

# *Gujarat Technological University*

## **Bolted Joints in Composites**

Organized by the 2013 Virtual Academy of Indo US Collaboration for Engineering Education  
(IUCEE)

Note: Due to some issues with servers, the webinar could not be held on 6<sup>th</sup> Nov 2013. It has been rescheduled to 13<sup>th</sup> November 2013.

Wed, Nov 13, 2013 **9:45 AM - 10:45 AM IST**

Registration Web Link: <https://www3.gotomeeting.com/register/466391214>

### **Presenter:**

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Eminent Professor

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### **Abstract:**

Composite materials are now essential for manufacturing many structures in aerospace engineering, civil engineering, etc., because of their high strength, stiffness, corrosion resistance, low density, etc. In most of these applications, composite parts need to be joined to each other or to metallic parts. Mechanical fastening is the preferred joining technique, in spite of severe stress concentrations introduced by bolts and rivets.

This presentation is in two parts. In the first part, the interesting and difficult task of measuring the contact angle between a pin (or bolt) and the hole is addressed. An instrumented pin with electrical contact, an instrumented pin with an optical fiber and photoelasticity are shown to be effective methods for measuring the contact angle. A very simple, inexpensive method employing 'layout fluid' is also shown to be equally effective. The coefficient of friction between the pin and the hole is changed in a controlled manner to compare the experimental results with the finite element analysis.

In the second part of the presentation, failure loads and failure modes in pultruded composite specimens are experimentally determined and analyzed using Load and Resistance Factor Design (LRFD) methods. Specimen dimensions are chosen to produce different failure modes such as bolt bearing, net tension, shear out and block shear. The LRFD methods are used to calculate 'block shear resistance factor' and 'net tension resistance factor'.