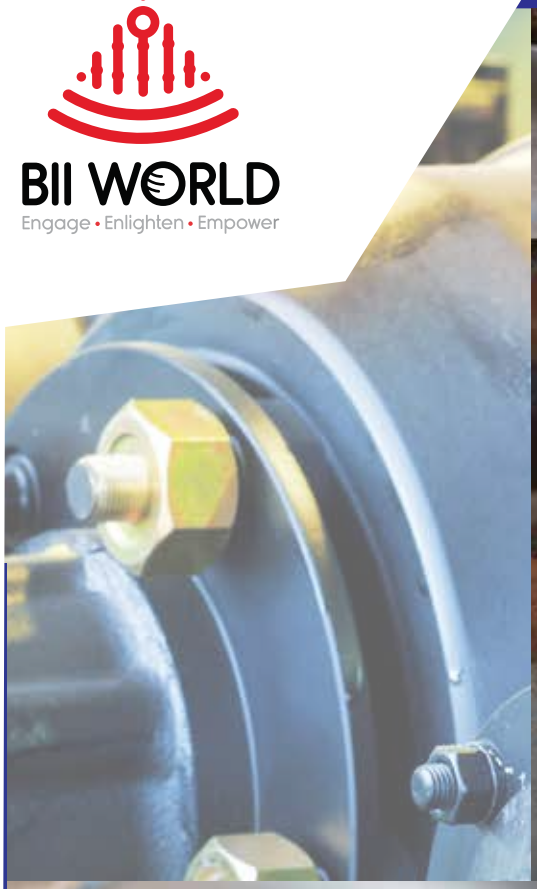
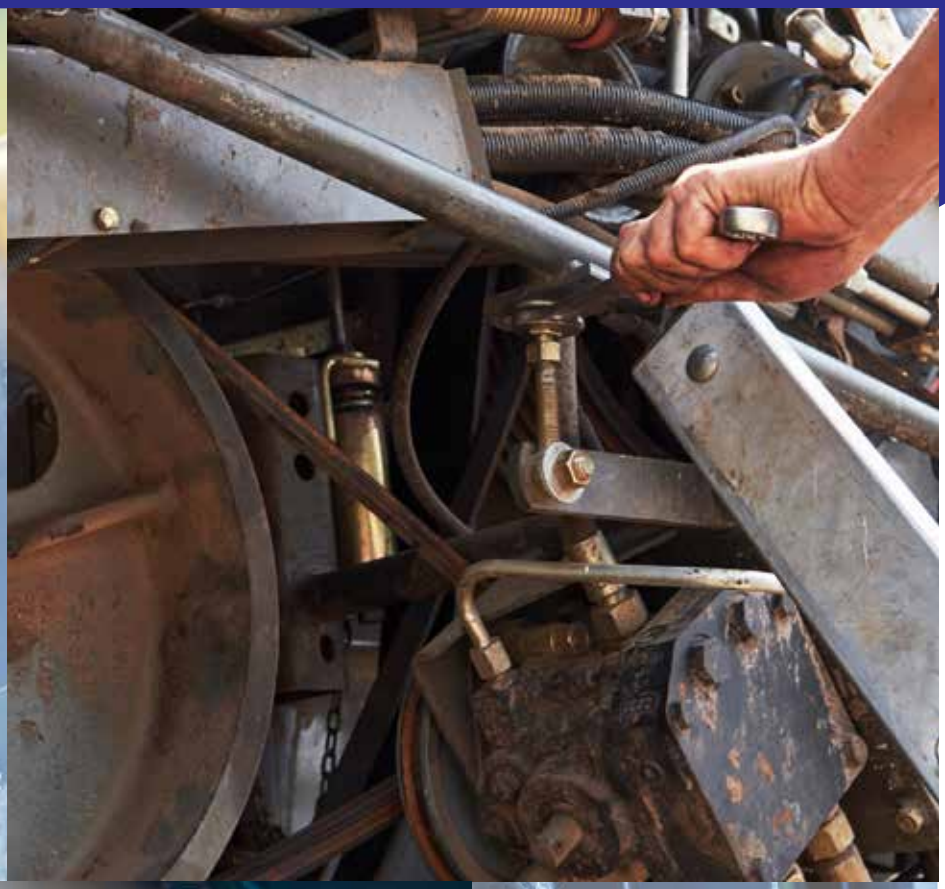
BII WORLD
Engage • Enlighten • Empower





PRECISION IN FASTENER APPLICATIONS

The next generation approach to challenges and solutions of bolts, gasket, flanges and related applications.

