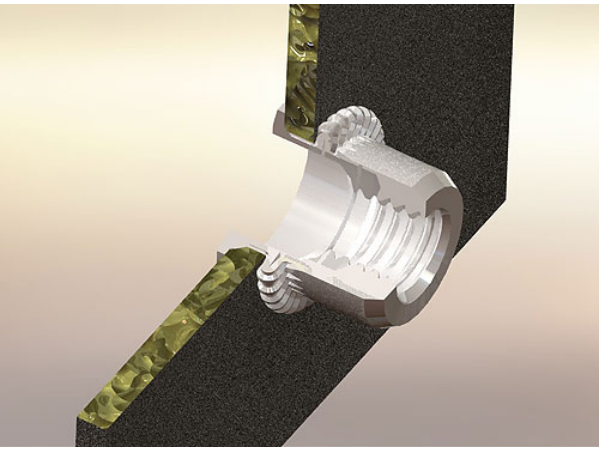
EFC INTERNATIONAL



Specialized in Rivet Nuts

B.C.T. Bulge Control Technology

- High performance and versatile solutions for Rivet Nuts

What does Bulge Control Technology achieve?

- It is an engineered feature that assures a repeatable bulge formation irrespective of the sheet.
- The performance and function of the rivet nut is tailored for the application.
- It allows a rivet nut to be used in extreme conditions.

Today's Challenges in Developing Fastened Joints

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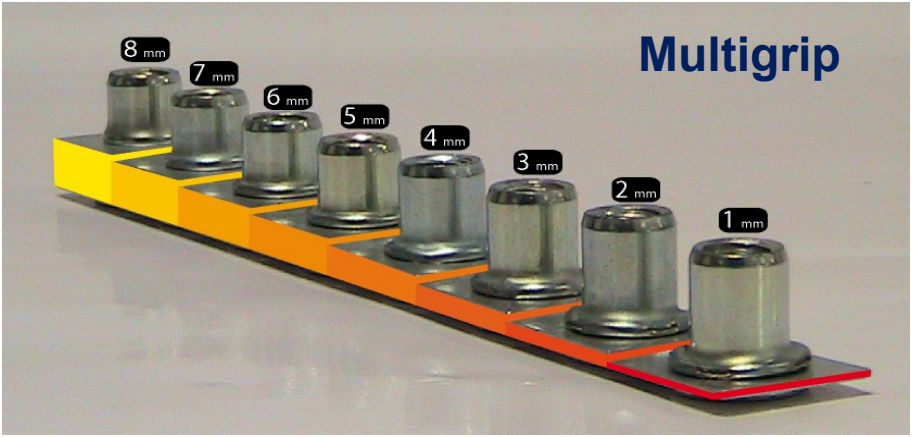
- Light weighting by using steel means selecting thinner steels (hence the weight saving) that compensate by being harder (ranging from 600MPA to 1,200MPa). There are issues with steels above 1,000MPa :
  - Problems with 'weldability' (weld nuts and weld studs)
    - The heat used during welding creates 'puddles' of softness in the sheets around the weld, weakening the sheet material. Therefore, position of the weld is limited to areas of the sheet where strength is not critical.
    - In very thin sections, welding is any way difficult
  - Limited fastening options
    - Piercing fastening solutions struggle to cope with the sheet material where the hardness is above 1,000MPa

