



This rivet also need a hole for installation and does not need access the backside of the panel. The mandrel is pulled over the rivet body and the entire rivet is compressed against the rear panel. See Fig 30 for the sequence.

There is a large footprint on the back panel and this rivet has superior tensile and shear strength. Moreover, this rivet is highly recommended for thinner pieces of sheet metal

Problems that occur when the wrong blind rivet is used.





Spot Gun



Pull Type Pneumatic Rivet Guns for only blind rivets



Push Type Rivet Guns for SPR's and Solid Rivets only



Pneumatic Rivet Gun with attachments for both SPR's, Solid and Blind Rivets



Some Rivet Guns come with different depth arms