16 hours of virtual learning experience

06 - 09 November 2023

www.biiworld.com

10:00 - 14:00 Eastern Standard Time (EST)

Course Overview:

This 4-Day online course will enhance the safety and reliability of your operation by honing skills of the workforce. The course will cover bolted applications for flanges on pressure piping and vessels and include:

- Recommended gasket selection for the subject piping category depending on whether it is a corrosive media, high or cold temperature, high vibration area, etc.
- Bolting for Structural Components such as bridges, platforms, etc.
- It will address the stress-strain curve for a bolt and the need to keep the bolt tension in the elastic range.
- Discuss torque vs. bolt tension and stress that the desired end goal is precise tension.
- Address challenges of temperature and pressure changes and the effect on the joint integrity.

Learning Objectives

- **In-depth** knowledge of proper and precision bolting.
- **Overview** of strength of bolting materials, specifications, and selection of proper specification for a given application.
- **Use** of charts to determine bolts that should be used in an application.
- **Understanding** of the difference between torque and tension and how they are related.
- **Learning** of the techniques/tools to achieve proper bolt tension.
- **Interpretation** of effects of temperature and pressure on a bolted flange on a pressure containing unit.
- **Comprehension** of bolt stretch vs. strain and catastrophic result of stretching a bolt beyond its yield point.
- **Insights** of the very negative result of cupped or deformed washers and how to avoid this phenomenon.
- **Knowledge** of how to do safe disassembly of bolted joints, especially flanged joints.
- **Special** Applications for example how to remove/extract broken bolts or taps.

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AUDIENCE (Who should attend):

Title/Industries:

1. Manufacturing – Assembly of Pressure Vessels, Prefab Piping, etc
2. Power Generation including wind power generation
3. Utilities – Power Plants, Electrical Substations
4. Food and Beverage – Precision Bolting to avoid cross contamination.
5. Pharma – Precision Bolting to avoid cross contamination
6. Oil & Gas – Precision and reliable bolting to avoid/eliminate leaks
7. Fabrication and Repair Facilities/Shops – Precision Bolting to reduce liability of manufactured equipment
8. Petro Chemical, especially hazardous chemicals
9. Paper Mills – Precision Bolting to eliminate leaks that contaminate streams and cause explosions
10. Transportation – Railcars, Switching Stations, Engine Maintenance, Floating Fleets, and Highway Trucking
11. Other industry that uses bolted connections

AUDIENCE (Who should attend):

Title/Department:

1. Directors and Senior Leadership – successful bolting practice needs full support of the leadership of the operation.
2. Managers
3. Maintenance and Reliability Professionals, Reliability Engineers
4. Safety Managers
5. Operation and Maintenance Supervisors
6. Pipefitters, Boilermakers including all the workforce that perform bolted connections

All the above disciplines need to work in unison to achieve an effective and reliable bolting process.

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Instructor:
Alfred DeVaux

Alfred "Al" DeVaux has been interested and intrigued with mechanical marvels. A Mechanical Engineer he has worked over 50+ years in a variety of industries. While he has a wide-ranging competence in several areas, his focus is on precision alignment of rotating and stationary equipment, integrity of vessels and piping, best lubrication practices, PM optimization and root cause analysis with implementation of corrective action, all of which are basically "Defect Elimination".

Experience & Training Snapshot:

- Developed Training processes to maximize Efficiency, Reliability & Safety
- Established Successful Condition Monitoring Maintenance Processes
- Planned and Managed Major Turnarounds; completed safely on schedule
- Directed repair/rebuild/upgrade of rotating assemblies to 30,000 HP
- Developed and Directed painting/insulation/lining projects
- Developed and Refined Safe Work Procedures
- Performed and Supervised NDT/Metallography analysis
- Managed Planning/Inspection/Equipment Reliability Departments
- Developed and Managed QA/QC Processes for Rotating & Static Equipment
- Precision Maintenance, Bolting, Lubrication, Root Cause Analysis (RCA)
- Reliability Centered Maintenance

The summary above highlights some major accomplishments obtained through his hands-on involvement in reliability/asset management endeavours. His day-to-day ongoing duties of leading Root Cause Analysis, Continual Coaching of the maintenance crafts, turnaround support, upgrading of PM tasks, etc. were achieved to maintain a comprehensive well-functioning, efficient, reliability enterprise for his employers and clients.