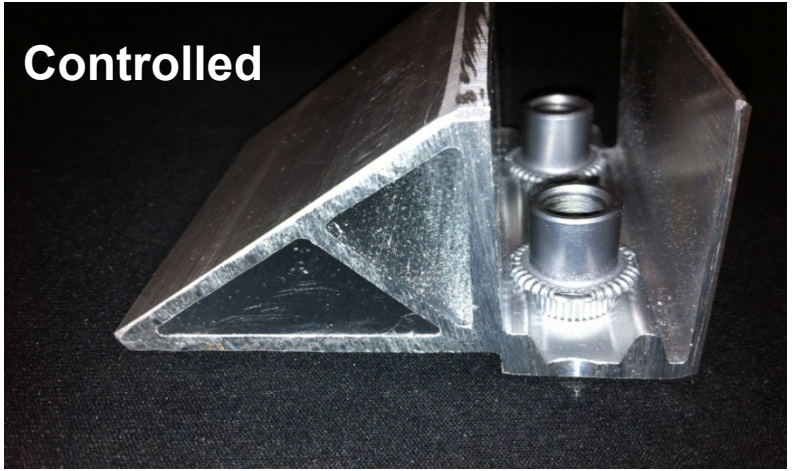
Today's Challenges in Developing Fastened Joints

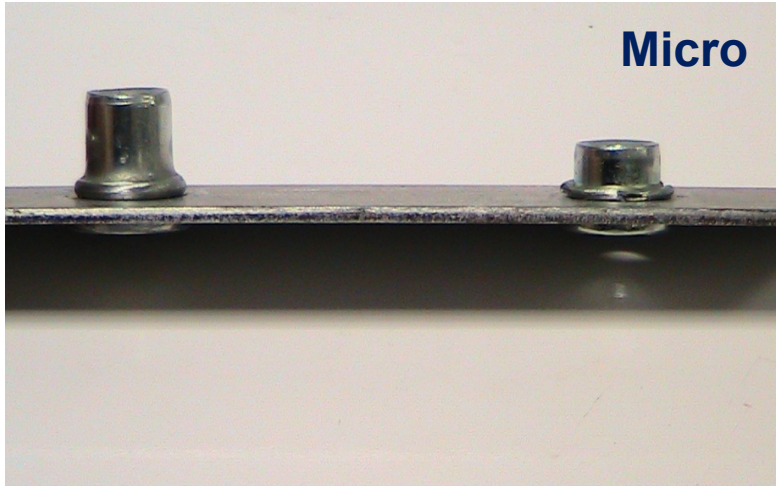
- Rivet nuts offer a 'cold' installation from the blind side.
  - However, standard rivet nuts are made from steel in 330MPa range and therefore do not offer the strength required.
  - BCT Ultra rivet nuts are made from steels ranging from 480MPa to 630MPa and therefore provide full 12.9 performance.
  - Also available in Aluminum 6000 series and still conforms to 12.9 bolting parameters.

