DABJ—Design and Analysis of Bolted Joints

24-hour course developed and taught by Tom Sarafin, Instar's founder

Testimonials

ATA Aerospace

"Essential for engineers who didn't cover fasteners in school."

"Great class to learn the engineering methodology for designing and analyzing bolted joints in the real world."

"The awesome part about this class is it allows me to make confident hand calc's that give me confidence that I can send my design to an analyst & it will come back with positive margins."

"I wish I had taken this class sooner."

"This class is a very comprehensive lesson of the subject matter, presented in a way that helps designers and analysists to better understand each others duties that will lead to better interaction."

"The topics of this course were explained very well. The experience and knowledge that Tom brings is invaluable and it is very easy to follow as it is presented. A great course!"

"My knowledge of bolted joints has significantly increased and I will be able to do my job better."

"DABJ is a great course to explain important concepts surrounding a bolted joint, from design to analysis to testing."

"Your engineering insight is something I found extremely valuable."

ATK

"The course is a succinct journey through the physics of bolted joint behavior, failure, and analysis. A great place to start for anyone who needs to understand bolted joints in order to work real life design challenges."

"Some of it was review, some of it was new and I realized I wasn't doing joints completely wrong or completely right. Now, I can do them completely right."

"The course greatly increases understanding of bolted joint design."

"This course is essential for any joint designer/analyst. The course teaches simplified approaches to conservatively evaluate bolted joint margins of safety."

"One of the most practical and directly applicable courses of my career. Tom has a tremendous talent for making the complex simple and therefore useful."

DABJ Testimonials

Ball Aerospace

"Your presentation skills are excellent with patient attention paid to class questions."

"I enjoyed Tom's interaction with the class. He is easy to relate to and his experience is evident. He answered questions very well."

"Good class materials, good reference. Well presented."

"In general, I think it is a very good idea, and money well spent for the company to give this type of training. It should be mandatory for design engineers."

"The material was well thought out and well presented."

"Tom was well prepared and professional. He answered questions well and allowed the students to interact during the course. Very interesting and effective course."

"Promotes a healthy respect for bolted joints and the engineering behind them."

"Good course, would recommend to all my engineers."

Boeing

"Really good course, more people need to take this."

"Great instructor/speaker, bring him back."

"Great Sarafin course (as usual)."

"All designers should take this course! It presents what analysts have to deal with and why we do what we have to do."

"It was an excellent course with many applicable concepts."

"It would have been nice to have taken this course early in my career."

"Excellent value to my job."

"Best course I have taken."

"This class is well taught. Ideas presented are definitely value added to the company."

"This course was extremely helpful in understanding the complications associated with fastened joints. It was a good 'eye opener' to potential problems and oversights commonly seen in the workplace. Very educational and thought-provoking."

Bristol Aerospace

"This course exceeded my expectations. I really developed an appreciation for the complexity of designing/analyzing bolted joints. I had wondered how bolted joints could be the topic of a 3-day course, but was surprised that the material was all very interesting and relevant and held my attention."

DABJ Testimonials

"I particularly enjoyed the emphasis on understanding the physical phenomena of bolts and joints rather than just presenting equations. It makes the content more memorable and (hopefully) easier to apply."

"Excellent course. Good presentation. I appreciate sharing of the wealth of knowledge."

"Excellent course for the design engineer."

Canadian Space Agency

"One of the most useful courses on joints/analysis/mechanical design I have ever taken."

"Good examples and real life cases."

"As usual, it was a pleasure!"

"Excellent course."

Electric Boat Corporation

"Great Course. Large amount of information provided with real life examples to help retain the knowledge."

"Great course, brought up many subjects I had not previously given enough time or thought."

"An essential course for stress analysts and mechanical design engineers of all skill levels."

"Great course in understanding bolted joints. Would recommend it to anyone working on bolted joints."

"This class is important because it shows the test validation behind important concepts."

"This course is crucial for any engineer out of college to show the difference between engineering and research."

"Bolts! This course provides an opportunity to expand knowledge and its potential applicability to other fields; improving the eloquent design."

"Great introduction to practical engineering joint design."

"Very useful. Thank you!"

"Great class on a critical subject."

"Short course provided an excellent explanation of bolted joint analysis methods in general, even though certain sections may not apply to every industry."

"Encouraged to make decisions on what can be implemented into our own requirement."

"Excellent overview of NASA-STD-5020 and general philosophy and background information useful in design and analysis of bolted joints for space flight hardware."

DABJ Testimonials

"Excellent for engineers regardless of experience."

"The presentation of the thought processes needed to understand the physics of bolted joints was unvaluable."

Ft. Eustis

"The best course for bolted joints."

"Class shows real life examples and applications to help everyday stress analysis and design of structures."

Goodrich

"Taking this course would be tremendously beneficial for anyone working with bolted joints, regardless of their level of experience. It reinforces the things that you may already be doing well and presents many ideas for improvement."

"Bolted joints which are at the heart of almost all engineering designs are often misunderstood and the necessary analysis missing or incomplete**. This course is essential for almost all engineers in the aerospace field.** Very few engineers know all the details, nuances, and required calculations to verify their joint designs!"

"All the things every design engineer and stress analyst in the aerospace industry should know (but doesn't) about bolted joints."

"This is an eye-opening course. It will definitely help hone my design skills."

"Great insight to bolted joints analysis. Discussed new topics I haven't thought of in my 30 years of experience."

"Good material and a good teacher with practical experience."

"Relevant and clear."

"Anyone designing with bolts should take the course."

"This course motivates critical thinking about integrity of bolted joints."

"A whole lotta stuff about bolts."

Jet Propulsion Laboratory

"This class has been immensely useful in providing a comprehensive framework for designing efficient joints, or the reasons behind certain design guidelines (i.e. 1.5 e/D, values for certain factors, etc.), and how to select good hardware, and what to watch out for when it comes to preload uncertainty/potential loss."

"Fantastic course, learned a ton of useful info which I will definitely use in the near future."

DABJ Testimonials

“Tom’s course looks at bolted joint design and analysis from practically every vantage point possible, guiding the student away from bad designs and towards the best possible.”

“Eye opening course to expose engineers to common pitfalls in bolted joint design.”

“Great course that every mechanical engineer should take if they want to actually understand bolted joints.”

“Excellent course that covers the theory, background, and practical applications of NASA-STD-5020.”

“So good I would take it twice!”

“Amazing course with tons of information; recommend for all kinds of mechanical related engineers.”

“This is the course I wish I had in college and should be required for all mechanical or structural engineers.”