Alfred DeVaux worked on various projects helping clients set up Preventive Predictive Maintenance processes and developed/performed training in Rotating Equipment Alignment, Leak Free Flange Assembly, Lubrication Best Practices that helped clients/employers optimize reliability and synergistically reduce maintenance costs. His current certification status: CMRP, CRL, MLT II, IR I, CWI, Vibration Analyst II.

PRESENTATIONS:

Day 1

10:00 - Pre-Course Intro

Module 1: Introduction – Fastener (Bolt) Integrity:

- Discussion of importance of Precision Bolting/ Dangers of inferior bolting practices
- Safety in bolting
- Review case histories of some catastrophic failures

Break

Module 2: Fastener Terminology/:

- List of terms and definitions
- Bolting terminology and symbols used for calculations

Break

Module 3: Fastener Specifications and Properties:

- Review of bolting specifications such as ASTM, ANSI, ASME, SAE, and ASSHTO
- Discussion of various charts and tables concerning bolt markings, strengths, and how to use them

Case Study – 1:

- Client had problems with corrosion of ¾" - carbon steel flange bolts (ASME GR 193 B7) bolts. So, they changed bolting material to a stainless ASTM grade A320- B8 (AISI 304 SS) to resist corrosion of the bolts. After this change they began to have leaking flanges. Note that the ASTM Gr 193 Grade B7 studs have a yield tensile strength of 105,000 psi compared to 30,000 psi for ASTM Grade 320 B8 Class I studs. This reduced the clamping force by over 3X

Exercise – 1:

- Yield strength of an ASME GR 193 B7 Stud with that of an ASTM Grade 320 Class I Studs and ASTM Grade 320 Class II Studs

Post-Session Q &A

14:00 – End of Day1

Day 2

10:00 – Review of Day 1

Module 4: Fastener Reliability:

- Bolted Joint Failures (Causes and Solutions)
- Discussion of Charts for Bolt identification with bolt properties and associated hardware such as washers and nuts

Break

Module 5: Stress-Strain Curve:

- Discussion of the stages that a fastener passes through when tension is applied from o tension to the Ultimate Tensile Strength
- Stretch to Proof Load, Yield Point, Neck down Region, Point of Fracture

Break

Module 6: Methods to achieve correct bolt tension:

- 10 different methods and how and where to use them
- The purpose of torque with bolting
- Torque related to bolt tension – not the same thing

Case Study – 2:

- Calculation Exercises – tensioning method

Exercise – 2:

- Stress Strain Curve for Fasteners (the stages of tension)

Post-Session Q &A

14:00 – End of Day2

Course Outline:

Day 3

10:00 – Review of Day 2

Module 7: Methods to achieve correct bolt tension (continuation):

- 10 different methods and how and where to use them
- Grip Length (why is it Important)

Break

Module 8: Assemblies with multiple fasteners:

- Torque or Tension Sequence of different bolt configurations
- Sharing the Load
- Tightening Steps

Break

Module 9: Flange Union Integrity:

- Discussion of precision assembly
- Discussion of safe disassembly
- Gasket Removal where appropriate and inspection of sealing surfaces (Discussion of application of ASME PCC-1 Specification and how to apply it)

Case Study – 3:

- Temperature and Pressure effects on Bolt Load

Exercise – 3:

- The effect that tightening a flange bolt has on the tension of the adjacent bolts

Post-Session Q &A

14:00 – End of Day3

Day 4

10:00 – Review of Day 3

Module 10: Flange Types and Gaskets – Where to use:

- Raised Face-most common Flat Face-generally for water or nonlethal service
- Ring Joint-For higher pressures Tongue and Groove, Male and Female,O-ring Groove

Break

Module 11: Flange Union – Adjusting for Temperature and Pressure:

- Temperature distribution in a flanged joint – effects of heat transfer
- This is very important to avoid overstressing the bolts caused by temperature expansion of the flanges as the bolts will be cooler than the flanges
- The reverse effect applies to a cold service