Full Automation or Single Show Installation

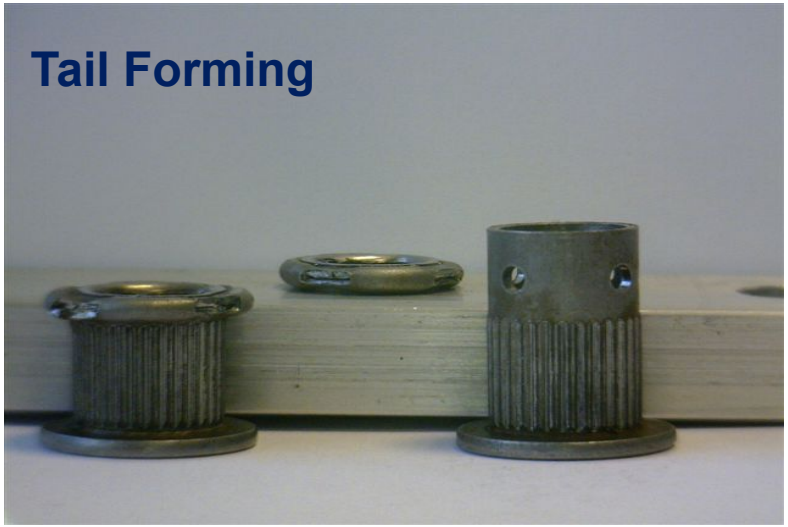
BCT Product Family







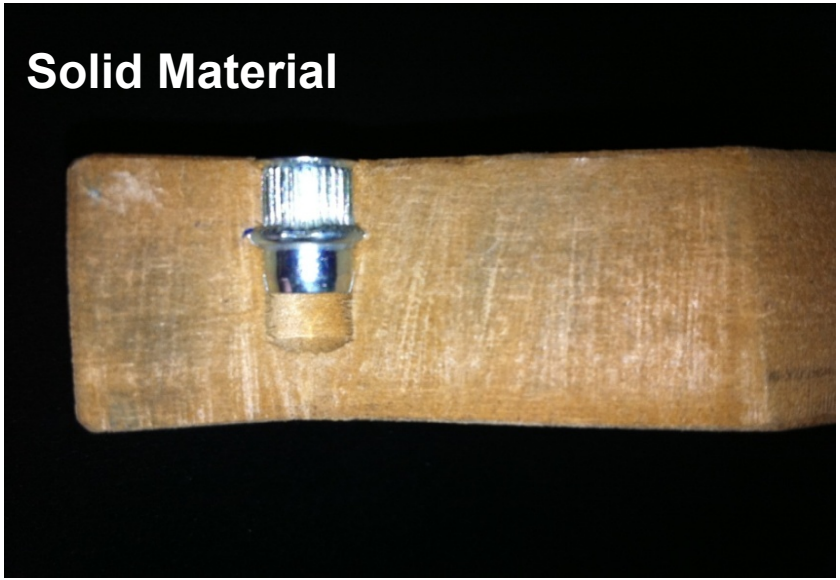
Tail Forming



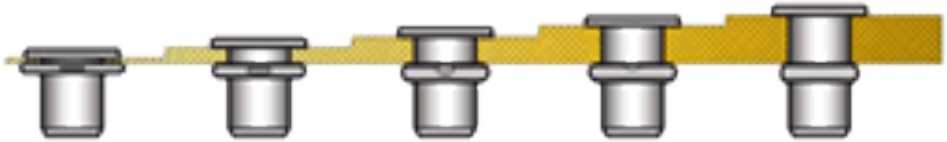
Tight Corners, Close to Radius

Stud Version

Solid Material



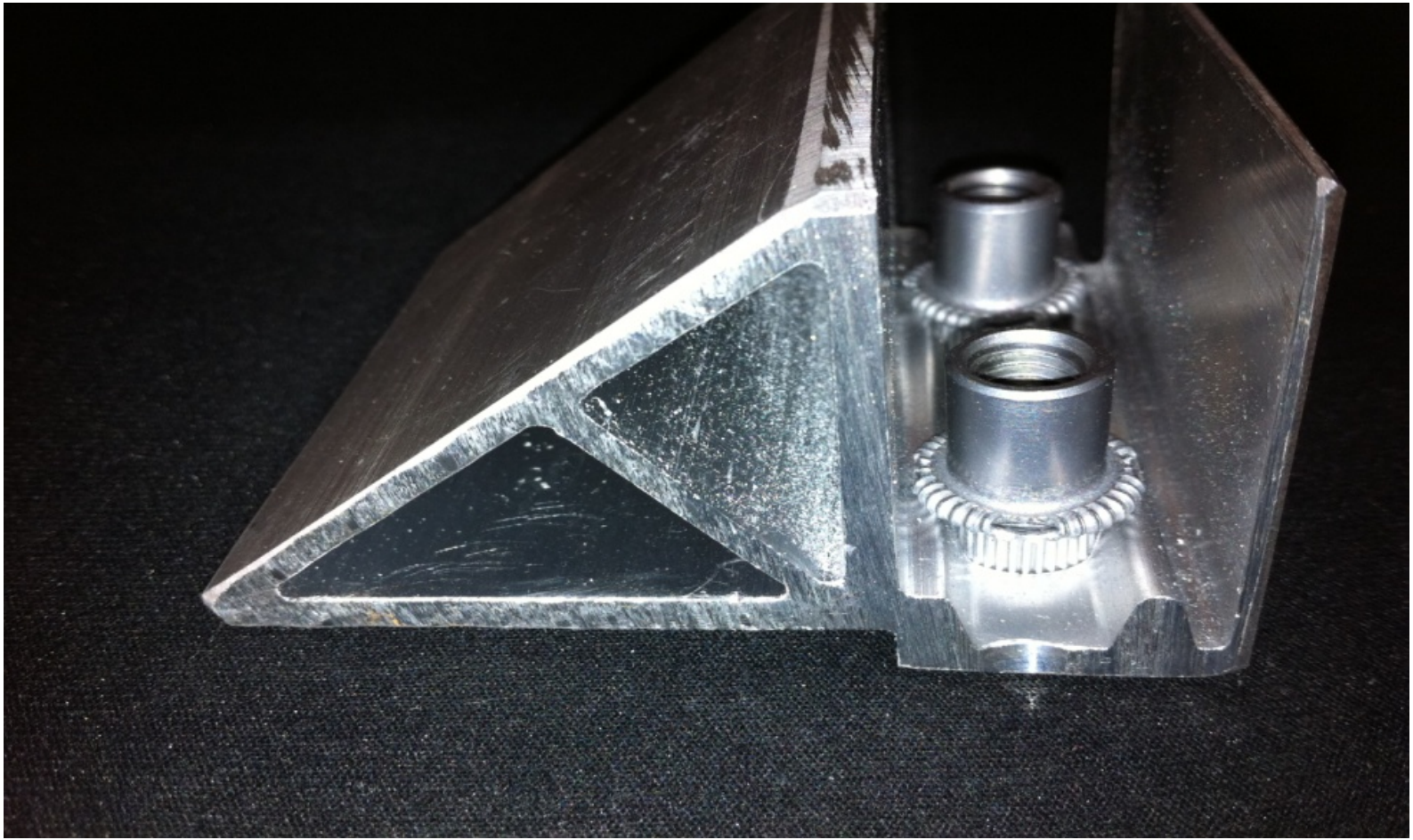
BCT Multigrip



More than 2 x the grip of a standard rivet nut.
Made from 'T' Material (40% higher tensile then standard rivet nuts = grade 8.8 performance.

- **Good for use in applications / materials with a wide variation in thickness occurs.**
  - Ideal where flexibility needed e.g. Repair or remote applications.
- **Can rationalize 1st and 2nd grip products to one product size.**
  - Reduces inventory
  - Eliminates risk of incorrect product selection
  - Eliminates risk of product mixing
- **Perfect for tool kit sales**
  - Simple product to use for low skill operators e.g.
  - Maintenance workers, garages, domestic.
  - KS08 tool optimized for rivet nut setting.

BCT - Controlled



Controlling where the bulge begins to suit specific application requirements

- We dictate exactly where the bulge is formed irrespective of the sheet material strength thickness.
- No expansion of the body during installation; perfect for use in composite materials.
- Bulge deformation is engineered, dictating the clamp load and bulge diameter.
- Sets “straight” in spite of 2 “ribs” in Extrusion. Current Rivetnuts will not function in this application.

BCT High Strength

- Made from higher tensile steels ranging from 330MPa to 600MPa
- Achieves thread performance of grade 12.9 bolts.
- Maintains pretension of the tightened bolt, meaning does not relax after time.
- Also available in Aluminium.

