Fasteners for carbon fiber reinforced materials

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Challenges

Corrosion Resistant Fasteners

Due to the different electrochemical potentials standard screws show intensive corrosion after a short period of time when used in carbon fiber reinforced materials. Even stainless steel (A2 / A4) will show this reaction given enough time. Seemingly, the only solution are fasteners made of higher grade materials such as titanium. However, these materials are extremely costly (hundredfold compared to steel) and due to less hardness, larger dimensions are required. Furthermore, fasteners made of this material are not able to form a thread into carbon fiber reinforced materials because the tip of the thread is not hard enough.

Robust Connection

Limited material thickness and the risk of delamination complicate processing carbon fiber reinforced materials

The use of metric threaded screws is often impossible due to the limited thread reach (0.5 x d or less). A metric thread can be realized by using a material accumulation or the more costly use of Inserts or Big-Heads, titanium bolts or similar materials, which are laminated or glued.

Cost efficient thread forming fasteners, where the thread of the chosen screw taps into the material of the part, are not suitable because of the limited material thickness. The thread is parallel to the fibre orientation, producing shear force within the material and causing delamination of fibre and matrix.

Solutions

Corrosion Resistant Fasteners

b&m-CARBONPLAST®

Thread-forming screw for application in carbon fiber reinforced materials

- Corrosion resistant austenitic material
- Suitable for thread-forming in carbon fiber reinforced materials
- Resistant against abrasive wear
- Thread geometry for an optimized flow of material
- Available in silver or black

b&m-CARBONMETRIC®

Metric threaded screw for resilient connections of carbon fiber reinforced materials

- Corrosion resistant austenitic material
- Hardness comparable to grade 10.9
- Combination of different materials possible
- Available in silver and black

b&m-CARBONCONNECT®

Integrated tube for resilient connections of carbon fiber reinforced materials

- Resilient connection through large thread reach
- Substitution of inserts or Big Heads
- Circumvents failure of components by delamination
- Suitable for thread-forming screws – b&m-CARBONPLAST®
- Usable in combination with b&m-CARBONMETRIC®
- Optimized fibre direction through diversion
- Orthogonal orientation of fibre and thread tip
- Possible designs:
  - Drape of component material
  - Add supplemental fibre material
  - Lamination of a pre-built tube