When a problem arises, the need for specialist skills and resources becomes paramount.

Background to our Test and Consultancy Services

BOLT SCIENCE

Specialists in Bolted Joint Technology

Bolt Science was created with the intention of becoming the recognized worldwide quality provider of independent technical expertise in bolted joint technology.

Bolt Science's reputation for high quality software products, support and service in the field of bolting technology is reflected in our client list, who include:

NASA John Deere Inc. Volvo Car Corporation Aeronca Inc. Dupont Inc. JCB Limited Case Corporation General Electric Corporation Inc. Aston Martin Black & Decker Corporation Ford Motor Company Ltd Harley-Davidson Jaguar Cars Limited Beckman Coulter Inc. Land Rover Limited British Petroleum (BP) Avery Dennison Inc Texas Instruments Inc. Beal Aerospace Inc. United States Navy General Motors British Aerospace Schwitzer (Europe) Ltd UK Ministry of Defence Rapid Networks Ltd Technology PLC London Underground Ohmeda Hong Kong Mass Transit Railway Corporation Loctite Corporation Balfour Beatty Railway Eng. Ltd Radenton Scharfenberg Ltd Advanced Fluid Systems Ltd Sperry Marine Inc. Turner Powertrain Systems Freudenberg-NOK Inc. Marshalsea Hydraulics Ltd Chempute Software CarnaudMetalbox Engineering Plc Eaton Limited Transmission Division CYTEC Industries Inc. AMEC Mech. & Elec. Services Ltd Atlantic Fasteners University of Winconsin-Stout Pico Estil Group APPH Limited Shur-Lok Corporation Centrilift Control Technologies Software House International Inc SKF Mounted Bearings Pall Aerospace Cranfield University Tenneco Automotive Pheonix Piston Hydraulics Inc Telsa Engineering Ltd Intertape Polymer Group Common Sense Fastener Technology Leyland Product Development ManTech Advanced Systems International Lockheed Martin Tactical Defence Systems AOFR Pty. Limited Oxley Developments Company Ltd Penny & Giles Controls Ltd Whirlpool Corporation Avestin Inc. Randle Engineering Solutions Ltd Marconi Medical Systems University of Sunderland Alstom Traction Limited Terabeam Limited Moog Inc. GE Dako TURBOCare Inc Dynamac Corporation MacLean Fasteners Lubrizol Performance Systems Limited Kaiser Optical Systems Inc. Mott Metallurgical Corp. Marshall University Research Corporation RS Technologies HYTORC (UNEX) Limited Reminc Inc. Westvaco Corporation Armstrong Fastenings Limited Pellerin Milnor Corporation Metaldyne Fittings Inc. Innovative Screen Technology Inc. American National Power ALSTEC Limited Norske Skog Tasman Limited General Electric VELCOTEC GmbH Carrier Refrigeration Singapore PTE Ltd Rosmil Industrial S.A. Brunner Scientific American Cap Co. Inc. Threaded Fasteners Inc. Southwest Bolt Inc. Tidewater Industrial Fasteners Corporation Industrial Screw & Supply Field Fastener Supply Co. Greer Stop Nut Inc WESTVACO Corporation Ready Rivet and Fastener Limited Parker Hannifin Corporation ABB Mexico S.A. DE C.V. BioMérieux Corporation Fujitsu PC Corporation Allegheny Ludlum Corporation KVT Technologies