Developing Applications

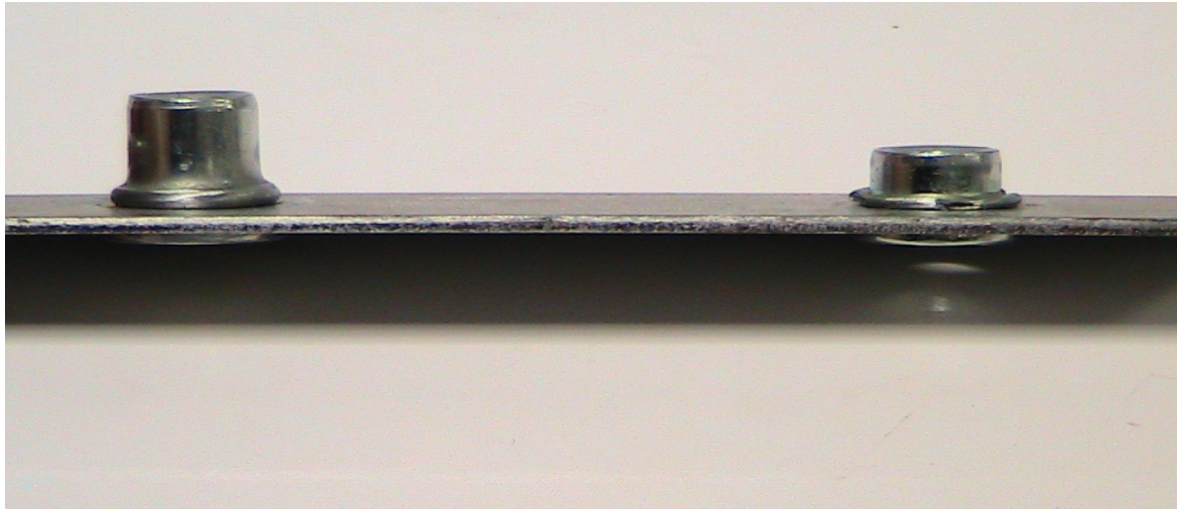
- Seat Belt Bolts. Traditionally M12, now BBA Ultra Series M8 Thread. OEM stated "we could not break/fail the Rivetnut, we save weight, labor and fastener costs.

- Bumper Application. OEM design Steel Rivetnut, but BBA Ultra ALUMINUM being considered due to exceptional Strengths. (in testing)

- Carbon Fiber Deck Lid – OEM considering replacing steel plate with Clinch Hardware with 3 BBA A4/316 Stainless Rivetnuts. Currently 2.2kgs per "plate" replaced with 3 BBA Rivetnuts at approximately 10-12 GRAMS total. Reduced install time for plates 15 minutes vs. 1 to 2 minutes for 9 Rivetnuts. Current method cost (3 plates) $30 to less than $10. Saving 14 minutes per assembly (early test stages)

BCT Micro

- Not all applications have rear side space e.g. Box section or when panels need to fit closely together.
- BCT reduced length is significantly shorter than a standard rivet nut.
- An M6 can be installed with a total blind clearance of 8mm, protruding just 5mm after placing.
- Achieves 8.8 thread strength.

