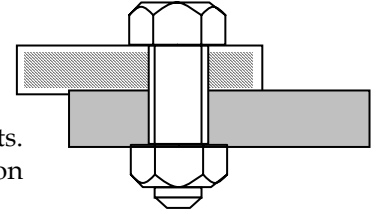


## Design and Behavior of Bolted Joints



This 2-day session will be of interest to practicing design and manufacturing professionals who are involved in assembly of electro-mechanical hardware components. Engineers and technicians in design and assembly operations would find the information presented in the session valuable in their professional activities.

**WHERE?** At your facility (For larger group)

**WHEN?** Any mutually convenient time.

**DETAILS:** Please visit for information and registration.

[www.Nutek-us.com/wp-sem.html](http://www.Nutek-us.com/wp-sem.html) - onsite seminar

**COURSE OVERVIEW:** Threaded fasteners play an important role in building the end product. A typical automobile, for example, uses about 4000 nuts and bolts. Because a few of them once in a while would come loose, over half of the warranty dollars for the same automobile can be related to fasteners.

### COURSE DESCRIPTION

Modern buildings, vehicles, machinery, and physical products of all sizes and shapes are put together by joining smaller components with another. A vast majority among these is assembled with fasteners, as they need to come apart for potential repair, replacement, or maintenance. Simply put, a fastener is a screw, nut, bolt or stud with external or internal threads.

### Why should you study fasteners?

Approximately 200 billion fasteners are utilized by the industry each year. Many such fasteners play important roles in transportation, safety and comfort of our modern life. A typical automobile, for example, uses about 4000 nuts and bolts. Because a few of them once in a while would come loose, over half of the warranty dollars for the same automobile can be related to fasteners.

### Learning Objectives:

Upon completion, you will learn how to:

- Calculate forces in the fasteners
- Establish what torque to specify
- How to increase functional life
- Analyze joints and failure mechanism
- Achieve better control of bolt tension
- Utilize torque application machines

### COURSE CONTENT

Fundamental Principles (Force, Torque, Friction, etc.)

- Forces in equilibrium, free-body diagram
- Mechanical properties of materials
- Spring and stiffness properties
- Scatter Diagrams, etc.

Joint Design Considerations

- Bolt Design and functional parameters (load requirements, friction, etc)
- Torque, tension, and turn angle relations
- Joint relaxation and loss of service loads

Assembly Challenges

- Torque rate monitoring and analysis
- Dynamic and static audit torque
- Torque and tension measurements
- Torque and tension variability
- Tightening strategies for avoiding bolt tension

General Joint Design Strategies

Understanding and Preventing Corrosion

- Coatings to combat corrossions
- Mechanical failure of joints
- Prevention of vibration loosening
- Reducing fatigue failures

### COURSE INSTRUCTOR

This seminar is led by Ranjit K. Roy, Ph.D., P.E., PMP, and Mechanical Engineer. Dr. Roy specializes in the Taguchi approach to quality improvement and engineering quality improvement topics.



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