Inc. Glaser & Associates Inc Co-Operative Industries Inc. American Superconductor Corporation Textron Inc. Vidomet S.A. (Greece) Hendrickson Europe Limited Spirax-Sarco Limited London Marine Consultants CIA Minera Antamina (Peru) Bantrel Corporation Stress Indicators Inc. JDS Uniphase Corporation Litton Marine Systems Lapp Insulator Company Digital Receiver Technology Inc. Wescam Inc. Sevcon Ltd TWR Race Engines Occidental Petroleum Corporation Weidlinger Associates Limited MODcol Corporation Dana Corporation FFE Minerals USA Inc. Whitesell Corporation Corvis Corporation Dale Industrial Corporation Waterware Corporation United Defence Limited Resistoflex Inc. Naval Surface Warfare Center Coryton Energy Company Limited Nortel Networks Limited Jaguar Cars Limited Beckman Coulter Inc. Land Rover Limited UPS Aviation Technologies Inc. Penske System Inc. Alliance Pipeline Limited Partnership National Railway Supplies Ltd Spectra Inc. TRW Inc. University of Winconsin Platteville Filtronic Broadband Limited Computer Sciences Corporation AEA Technology Battery Systems Ltd Alvis Vickers Limited TRW Systems Limited Benninghoven U.K. Limited TESCO Engineering Inc. Metaldyne Inc. SAB WABCO Pentadyne Power Corporation Unseen Technologies International Ltd Halliburton Corporation Mid-states bolt and screw Inc. IEC Corporation University of Bradford Country Coach Inc. Doran Eng. Co. Limited DePuy Inc. BorgWarner Turbo Systems FEJUCY S.A.C. ACL Computers and Software Inc. Serco Docklands Limited Pacific Scientific Energetic Materials Co. INTRACOM S.A. (Greece) Westwind Air Bearings ALUMETAL AG Clough-Unithai Engineering Limited Ashland Chemical Henry Filters Inc. Resco Railways Limited Pacific Scientific Energetic Materials Company Clough-Unithai Engineering Limited Marion Mold & Tool Inc. 3-Phase Measurements AS Infast Automotive Ltd Zakum Development Company ALSTOM Power Karagozian & Case Consulting Engineers Transvac Systems Limited Ballard Power Systems Inc. Kreska Proyectos Industriales C.A. (Venezuela) Silvertown UK Limited Aztec Bolting Services Inc. Sauer-Danfoss Inc. Gits Manufacturing Co. NP Aerospace Limited Bodycote Materials Testing Ltd Goodrich Corporation Robert Bosch Corporation Tilt-Lift Equipment Pty Ltd Coherent Inc. BAE Automation Limited Kingston University Polytechnic University of Madrid TechMotive Tool UK Ltd Kinetic Concepts Inc. Thales Communications UK Revcar Fasteners Dana Spicer Europe Limited Chevron Texaco Ford Motor Company of Australia Sherborne Sensors Limited Dresser-Rand Company Life Measurement Inc. PaperlinX Limited DTA de México S.A. de C.V. L-3 Communication Systems Instro Precision Ltd Denel Optronics MoreVision Limited Philmor Rail Limited Maritime Applied Physics Corporation Marine Project Management Inc. Korea Aerospace Industries Ltd Ford Otomotiv Sanayii A.S. Sauer-Danfoss ApS US Naval Surface Warfare Center Crane Division Honeywell (China) Co. Ltd Atlas Copco Orion Bus Inc. United Defense LP PCB Piezotronics Inc. Tyco Flow Control Noble Drilling Services Inc.