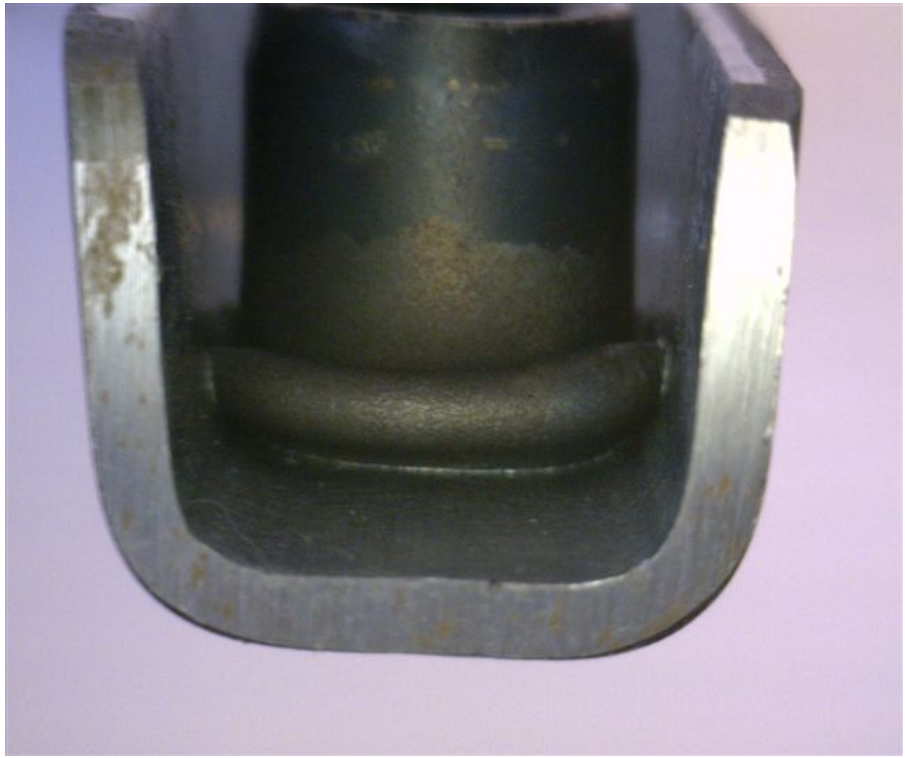


Anti Rotational 1 / Blind Hole, Solid Material

- Produces bulge deep into the material giving increased pull out performance.
- Increased anti rotational performance in round hole due to non round bulge formation.
- Good for all foam filled sections and even soft wood.

Narrow Spaces, Anti Rotation

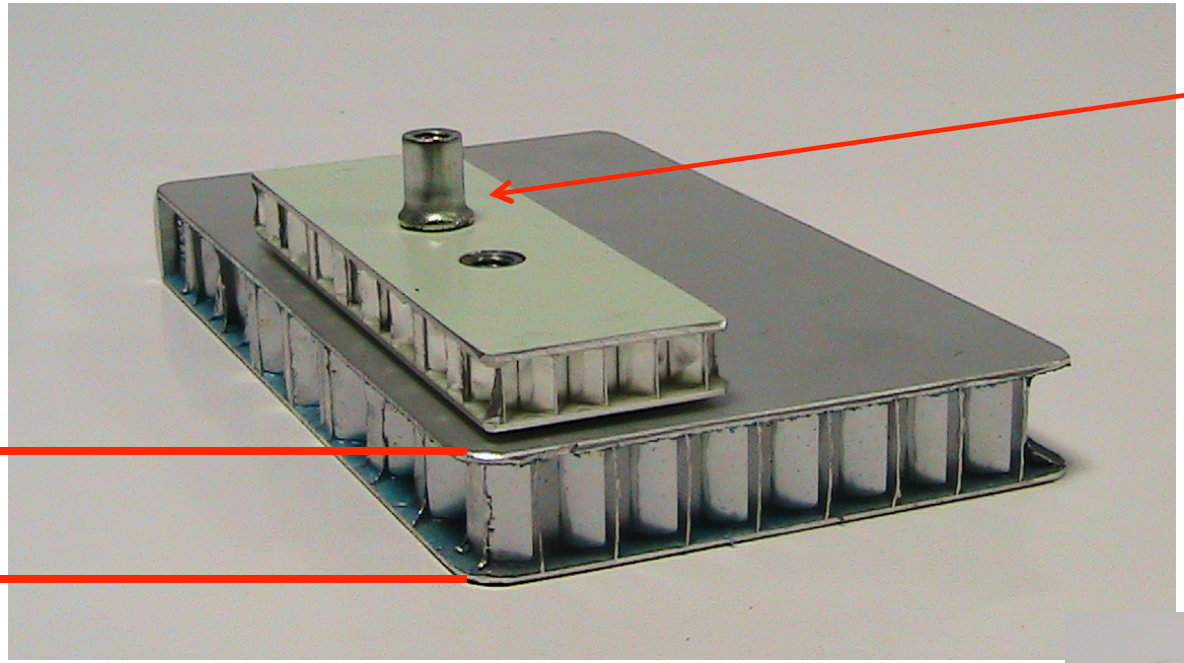
- To be installed into tubes, channels or ‘wedge’ materials.
- Will not rotate.
- Standard rivet nut cannot form bulge here.