“Mr. Sarafin is very knowledgeable and the course is a must for every mechanical engineer.”

“Love the stories and failure examples.”

“The best way to have successful bolted joints is to understand their purpose from the onset. This class teaches you to think about the joint rather than blindly make it or analyze it, ultimately leading to better joints.”

“Printed slide package as a book is a great reference.”

“A great tool for new or senior engineers.”

“This course is good as both an introductory and refresher course for analyzing bolted joints. It focuses well on important types, and provides a useful book for later reference. Would highly recommend.”

“Lots of detail. Great to have a course taught by someone who really understands the origin of the material and concepts overall. A good class.”

“Tons of practical information & background for (NASA-STD-5020) and bolted joints in general.”

“A must for anyone designing bolted joints!”

“Very useful course. Thank you very much!”

“As a manager, “Trust but verify” is a good philosophy to follow when it comes to ensuring your team is doing it right. When it comes to bolted joint design, this class gave me the insight to ask the right questions so that I can actually verify.”

“This is a course that will benefit any engineer looking to learn the basics of fastening systems and bolted joint analysis.”

“Great course, highly recommended.”

“Definitely like simplified approach to analysis.”

“Extremely insightful class on bolted joints.”

DABJ Testimonials

"An essential course for any entry level engineer in the aerospace industry."

"Excellent. Every page of presentation full of useful data. No wasted time."

"This course was very thorough and informative."

"Excellent introduction to bolted joints and NASA Standard 5020."

"Take this course."

"An ultimate guide for bolted joints that every engineer should take."

"Great class. I may take it again."

" Everything you ever needed to know about bolted joints."

"Great mix of engineering theory and real-life usage and problems with bolted joints."

"This is a great course for any new hire, recently graduated mechanical engineer."

"This helps confirm I was doing my job correct or at least pointing other to the right direction."

"Recommended as a course that all mechanical engineers should take and I will agree."

"Course book will be a great addition to any library."

"I think the course really opened my eyes to all the types of failures which can occur at connections, many of which are counter-intuitive."

"Incredibly detailed and useful course on bolted joints. Highly recommended."

"No improvements needed; this class is already great."

"Required course for all of my support engineers."

"I now feel confident and excited to take on a new flight hardware design challenge now that I have a stronger understanding of how to methodically and thoroughly analyze bolted joints."

"Everything you were doing wrong explained."

"This course provides **a great balance of detailed analysis and big picture concepts** regarding bolts, nuts, and the fastening system as a whole."

" "Design and Analysis of Bolted Joints" is an excellent course for all professionals involved with bolted joints. The class is very well laid out and Tom explains all concepts in a clear, concise manner."

"Excellent class to present a general view of bolted joints. Starting point for a more in depth knowledge of bolted joint verification."

"This class should be a requirement for any engineer, designer or analyst involved in the design, analysis, testing or fabrication of structures."

"Useful for not only engineers, but technical managers, as well."

"Very good course for any person that uses structural fixtures or MGSE flight support equipment."

DABJ Testimonials

"Very useful course, especially for those who have not learned any of this formally!"

"Design and Analysis… was a useful course that provided insight, practical experience and guidance on industry standards. A must for practicing engineers."

"Important information on the most common mechanical design feature which is not taught in college."

"This course made bolted joint design more transparent and simpler than it seemed before taking the class."

"This should be a required course for designers."

"I had no idea how much was involved in a bolt and a nut!"

"I feel like so many of the examples were applicable to things I see on a daily basis."

"I wish someone offered this to me in college."

"I am a young engineer with very little actual design work. This class has been very useful! **These are the things they don't teach you in college."**

"Great informational class with valuable lessons and lays out the foundation for successful design of joints."

"Very good and useful information. This book will be a very good reference in the future."

"Valuable information!!! Wish I had this type of course in college."

"This course is a great supplement…to our standards at JPL."

"Excellent course! I learned a lot and gained a better understanding of the conceptual mechanics of joints and the goals of joints design."

"Excellent course. Learned a lot. Thank you. Would have been very useful for aircraft design."

"This class is very useful to stress engineers, and I would absolutely recommend it. Thank you Tom!"

"There is a good amount of information in this class that I see as extremely important to my job."

"A great refresher if you already do this work, and a great introduction for new comers."

"Good course. Gave me many things to think about and consider when designing future joints. I will also go back and double check current designs I'm working on."

"Very high quality—extremely useful information."

"Good anecdotes and war stories."

"High-level advice on intelligently designing a joint."

"Tom was incredibly knowledgeable and shared great stories/lessons learned."

"Knowledge of the presenter was excellent! He has amazing track record, experience, and contacts."

DABJ Testimonials

"Presenter is a very personable instructor and welcomed real-time complex questions, and was able to explain in a basic manner…a real expert! Thank you, Tom!"

"This class should certainly be offered again at JPL if Tom is available in the future."

"Excellent list of resources for future research."

"Appreciated presentation of analytical theory that was backed up with test data."

"Presenter was able to offer alternate examples and methods of explanation of concepts."

"Presenter kept class interesting by engaging students and having discussions."

"The presenter is very knowledgeable of the material. His experience and work in the field of bolted joints has made the class extremely informative, easy to understand, and has great tips in designing and analysis. He not only touched upon the necessary calculations needed for bolted joints, but also the design considerations that must be taken into account along with the failure modes that may affect the calculations of analysis. This is definitely a much needed course for mechanical engineers."

"I'd recommend this class return to JPL. More of our engineers would really benefit from this info!"

"Great class. Learned a lot of useful information that I will be able to use on a frequent basis."

"Really excellent qualitative description of cause and effect."

"Excellent presentation, great 'general concepts' type of info in addition to detailed analysis."

"Liked the nature of the course. Open forum for discussion. Presented multiple methods used in industry. Examples and equations especially useful."

"I really like the lessons learned and test examples. Really enjoyed the course. I got a lot of good info."

"The intuition-based examples were great. Overall the course was very engaging and useful."

"Appreciate the emphasis of doing each specific case by hand and 'getting out of the black box'."

"Example problems were very useful. Class problems helped reinforce subject matter. Good emphasis on theory. Great discussion of preload."

"Overall good course, good balance between theory and practical application."

"The presenter had a good sense of the class attentiveness and understanding, and knew when to go back and repeat material. He also was able to refocus the class when we were losing track of the material. This is a very useful class."

"Good class. I would like to take some of the other classes offered by Tom."

"Great class. Should be taken by more mechanical engineers at JPL!"

"**Well worth my time.** Great presentation and materials. Would definitely be interested in taking more of Tom's classes. Great use of props to further define topic."