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Consulting

Bolt Science can assist you in the resolution of structural integrity problems relating to joints containing threaded and other types of fasteners.

Problems can often be solved more effectively with assistance from an outside organization offering a fresh and unbiased view combined with extensive experience of solving similar problems across a range of industries.

We have an extensive library of technical resources including technical reports, articles, research studies and standards on bolting related topics, all of which are indexed.

By having extensively researched the subject and by keeping up to date with the published literature, we can offer state of the art solutions to your fastener and bolting problems.

Our analysis services include:

- Resolution of product service and in-field problems that have fastener related issues.
- Fastener Failure Analysis (fatigue, tensile fracture, thread stripping)
- Determination of forces acting on the fasteners within a joint.
- Torque Tightening Analysis.
- Gasket Leakage Problems.
- Fastener size and strength requirement determination.

We can also assist with:

- Fastener loosening problems.
- Fastener design problems.

We pride ourselves on communicating the resulting analysis and opinions in a concise and easy to understand manner. If you have a problem that you think that we may be able to assist you with, why not contact us for a no fee, initial consultation.

Our approach is analytically based and whenever it is feasible, we quantify the issues we discuss.

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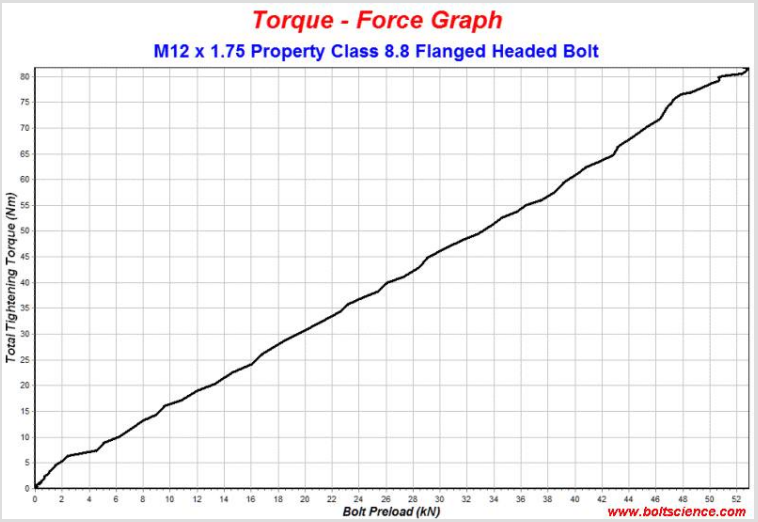
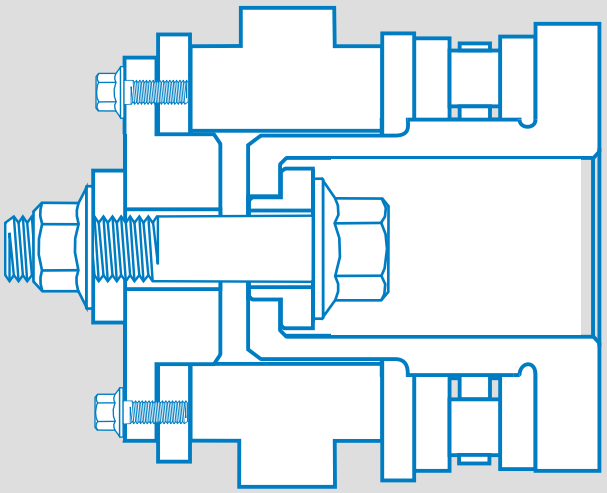
Test Services

Bolt Science can perform a range of tests on fasteners and bolted joints to assist organizations in problem resolution, our test capabilities include:

Torque-Tension Tests

Determination of the torque-tension relationship for a threaded fastener allowing the appropriate tightening torque to be determined. Such tests will allow the nut factor (sometimes referred to as the torque coefficient or k factor) to be determined and the overall coefficient of friction. By completing several similar tests, the variation in the torque-tension relationship, due to friction variation, can be established for an application.

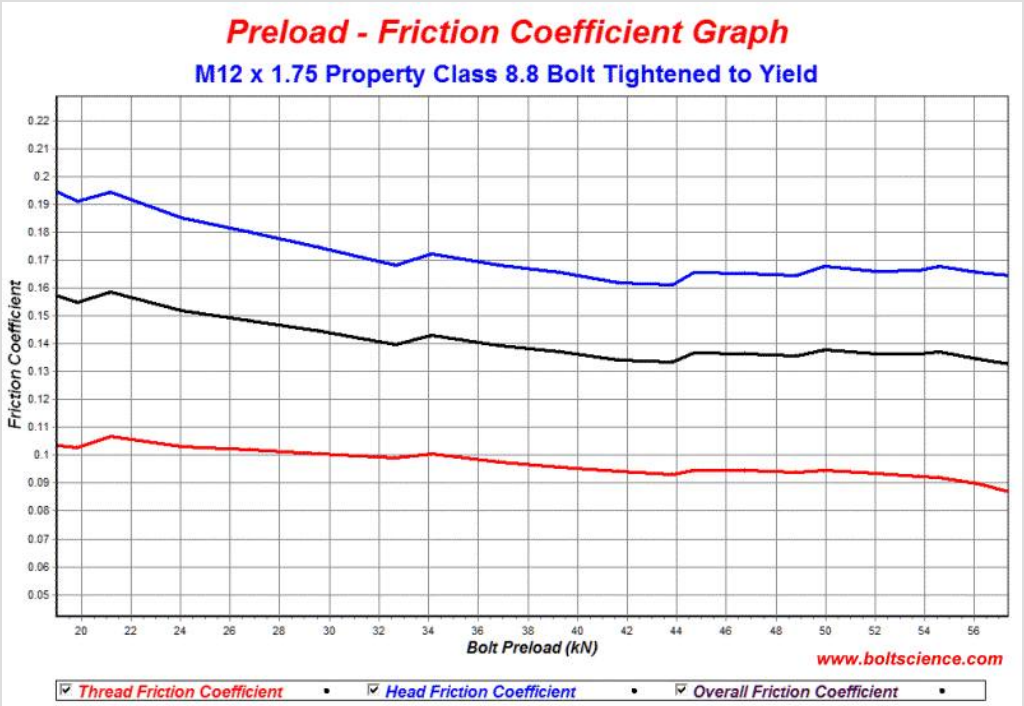




Thread & Head Friction Test Rig

Fastener Friction Tests

Test fasteners can be set into a test rig to allow the thread and head friction torques to be determined. From these results the thread and nut face friction coefficients can be determined. These values are of importance to allow an assessment of what effect various joint surfaces can have on the bolt torque-preload relationship. Such tests can be completed, for example, to assess the effect that introduction of new fastener finishes will have a joint performance.