BCT: Hoku

- For applications where there is limited top and rear space.
- Grade 12.9 strength.
- This is not a compression fixing, meaning it does not apply additional stress to the material after placing.
- Installed with Standard Rivetnut Tools

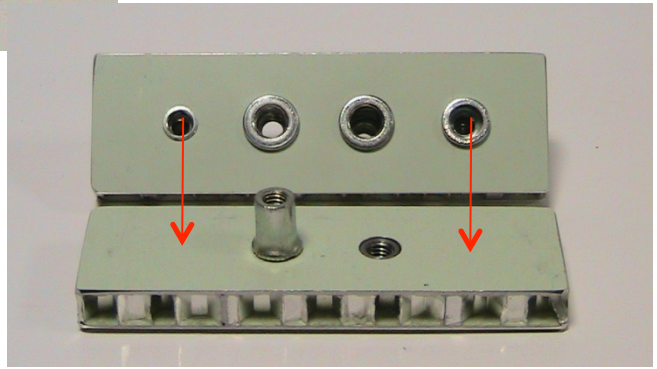
Application Areas

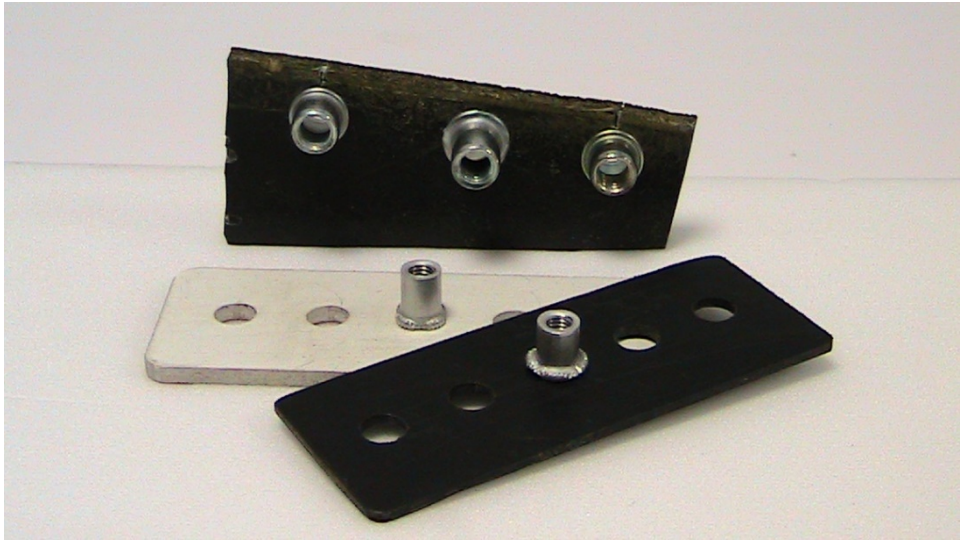


Bulge Control Does not form in the material, but behind the rear sheet.

BCT Micro

M6 BCT can have a rear protrusion as small as 5mm (when placed) while still giving 8.8 grade thread strength.





Carbon Fiber
Fiber board
Rubber sheet
Plastics
Honeycomb

Assorted Parts

Controlled A4 Stainless Steel : Carbon Fibre

BMW i3 & i8

- Extensive use of Carbon Fibre. Light Weight but difficult to fasten.
- Initially BMW used bonding technologies. However, they were considered slow, dirty, expensive and not highly effective.
- Accepted BBA BCT as system technology across vehicles. Now being adopted across entire BMW range.

Multigrip with High Strength

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FIAT / Chrysler Automotive

- Structural application in front end tie bar assembly. Wanted a fastener that was blind, fast to install and that would accommodate for variation in sheet thickness while providing 8.8 thread strength.

- BCT Multigrip M6 and M10 tested and achieved all requirements. They are now used across a series of FCA vehicles in the USA and Europe.

Booth # 20

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