DABJ Testimonials

Johnson Space Center

"Class provides an in-depth look into the behavior of the bolted joint starting at the system-level and continuing down to the fastener details. The student will leave with practical analysis and sizing techniques relevant for all aerospace engineering practitioners."

"A must take class for all designers and analysts, especially the younger ones."

"I feel much more confident when designing structures with fasteners."

"I always heard about how important and effective the subjects taught in this course were. Now having taken it, I wish I would've taken it sooner in my career, but I know of projects within which I'll use these methods and lessons learned …"

"I wish I had taken a course like this very early in my career as a mechanical design engineer."

"It was a fantastic course that gave me a better understanding of bolted joints."

"This course information and concepts taught will be something I refer to back often to help me do my job better as a stress analyst. It reinforced concepts I know and taught me where to look for pitfalls. Great course. It also helped to fill in some gaps in knowledge and invokes thought."

"There is no substitute for real life experience. We engineers need to get more involved with testing as much as we can."

Lockheed Martin

"Covers from general overview to highly intellectual/technical materials. Brings up the sophistication in detailed bolted joint analysis and presents simplified approach. Transfers extensive knowledge on the subject matter to students with different levels of experience."

"Course covers all aspects of joint design. Book is a great reference for every engineer."

"It tied together a lot of loose pieces of information that I had informally learned through experience. As a designer, this gave me more insight and increased my understanding of a stress analyst's world."

"This has been the most useful training Lockheed has offered me."

"Require that all ME's take this course."

"Excellent overall. Thank you, Tom! Great use of time."

"Lots of practical examples."

"A great course to remind you to pay attention to the details and practice your basic skills."

"This course should be required as part of an orientation to mechanical design for anyone hoping to perform mechanical design."

"This is a fine class. Does a wonderful job of combining bolt joint data into one location."

DABJ Testimonials

"This course was very informative. **I've analyzed bolted joints before, but after taking this class I realized the analysis could have been performed more efficiently and more accurately.**"

"Well organized lecture material with excellent teaching and presentation skills. Must take course for all structural and stress engineers."

"This course was excellent! Great detail, good course pace, good sample problems."

"This is an excellent course for both designers and analysts."

"Highly recommended for both analysts and designers."

"Excellent; the level of detail was appropriate and the instructor was knowledgeable and communicated well. **This course was a real eye-opener.**"

"A great course for young engineers and a great refresher for senior engineers."

"I found this course to be very helpful. **The instructor (Tom Sarafin) can take more complicated material and present it in an understandable manner.** The student/teacher interaction was excellent. This course will give an individual an excellent foundation in the design and analysis of fastened joints."

"I found the course extremely useful."

"The class problems were priceless—it's so nice to see how the theory applies to the real world."

"Excellent. I wish I'd had it in school or at my first job."

"Very logical sequence. The examples and background stories in addition to theory made the course very effective in relaying info and ensuring understanding of concepts and applications."

"Examples were great, info was logical."

"Excellent information that applies directly to my work."

"Instructor did a good job keeping the class interesting. Used many helpful examples."

"Great course. This course has given me a much better understanding of my mechanism."

"Time well spent."

"Provides good understanding how to analyze bolted joints that I didn't know before."

"Instructor explained important concepts well before going through process."

"Very practical. Well organized."

"Excellent information: very helpful and applicable."

"Very informative and useful course. Of all the courses this year, this one will prove the most helpful."

"Fantastic—I wish I had this class when I started out as an engineer."

"Good. We need this type of training on this program."

"Practical approach to design and preliminary analysis."

DABJ Testimonials

"This class would be useful to every mechanical designer or stress analyst at the company. It should be mandatory training."

"Another excellent course!"

"Great course, everyone should take this."

"Excellent course and excellent instructor!"

"The instructor was very knowledgeable and able to clearly explain concepts. The course material is highly valuable for designing and analyzing bolted joints. Anyone who is designing or analyzing such joints should take this course."

"Introduced lots of concepts needed for good mechanical design that is often overlooked. I can apply this info now."

"Very useful to designers."

"There was a good balance between theory/mechanics and practical application."

"Very useful info. Will directly help my work."

"Very useful knowledge/skills that I hadn't previously known."

"Recommended to every engineer."

"This is a great course. Brought up a lot of good points that we don't get in college."

"I would recommend it to other designers."

"Awesome!! Wish I had this course about 15 yrs ago. Great job, Tom!!"

"Very well structured class, flow of study theory, look at an example, get class participation—really 'ties it all together.' Excellent course!"

"Excellent course. It has been one of the most complete short courses I've taken."

"Very good refresher on analysis. Very useful practice problems on selecting fasteners."

"Excellent!!! Instructor was very good at explaining material. This topic is directly related to job activities."

"I would highly recommend this class to anyone having something to do with bolted joints. The instructor also added greatly to the class materials through both detailed explanations, past experiences and current activities."

"This is a great course and all structural designers/analysts should take it."

"Since I'm a designer, I really enjoyed seeing the stress side of everything. This will make me more aware of stress when creating my designs."

"Highly recommend for those in the mechanical design/analysis group."

"Excellent course, one of the best short courses I've taken!"

DABJ Testimonials

"Great course for design and stress employees."

"A 'must have' for design and analysis engineers!"

"Excellent instructor—master of subject with a lot of enthusiasm. Invaluable material and training that I very much needed as a designer. Really liked how many concepts and course materials were illustrated by real-world stories and examples."

"Excellent course! All design and stress engineers at Lockheed Martin should be required to take this course!"

"Immediately applicable, brings you back to real world sanity checks to compare to 'black box' results."

"Excellent course. Very clear and concise discussions of topics."

"Great course. Very direct. I needed this course years ago."

"Very fresh and current material."

"Knowledgeable instructor with industry experience."

"This is hands-down the best course/training I have taken at Lockheed. Great job!!"

"Thoroughly enjoyable."

"All stress analysts need to take this course."

"All that I learned was very applicable to my job. I'm looking forward to reviewing the material and putting my new knowledge to use."

"All design engineers should take this course in their first 1-2 years of employment—would yield more effective and efficient designs, reduce design/analysis time."

"Very detailed course. **Cleared up most of the questions that I couldn't find anywhere else.** Threads in shear knockdown, yield effect on gapping, etc."

"The most relevant course I have taken through LM."

"I didn't know too much about how fasteners worked, and now I do."

"Very valuable for design engineers."

"This course is crucial for analysts involved with tension joint analysis."

"Realistic view of how joints and material act in real life. Overall very well done course."