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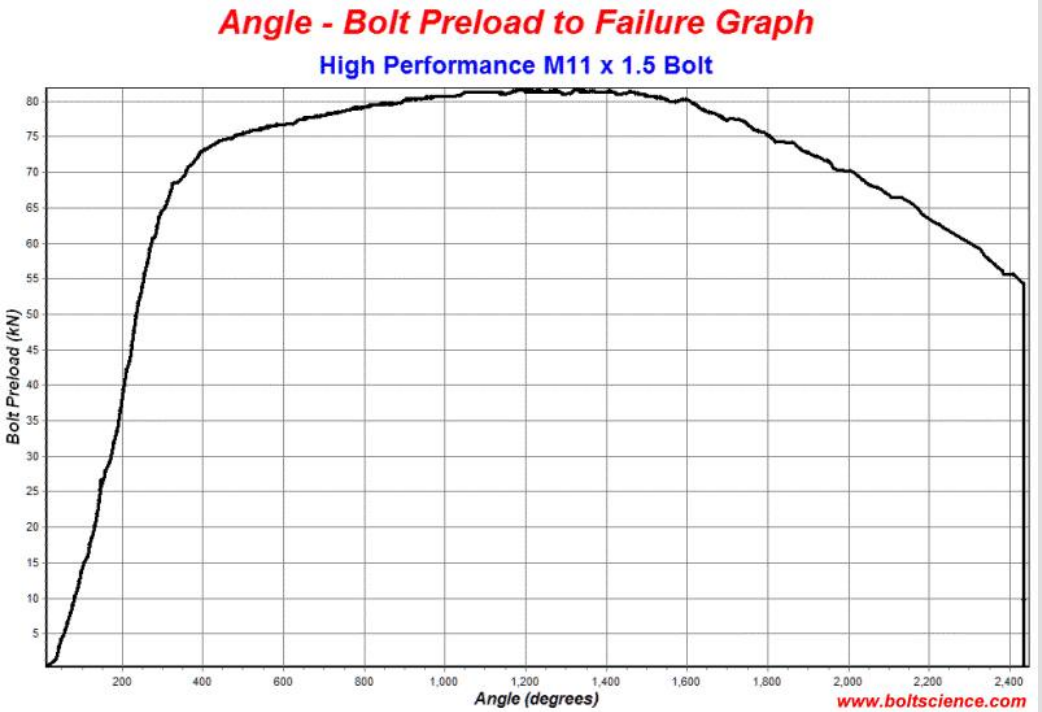
Fastener Failure Tests

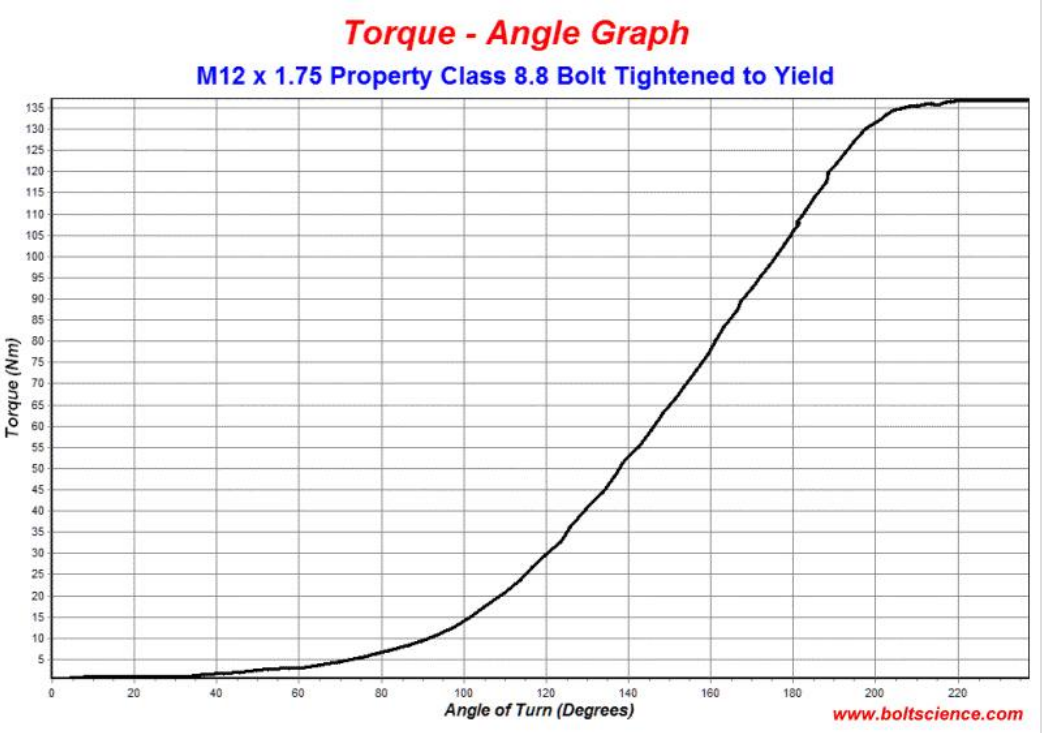
Tests can be performed by tightening the fastener to failure. This can be completed on actual assemblies and/or test fixtures to allow torque-angle-force characteristics to be established. From this information torque-angle tightening specifications can be derived, allowing accurate controlled tightening to be completed. Such tests can also be used to determine what is the maximum preload that an assembly will sustain.



Torque-Angle and Torque to Yield Tests

Tests can be performed on actual assemblies to obtain torque-angle graphs that can be used to establish the torque needed to reach the yield strength of the bolt. Such graphs can be used to establish the appropriate torque-angle specification.

Torque-angle test information can also be used, with analysis software such as our BOLTCALC program, to assist in assessing the structural integrity of an assembly. The advantage of measuring the applied torque and angle of rotation of the fastener, is that tests on the actual joint can be completed without having to change the joint stiffness by introducing a load cell.



Torque-angle and bolt preload-angle test information can also be used to establish the onset of thread stripping and joint compression failure. Measuring the angle of turn of the bolt/nut is an indirect way of measuring bolt extension/joint deformation. This can be used to advantage in many joint measurement applications.