"Tom was a great speaker, very knowledgeable, interesting and engaging. Course material was easy to follow, well prepared and enlightening."

"Wonderful to see so many aspects of subject tied together in one course and package."

"I thought this course was very useful and applicable to my daily work."

"Great summary of bolted joints. Covers both design and analysis aspect so designers and analysts in the classroom get to see into each other's worlds and have an appreciation for the challenges each face."

DABJ Testimonials

"Probably the best course I've taken through LM. Excellent pace set by instructor, helps retention of key topics."

"Wonderful course and package tying together subject."

"Tom Sarafin is a great speaker, very knowledgeable, interesting and engaging. **Course material was very easy to follow and well prepared."**

"Overall, an excellent course giving very practical information for mechanical engineers."

"Very informative. Made me more aware of detailed stress concerns in how fasteners perform."

"Great course! Every LM mechanical engineer should attend (stress and design)."

"Plenty of real-life examples and stories."

"Excellent course. Structural analysts should be required to take this course and others like it."

"It directly relates to my job and the products we deliver to our customers."

"Presenter was knowledgeable and dynamic. Exercises were directly applicable. Daily review of important points was helpful."

"Excellent course! This should be mandatory for all new design engineers and analysts."

Excellent…thoroughly enjoyed this course!"

"The many topics that were covered…very applicable to my job. Loved the example problems…helpful to cement the knowledge learned."

"Good! This class refreshed my memory of what I learned in college and solidified that knowledge—not to mention the shortcuts he taught, will save a ton of time."

NASA Dryden Flight Research Center

"Excellent course! Excellent instructor!"

"Very good presentation and material. Instructor is very knowledgeable and answers all questions effectively."

"This is probably one of the best short courses I have ever taken."

"Being a non mechanical/structural engineer and having a background mainly in electrical engineering, the class was presented in a way that I could follow along. Easy to pick up on things."

"Great practical course. Provided knowledge/lessons learned that would have taken years to develop via mentoring."

NASA Goddard Space Flight Center

"This course is very helpful with a lot of information."

DABJ Testimonials

"This is a highly beneficial course to anyone designing, analyzing, or building flight hardware."

"Incredibly valuable course for anyone working with mechanical systems."

"An essential course for anyone involved with producing quality spacecraft designs.

"This is a really great course for new engineers, new analysts or a refresher course for structural analysts."

"Great Class! A lot of information that I will use every day to help me improve and become better engineer and under(stand)ing bolts and how to better design joints."

"This is a great course densely packed with valuable information regarding the design and analysis of bolted joints. Engineers and analysts from all ranges of experience will benefit from taking it."

"A great course for understanding the fundamentals of bolted joints."

"Extremely useful material and humbling when I consider 30 years of engineering and realize how much I could have used this when I started and how many times I could have done things better."

"Very informative class that reminds us to think about the several aspects of bolted joint designs!"

"This course is great! It takes you from theory to practical application of design and analysis of bolted joints."

"This is a great course!" It has motivated me to brush up on my statics and mechanics of materials."

"This course will expose you to key concepts in not only bolted joints but also in structural analysis and mechanics as a whole."

"A must have course. Well done!!"

"This course brings the fundamentals of bolted joint design back into focus for design engineers. Must take course!"

"A class every NASA engineer should take."

"This is a great class for engineers who have not worked on bolt analysis in a while. Topics are interesting and I was able to follow without getting lost."-

"This course serves as a crash course into designing and analyzing bolted joints in a practical way. **I would recommend any new engineer take this course upon starting their careers and again every few years as a refresher."**

"A detailed, comprehensive course that covers all aspects of joint design and analyses. A topic that generally does not get much detailed scrutiny and serious thinking. Excellent course."

"The lessons learned and knowledge gained from 3 short days has been extremely valuable in growing into an effective engineer. I highly recommend this course to everyone working on flight hardware, especially young engineers like myself."

"If NASA-STD 5020 confuses you…you should take this course."

DABJ Testimonials

"The course notes are an excellent reference."

"Very insightful course."

"Excellent training for both design engineers and analysts who deal with threaded fastener systems. I have been in the industry as a stress analyst for 20 years and have learned some new concepts and new ways of looking at bolt analysis."

"Excellent class in the review of bolted joints and standard 5020. Provides great background information on why things came to be."

"I think this course is the perfect way for an engineer beginning his/her career to become acclimated with nuisances associated with the analysis and design of effective structures in this industry. The knowledge gained in this course will definitely benefit me in the rest of my career."

"I liked the fact that you were familiar with practices and problems we do here. Also, I think examples, or stories, from industry are invaluable."

"It's a good course, especially for young stress analysts, to get an appreciation of the way loads are carried in joints and how to analyze them."

"Great course! Mr. Sarafin did an excellent job and obviously understands the material well."

"I think I'll be a lot less dangerous with all of these guidelines to use. Well, at least I'll be a lot more efficient in my designs."

"Excellent. Makes me realize the importance of engineering judgment."

"Very good, if nothing else, demonstrates bolt analysis is not a mindless process."

"Thought the course was very useful and easy to follow."

"Excellent practical information for anyone responsible for designing/analyzing bolted joints on aerospace hardware. Great job overall."

NASA Johnson Space Center

"Excellent overview. Good mix of general concepts and technical detail. I would encourage everyone in my division to take this class in the future."

"Excellent material, excellent instructor!"

"The instructor was very impressive on his knowledge of the material. I look forward to attending another of his courses. Great course!"

"Mr. Sarafin presented the course material with an effective and knowledgeable approach. Notes are detailed for easy reference. I enjoyed the class and I think this material will be used to support my current position."

"Extremely valuable information. Makes job easier by standardizing bolt selection criteria."

DABJ Testimonials

"So much helpful insight to feel confident on what matters for stress analysis."

"Wonderful course."

"Excellent material and instructor. Would definitely recommend."

"Quality was excellent. My estimation of value for mechanical engineers is excellent. My estimation of value for quality engineers is good."

"Well done."

"Take it (this course). Tell everyone you know to take it."

"Excellent instructor. Great lessons learned on failure modes shown from testing. Required background for analysts."

"It is a good idea to take to understand NASA standards."

"A fantastic course—one of the most useful short courses I have ever taken."

"Very useful to all people. Really shows how difficult bolt analysis/design is and how much we underestimate the work required."

"Excellent. The instructor was very good, knowledgeable and experienced."

"I would recommend this course be taken by anyone involved in the design/development of spaceflight hardware, even for non-technical management. The course clearly demonstrates many issues/concerns that can affect bolted joint design and analysis, most importantly the shortcomings of analytical approaches that are often favored over testing."