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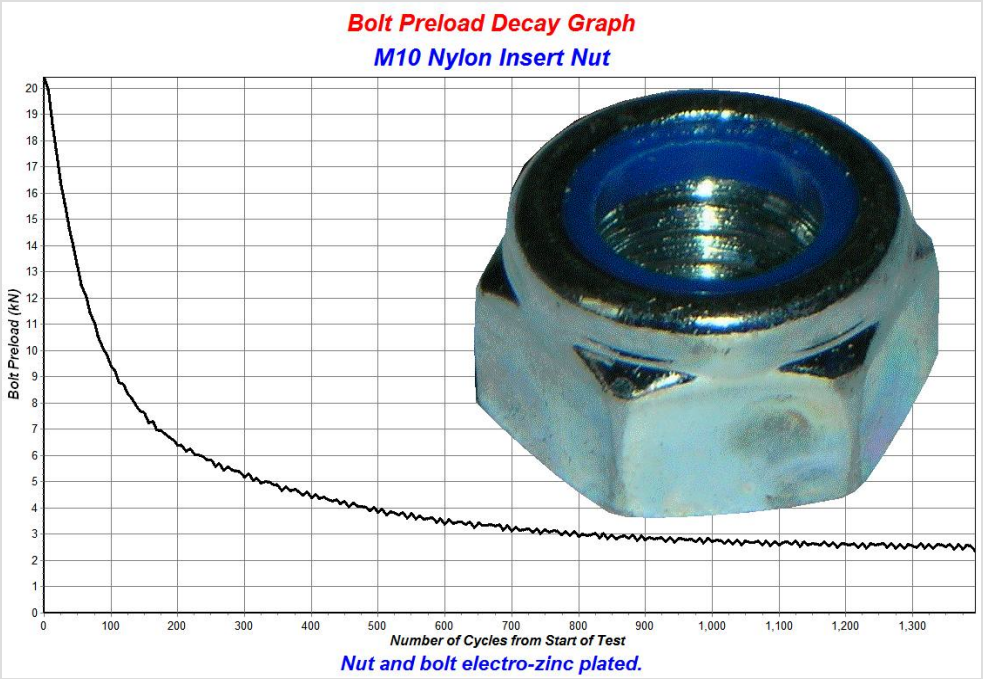
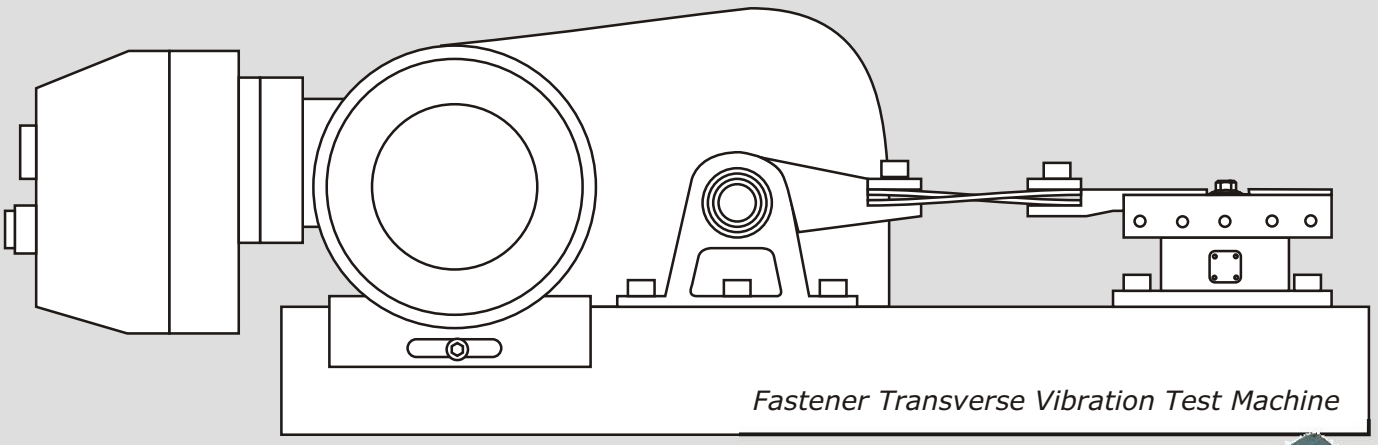
Vibration Loosening Characteristics of Threaded Fasteners

Practically every engineering product with any degree of complexity uses threaded fasteners. A key advantage of threaded fasteners over the majority of other joining methods is that they can be dis-assembled and re-used. This feature is often the reason why threaded fasteners are used in preference to other joining methods and they often play a vital role in maintaining a product's structural integrity. However, they are also a significant source of problems in machinery and other assemblies. The reasons for such problems are due, in part, to them unintentionally self-loosening.

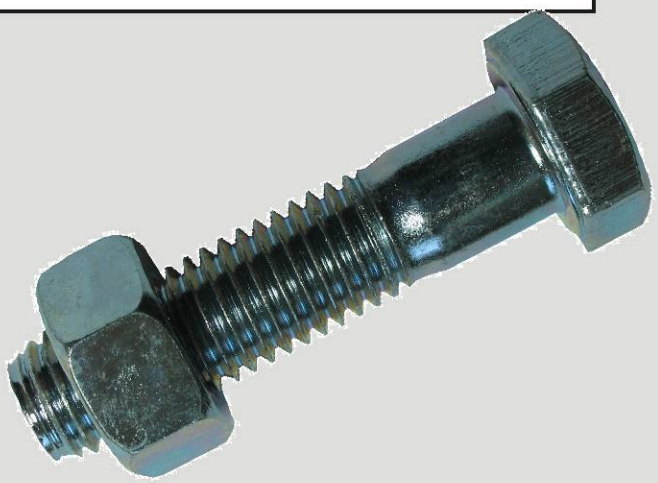


Fasteners coming loose is a common problem across many industries. We can complete an assessment of a fastener's self loosening characteristics using a transverse vibration test machine (often referred to as a Junker machine). The fastener preload decay graphs produced can allow an assessment to be made of a fastener's resistance to self-loosening.



By combining our test and analysis resources together with our extensive experience in solving fastener and joint problems we provide a unique service.

We strive for excellence, therefore we are committed to providing our clients with the best professional service available in this field.



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