"A must course for structural/mechanical engineers and anyone who has ever questioned the assumptions assumed in bolt analysis."

"Effective summary of bolted joints fundamentals invaluable to any mechanical design engineer."

"Any NASA engineer involved in flight hardware development should take this course."

"The instructor was very patient with students and encouraged participation and questions."

"Anyone involved in bolted joint design, analysis or installation should take this course."

"Everyone at NASA should take this course!"

"You need to take it."

"Excellent job of taking difficult subject matter and explaining it to a variety of people with a diverse range of backgrounds and job responsibilities."

"This course was very good in helping me understand potential issues with joints and fasteners and what the important factors are that influence them."

"**Mr. Sarafin's teaching skills are excellent**, so I think anyone involved with doing the work or just making programmatic decisions based on recommendations from the stress engineers will benefit."

DABJ Testimonials

"I found the broad design concepts and ideas helpful. Now I have a better understanding of what is involved in analyzing a bolted joint."

"The course is good for all engineers, whether or not they will actually perform the work. Program engineers will obtain a real appreciation for the difficulties and pitfalls that structural engineers face."

"Very informative. It will teach you or resupport what you know. Take it, it's very worth it."

"Tom has excellent understanding of the subject matter. He also was able to effectively communicate this information to all skill/proficiency/background levels of the people in the class."

"It was much better than my expectations!"

"Excellent instructor! Excellent examples and class problems to force us to think hard about content. Definitely encouraged long term retention. Anyone who has questions about fasteners, NASA/commercial analysis, and preloads should take it, even if they may not be M.E.'s who'll understand it all."

"Take it if you ever deal with anyone who deals with bolted joints."

"Worth sitting through."

"Recommended for all engineers."

"Great discussion of general topics along with specifics on how to meet NASA standards."

"Good for designers and analysts."

"This a good course to help better one's understanding of fasteners, bolt design requirements of bolts, and fastener/bolt terminology, especially if you were not trained as an engineer but work with this kind of hardware."

"This class would be beneficial in understanding basic concepts/tools used to analyze fastened joints. Would recommend to…folks to aid in understanding fasteners."

"Definitely take (the) course."

"It was worth the time and will definitely help me in my job."

"Very good in helping me understand potential issues with joints and fasteners and what important factors are that influence them, and thought processes, and good practices."

NASA Langley Research Center

"This a very useful course for engineers new to industry who are liking to deepen their understanding of bolted joints."

"The DABJ course gave new perspective and a stronger understanding of an often overlooked topic. Thanks so much!"

DABJ Testimonials

"This course helped me gain a much better understanding of how to design and analyze bolts & fastener systems. The material is presented in a way that helps less experienced engineers keep up and provides a lot of depth that will keep more experienced engineers engaged."

"All engineering related issues regarding design and analysis of bolted joints."

"I found all parts of the course interesting and useful. The instructor's many years of experience made the discussions very interesting and valuable."

"This course is essential for any design engineer or anyone involved in the design of bolted joints, and teaches you to take a different look at how to size bolted joints. I will be using this reference book frequently when making future design choices."

"This is a great course for anyone who works with fasteners."

"Overall excellent course."

"Instructor was excellent at explaining material but also could tell he is a clear expert of the field."

"This course is excellent at developing an understanding of bolted joint theory and then distilling that down to workable, practical applications."

"Very informative course, learned more than I did in school!"

"Enjoyed, very insightful."

"Instructor is excellent and knowledgeable."

"Good use of examples—equation problems and visuals of failed hardware. Thank you!"

"Great course."

What I thought was most interesting or useful: "The depth & background in the subject."

"Instructor is very knowledgeable and presentation style was good to keep class interested and participants engaged."

"Very detailed, informative, presentation was well ordered and organized."

"Excellent."

"Thorough coverage of topic. Instructor very knowledgeable. Handbook will be valuable."

"Very knowledgeable. Told real life examples for better understanding."

"Fantastic."

"This class should be mandatory for all new design engineers at NASA…"

"It's the best class I've taken since college."

"Good, broad handling of the topic. Suitable mix of text, tables, and examples."

DABJ Testimonials

NASA Marshall Space Flight Center

"You get out of it what you put into it. Commit to 3 full days."

"Awesome. Deep dive. The challenge to know the theory behind the spreadsheet!"

"This course improved my understanding of bolted joints, gapping, loading, and analysis of joints. I feel confident in my ability to design a bolted joint with margin to pass all requirements."

"Must have for anyone who deals with bolted joints."

"Hats off to 'Mr. Tom' for his in depth teaching techniques to an 'old dog' that's never too old to learn new tricks – Excellent Class!!!"

"This course is great for critical joints and helps to understand where failure modes will occur."

"This is a good class for design & stress analysts that work with flight hardware. I don't do flight hardware and it's not practical to apply these methods unless there's a specific case. Regardless of my review, this class would be excellent for engineers dealing with flight hardware."

"This class showed me what I was doing wrong as well as what I was doing correct in STE (structural test equipment) design & analysis."

"Excellent course."

"Very informative. Tom is very interesting! We appreciate the time."

"Good to do this—refreshes the basics."

"Good teacher. Class is worth taking!"

"The book will make an excellent reference document."

"Interesting listening to examples of problems with joints from past experiences."

"Tom possesses excellent knowledge of the subject and is a good presenter."

"Well-researched, well-designed course."

"This is the most relevant and practical course I've ever taken for my day-to-day work."

"Removes the 'mystery' on bolted joints."

"The course offers a one-of-a-kind perspective on bolted joints, blending design, analysis, and testing considerations, and balancing theory with real world practicality. **This course is great! Especially if you *think* you know everything you need to know."**

"I was able to grasp a better understanding of how to fully analyze bolts as well as all the factors acting on a bolt/fastener."

"Good, important class especially for designers, stress analysts, manufacturers, and material engineers. Warning, class is intense and takes up a lot of your time. Also, it is unnecessarily (sic) long."

"Everyone on my floor should be mandated to take this class."

DABJ Testimonials

"Provides simplified criteria to do preliminary bolt analysis during the design/concept phase (without FEA), rather than waiting until after stress analysis has been completed to properly size a bolted joint."

NASA Wallops Flight Facility

"Talking nuts and bolts for 8 hrs a day for 3 days may not be fun, but the information in this class in worth it."

"The most comprehensive course on bolted joints that I have ever had."

"Very educational."

"Very enlightening."

"Very interesting. I found the information on strength/load variation due to dimensional tolerances, torquing, etc. particularly interesting, as I was not aware of it before the class."

"Great class for all engineers in the aerospace industry especially those required to meet NASA-STD-5020."

"This course offers analysis process that most undergraduate programs choose to ignore on joints."

"Great introduction for recent grads that are new to aerospace."

"You will be surprised what you don't know about bolted joints."

"DABJ is a course that all mechanical engineers in aerospace would benefit from taking."

"My time in this course far surpassed anything from a college classroom."

"Good presentation style, humor is always good. Instructor is very knowledgeable."

"Vast amount of knowledge covered."

"(Instructor is) very knowledgeable and open to debate and views."

"Gave great theory on bolted joints."

"I felt the material was presented well. Very good."

"Good balance of theory and application."

"Excellent flow of material, right level of detail, built good understanding of theory."

"Excellent knowledge and presentation style."

"Knowledge: impressive and expansive. Presentation style: engaging."

"Very good knowledge and presentation."

"Very thorough on formulas—very logical approach utilizing "old school" and new to determine set goal."

DABJ Testimonials

"The instructor is very knowledgeable in the subject. If I ever was on a project where I wanted an expert advice on a joint, I would look for his advice."

"The course was outstanding"

"Very good instructor. Like the examples from actual tests and related discussions."

"Well done. Suitable and appropriate."

Northrop Grumman Aerospace Systems

"I wish this class was offered to me as an E1 or E2. So much of my design career was spent following guidelines and processes without questioning the validity or basis."

"This course is a practical approach to bolted joints analysis that can be applied to design."

"You would have to be nuts to pass up this course."

"If you don't take this course, you're screwed!"

"This is a fine course."

"Surely the best course I have taken."

"A great crash course for design engineers who find it difficult to make stress analysts happy."

Tom's vast knowledge of the subject matter and engaging presentation make this a great course both for new and experienced engineers."

"A class critical for any engineer no matter level of experience."

"This class should be a requirement for anyone entering the industry."

"This course is a must for all experience levels of design and analysis engineers and the course assures consistent conservative practice while minimizing costs in both engineering time and hardware cost."

"I purchased Tom Sarafin's book "Spacecraft Structures and Mechanisms: From Concept to Launch" several years ago, which has been invaluable to me in design and analysis. I never imagined that I would have an opportunity to learn from him directly in his "Design and Analysis of Bolted Joints" course."

"This course has opened my eyes to the complex phenomena occurring in bolted joints, yet given me practical tools for everyday analysis."

"This course codifies principles I have in mind, but corrects mistaken assumptions on my part."

"I'd recommend that any designer, mechanical engineer, or stress analyst who wants to gain or improve their design and analysis of bolted joint skills take this class."

"This course should be taken by all mechanical design and analysis engineers. The course material is very useful."

DABJ Testimonials

"You know this is a good course if you have to question every past design. Great for standardizing a group's way of thinking through analysis."

"I wish this course was taught when I was hired in. It would've helped me tremendously as a new hire."

"Instructor offers a very comprehensive course that challenges experienced engineers as well as young engineers."

"Tom is very knowledgeable in this subject matter. **I would recommend that everyone and anyone who deals with bolted joints, no experience to 20+ years experience, take this course."**

"Excellent course, applicable to real world."

"This is a valuable course for junior engineers beginning their careers in aerospace and astronautical engineering. It teaches and reinforces the correct methods to designing quality products and encourages thought and consideration is sizing and selecting hardware."

"This will help you practically evaluate your design so that you know, without doing any calculations, whether your configuration is worth pursuing."

"Great course in continuing education in bolted joint design and refresher in basic joint design."

"Great course to teach designers how to design efficiently, definitely recommended."

"Great overview to start/restart looking at load paths and joint details."

"The class thoroughly covers the background and analysis for how bolted joints work."

"Tom is the only person I've heard that addressed the 2 incomplete threads allowed on a bolt, when designing fasteners in a joint. He's very detail oriented."

"Very good course. Ask questions and do your homework."

"The most engaging course you'll find for the nuts and bolts of joint design and analysis!"

"The update course was a good refresher class in addition to highlighting the info about the new standard."

"Great course, there is always something new to learn even after taking the course twice for the NASA updates."

"These methods will save you hours of digging through many resources to ultimately find something less useful."

"Great course to broaden understanding of process and procedures of bolt design and analysis."

"Well spoken, knowledgeable instructor with many entertaining stories and in-depth explanations for stress and design."

"Great course on the new standard NASA 5020."

"This course opens your eyes to the complexity of fastener mechanics and their significance to static design of structural joints."

DABJ Testimonials

"Very useful class overview of all things to consider when analyzing bolted joints. Entertaining class."

"I believe this course should be a requirement of all designers. There is a good amount of information covered, but very valuable to get the juices flowing in the engineers head and be more mindful of the nuances of bolt and joint design."

"Highly valuable for anyone dealing with bolted joints."

"All aerospace engineers should take this class."

"Good course to have in-depth understanding of bolted joints."

"All designers should take this course to help their understanding and appreciate their analyst. All stress analysts need to take this course."

"How good are your bolt joint analysis assumptions? Have you been under-conservative/lucky? Have you been flying heavy/expensive structures? Can you improve your design approach? Take this class and find out just how much!"

"This class is invaluable to all stress analysts to help them understand the design considerations of bolted joints and the analysis tools/methods that are most applicable to that type of structure. This class promotes better design by understanding load paths and promoting more direct load paths and analyzing well understood problems."

"Course carried so much information beyond just bolted joints. It also gave us insight on how to approach a problem and consider your allowables, where they come from, and how standards are developed."

"It helped me a lot on how to make a bolted joint more efficient, (to) better predict the potential failure area."

"Simplified explanations, good thoughtful problems, good discussion, easy going, kept my attention."

"Good practical tips. All engineers should know this stuff."

"This is a great course for designers and I would recommend it to anyone in my work group."

"Great review for someone who's been out of school for awhile."

"I liked all the industry examples and inside knowledge."

"Great course! Lots of lessons learned examples made it that much better."

"**Kudos to you for spreading knowledge!** Wish you a long and successful career."

"The course was good, well paced, very informative."

"This class has been tremendously helpful in generating confidence in my own analysis technique."

"A great class. I hope to take another of your classes in the future."

"Very thorough. Very useful course. A lot of useful information, and very well presented."

"It is a very good course for working engineers."

DABJ Testimonials

"Excellent. I wish I'd had this when I was choosing bolts/inserts 6 months ago."

"Class was enjoyable, instructor has real world experience. I would recommend this course to MGSE designers."

"Loved the whole thing. Class problems were a little humbling and kept it real."

"I was pleasantly surprised to find how high-level this course was. I thought I knew a lot about fastened joints and that I might not find the course useful. I learned a bunch."

"The professional's experience shone through."

"Thank you for being an engaging speaker/teacher. I enjoyed the personal anecdotes and lessons learned—these are some of the best ways to learn. Thank you also for the example problems and class problems, as I rely on 'doing' to really understand what is going on."

"I think all stress people at this company should take the course."

"Real world examples were really helpful."

"This course will be valuable for performing preliminary analysis on designs prior to giving it to the stress group. The instructor for this course was also very knowledgeable in the subject matter."

"This would be a good class for managers who don't have the background to help them understand why analysts request testing or changing the design, etc.."

"There was a lot of quality material presented, especially for young engineers who may be a little bit shy in asking."

"This course is invaluable for bolt design and stress analysis engineers. It would also benefit students in engineering school before they graduate."

"**I loved this course. It will be very valuable to my everyday work.** Real examples that you and others shared with us."

"Class problems related to real world applications and test data."

"Very important to neglected topic—found it extremely valuable. Thank you!"

"It really opened my eyes as to where allowables come from, good rules of thumb, identifying failure modes."

"The class has given me tools and knowledge to better do my job as an MGSE designer."

"Excellent class, went over many topics used every day in my field. Examples of real life situations were very well incorporated."

"Outstanding course, very thoughtfully presented."

"Tom is a great instructor."

"Very good, practical course."

"I think the course material is extremely applicable."

DABJ Testimonials

"This class gives me more confidence when (I) look into analysis of bolt jointed design or existing assemblies."

"Very informative, exposed to concepts/checks that I didn't check for in the past."

"Overall very good class."

"An excellent presenter and an expert in his field."

"Great course! Very applicable information."

"This course will make me more aware of what I do and why I do it. I recommend it to anyone who either knows nothing or thinks they know everything."

Orbital ATK

"This course has helped me understand the basics of bolted joint design and would be valuable to both design engineers and stress analysis. It has been very helpful to me on a topic I have been using almost daily for seventeen years."

"The course was very useful to me, as someone who is new to the industry and has had little interaction with bolted joints. I felt that the course provided good detail and made me more confident with working with bolted joints."

"Course was excellent, from simple fastener concepts to complex factors of bolt analysis. Highly recommend for any analyst or DE requiring an understanding of fastener design."

"I thought this course was very helpful for all experience levels of engineers."

"The combination of historical background and theory was perfect. I now feel more comfortable talking bolted joint issues with my company's SMEs."

"Although I've used NASA-STD-5020 to assess bolted joints many times, I gained a new appreciation for when and how these equations and criteria came about and when they are conservative and when to be careful (or get your own data). The instructor is highly qualified and really brings the material to life with real life examples."

"An overload of good information. Take this class more than once."

"Any engineer that will be designing or analyzing bolted joints should take this course."

"Analysts and designers should take this course. After years of experience, I still learned a lot. Don't analyze a bad design."

Sandia National Labs

"Tom Sarafin brings a lot of practical experience to the table. The material taught in class will be very useful in my day-to-day activities at work."

DABJ Testimonials

"This class is a must for anyone involved with design, especially the design of joints."

"Extremely informative, going well beyond the text books. We would call you "Dr. Bolt," (PhD or not)."

"I think this course would be great for design engineers, with some application to stress analysts."

"Tom's bolt class should be mandatory to any engineer who works with fasteners and joints. The class breaks down all key aspects of the design and analysis of bolted joints with great stories of successes and failures in the field."

"This course is an absolute must for anyone designing bolted joints to save headaches at a point where things can no longer be changed."

"Great course, especially if you think you already know how to analyze bolted joints."

"Great course to see the fundamental aspects of bolted joint design to a good depth. Very informative to beginners and likely to experienced practitioners as well."

"Great course!"

"Excellent course to understand both the design and behavior of bolted and threaded fastener connections."

"There is so much misunderstood about the mechanics of fasteners and Tom clears it all up while adding tons of practical knowledge from his years of experience."

"This course gave me a new appreciation for design and analysis of bolted joints, and left me with new ideas to improve our treatment of jointed structures."

"So much information I have never seen before."

"Course provides a nice combination of basic engineering techniques (equations, etc.) with practical/experiential context to allow the student to get the basics and some experience transfer as well."

"This class was full of useful information that I plan to implement in future designs."

"This course provides a great overview of bolt analysis and provides plenty of tools to help analyze designs and joints."

"This course is a great reintroduction to proper engineering of bolted joints."

"It was clear (the) instructor had extensive hands on experience in subject being taught."

Sierra Nevada Corporation

"Prof was very knowledgeable on material."

"I am quite impressed with the amount of updating since 2009."

"Excellent course!"

DABJ Testimonials

"Great course, very informative with new information and good refresher for some things (I) haven't used a lot."

UTC Aerospace Systems

"Tom Sarafin has a vast amount of very useful experience and knowledge for bolted joint engineering and analysis."

"This course greatly expanded upon my understanding of bolt failure modes and analysis."

"This is a very comprehensive course that will benefit a wide variety of engineers – new graduates through senior engineers, design engineers and structural analysts."

"Very good overview of NASA-STD 5020."

"This course is very informative and provides meaningful information you cannot get elsewhere."

"Great course for industry novice and greybeards."

Other organizations

"This class is the course my professors should have taught me in school! Highly recommended!"

"Tom is a fantastic instructor, engaging, knowledgeable, good story teller. I learned a lot of practical, critical information that is directly applicable to my job."

"It's really amazing that after working 15 yrs. as a mechanical engineer, how much I didn't know about bolted joints. After taking this course, I definitely feel like I can improve my designs and better contribute to my technical team."

"Must course for stress analysts."

"All entry level engineers working with fasteners should take this course."

"A good outside perspective on bolted joint analysis."

"DABJ is one of the most useful and practical continuing education courses I have taken in my career thus far. I feel better equipped to analyze designs and interpret test results. I would highly recommend this course. I wish I had know this information 3 years ago."

"I would make this course compulsory for the mechanical design engineers in my company if I were the director."

"Extremely detailed course that covers a wide variety of topics on bolt analysis."

"Really well thought out course, with years of experience and data backing material. Seriously helpful for designing fastened joints."

"This course opened my eyes to the errors that exist in the aerospace industry. As a design engineer, I did not get too caught up in the analysis portion and was able to walk away with design changes for my

current program. The analysis really helped me understand the importance of doing simple preliminary analysis before maturing the design. The instructor did a great job of ensuring material was understood and presented a multitude of concepts, even if he did not agree with the decision/wording of the specs."

"I wish that this was taught in college."

"Can not recommend this course enough, will definitely be urging my design team to take this class."

"I found this course to be extremely useful, with a back to basics approach often missing in every day work activities. It was a great way to refocus myself on engineering principles and systems thinking."

"Great course. I recommend this for engineers looking for lesson learned from industry and correlation btw correlation btw engineering and theoretical world."

"One of the most useful continuing education courses I have seen for design engineers, systems engineers, and analysts. This will greatly help any engineer using bolted joints."

"Anyone who works on designing or analyzing bolted joints should take this course."

Great course, lots of good information. Presents complicated concepts in digestible form. Awesome charts to use for future reference."

"Great course! Tom's experience is priceless."

"An engineer must fully understand the mechanics of a bolted joint to effectively and efficiently design and build a complex structure. This class achieves this understanding."

Excellent course, providing a practical approach to bolted joint design."

"It is an invaluable experience to attend DABJ course being a milestone in the career of Mechanical Designers and Structural Analyst."

"I thought I knew about bolted joints, but I learned a ton and it was all aviation industry applicable."

"This course explains all the things that you need to know about fasteners and bolted joints."

"Since I am a test engineer, it was most useful to see where issues arise in the installation process."

"The class problems and exercises were great. It was interesting and helpful to practically apply the concepts."

"This course expanded my knowledge of engineering and will make me a more cognizant engineer."

Everything was very helpful."

I am fairly inexperienced in aerospace and have never worked with spacecraft, so this was an excellent crash course."

It was a very informative and insightful look into a portion of the aerospace industry I do not have a lot of experience with."

"As a "fresh out" engineer, the knowledge that I gained in this course is beyond valuable. I will be applying what I learned for the remainder of my career."

DABJ Testimonials

"This short course, "Design and Analysis of Bolted Joints," gave me insight regarding the design and correct use of fasteners."

"The course is relevant for any engineer who uses bolted joints in any design."

"**The course contains many helpful class examples** and covers enough material to give the student increased capabilities in designing and analyzing bolted joints."

"This course has provided me with a very good background and method in designing bolted joints."

"This was an excellent class for any design or structural engineer."

"It was informative, not only for bolt analysis methodology, but made us thing about how to look at a design, analyze it, and improve upon it to increase, strength."

"I would recommend all design and test engineers take this course."

"The content is highly valuable to every design engineer."

"This course offers great insight on how to design bolted joints by using proper analysis steps."

"This course provides a lot of useful knowledge and tools that are very applicable to an aerospace engineer."

"In my entire career so far, the material from this course has served as my Bible in how I approach bolted joints."

"Great course!"

"One of the most beneficial and eye-opening short courses I have attended."

"Course has helped make me a smarter engineer, which helps make me a safer and better engineer."

"This course trained me on the most current DABJ techniques – techniques that are not readily learned/mastered elsewhere."

"This is what a college engineering course should be."

"The course was excellent because it took all the fundamentals of mechanics and applied them directly to bolted joints."

"My toolbox of analysis techniques was expanded which, as a design engineer, allows me to design parts/assemblies that are more efficient and easier to analyze."

"This course is a great source for understanding the mechanics behind bolted joints."

"Great class, highly recommended."

"I learned techniques for analyzing bolted joints that comply with NASA-STD-5020, as well as many important details to check on engineering drawings and when in the hangars."

"Anyone who uses threaded fasteners should take this course."

"Without a doubt, Mr. Sarafin's classes have made me a better engineer."

DABJ Testimonials

“Probably the most important training course for any stress engineer working on a manned space flight program.”

“A great and necessary course for anyone who wants and needs to truly understand bolted joints.”

“Concise and comprehensive course on fastened joint analysis and NASA-STD-5020.”

“Anyone with a bolted joint, even seasoned analysts, should understand and periodically review the curriculum of this course.”

“This course provided all necessary guidance on the analysis of bolted joints and the information necessary for compliance to NASA-STD-5020.”

“A fantastic overview of joints and bolts.”

“Great course for gaining a better understanding of what it takes to properly design a bolted joint.”

“Very useful to better understand the analysis concepts dealing with my design work.”

“A very useful course covering analysis techniques and in-depth design considerations for bolted joints.”

“This class was very helpful in understanding and evaluating how bolted joints affect design. I learned many techniques that will apply to my designs.”

“As a new engineer, it’s hard to find all the rules and regulations that a designer or analyst needs to follow. This course brings all that knowledge together and presents it in a manner that is easy to understand and use. Would recommend it to anyone.”

“Very interesting course! It made me think more about how we do things and wonder if they are correct or not.”

“Very complete.”

“Excellent coverage and delivery!”

“This course was excellent. This binder will be at my finger-tips when doing fastener analysis.”

“I like the stories! Captivating instructor helps make the class useful!”

“This is a must course for every stress analyst who has been doing this type of analysis in a much different way.”

“Great course. Very informative with real world examples.”

“You will learn a lot about bolted joints.”

“Best class I have ever taken. Learned more than expected.”

“Extremely practical for multiple disciplines.”

“Excellent course and instructor for analysts and design engineers.”

“Great preview and background for NASA-STD-5020.”

DABJ Testimonials

"Excellent class to learn about the complications of bolted joints, and how to make it manageable and not too much of a science project."

"I wish I had taken the course earlier in my career."

"Excellent course that should be required by management for all analysts."

"This is an incredibly resourceful introductory course on bolted joint analysis and the new NASA-502o standard."

"There is so much I forgot when I am trying to do my job because of the spread sheets. Now I feel better to check not only my work before test, but also the analysis/design quickly."

"Great course. Stress analysts must take it!"

"Tom adds a lot of personal enthusiasm when he teaches."

"Bolts and SMS classes are the most applicable training I've taken for my job."

"This course is an absolute "must" for all stress analysts. This course is revolutionary for bolted joint analysis."

Email received a month or two after class:

> **"Hi Tom,**
>
> **I took both of Bolted Joints and Structural Test Design and Interpretation courses. They are really practical and tailored for working engineers.**
>
> **I was working on a mass simulator design and we were preparing for the static proof load test. Just a few days prior to the test, I discovered that a few of the bolted joints didn't have adequate strength to support the required proof load test. By using the knowledge from the bolted joints course, I was able to identify the problem area and modify the design to support the proof load test.**
>
> **Please keep me informed on all your future courses."**