Break

Module 12: Reference Charts:

- Various Charts illustrations and how to use them for bolts, nuts, washers, flanges, gaskets
- ASME, SAE Charts
- Bolt Lengths and Sizes for flanges 150# to 2500#, Hex and Heavy Hex Nut dimensions Washer - (standard and specialty) sizes Gasket Type/ Construction and Stress to seal

Module 13: Special Applications:

- Removal of Frozen Nuts, Methods of locking fasteners, Easy Outs, etc
- Prevention of thread galling
- Removal of broken tap

Case Study – 4:

- Client having problems with thread galling

Exercise – 4:

- Demonstration of lubed vs. dry bolt torque/ tension values

Post-Session Q &A (Day 1 – 4)

14:00 – End of Day4 & Course

FAQs

Does BII Online Virtual Training have the same value as traditional classroom training?

Yes, BII Online Virtual Training offers participants; same training system as in-person, i.e face-to-face engagement with instructors, course material, interactive participation of all delegates, and personal support that they would expect to find in a traditional classroom.

What are main features of your online courses? Are they on-demand? Is it different content from the in-person offering?

The content of the virtual training is similar to the in-person sessions and customized presentation makes it a richer online learning experience. As always, we will share presentation materials with attendees for later reference.

The online courses are not on-demand and recordings cannot be purchased. They are set on scheduled dates, live with an instructor and co-host via webinar software. While the day is shorter than an in-person session (4hrs vs 8hrs), timing are adjusted to accommodate attendees in different time zones and allow more time for one-on-one conversations via the Q & A.

What are the technical requirements for participation in a virtual course?

All you need to participate in virtual training are:

- Desktop or Laptop or Tablet Computer, and Internet connection
- Webcam
- Headset with built-in microphone

Can I attend an online training session if I have a Macintosh computer?

Yes, Our Online training systems does allow Macintosh computers, PCs, and computers running Linux to easily enter any of our online training sessions.

What type and version of browser will I need for online classes?

It is recommended that you use the latest version of Firefox, Chrome or Internet Explorer for Windows and Firefox or Safari for Mac. Each of these is available for free download and also suggested you have the PDF Reader

How do I have access to the trainer for questions?

As in the classroom, you will see the trainer in front of you and have the opportunity to ask questions at any time - all via audio and video transmission.

Is there a mute option within an online training session to minimize background noise from my audio connection?

Yes, the Mute button will display to the right of your name as you hover your mouse over your name shown in the Participants panel on the top, right side of the Web conferencing screen.

What if I miss few sessions of the online training program?

The training will be simultaneously recorded which will be provided to you as per request & requirement

Do I get a Certificate at the end?

Yes, you will get a PDF version of your certificate of completion

Precision In Fastener Applications

06- 09 November 2023

BII World Limited
9616 45th Avenue
Northwest, Edmonton, AB
T6E 5Y9, **Canada**

Please complete this form and send it back to:
E-mail to: **mithun.siddartha@biiworld.com**

Event Code: OL TE 69

Delegate Details

1. Name: Mr/Mrs/ Ms .....
   .....
   Job Title: .....
   Email: .....
2. Name: Mr/Mrs/ Ms .....
   .....
   Job Title: .....
   Email: .....
3. Name: Mr/Mrs/ Ms .....
   .....
   Job Title: .....
   Email: .....

Company/Organisation Detail

Name: .....
Person to Contact:.....
Email: .....
Address: .....
.....
City: .....
Country: .....
Contact No: .....
Type of Business: .....
Website: .....

Payment Details

METHOD: CREDIT CARD ☐ OR WIRE TRANSFER ☐

Please debit my

Visa ☐ Eurocard /Mastercard ☐ Amex ☐ Diners club ☐

Card Billing Address:.....
Street: .....City.....
Zip/Postal: .....
Card Holders Name: .....
Email Address: .....
Card Holders Signature: .....
Card Number

Credit Card CVV2/ CVC / CID Number:

Visa / Mastercard (3-digit code on the back) | | | | Amex (4-digit code on the front) | | | | |

Valid from: | | / | | | Expiry Date: | | / | |

I agree to BII debiting my card

Authorization and Acceptance of Sales Contract & Terms & Conditions

I hereby declare I am authorised to sign this contract and terms & conditions in the name of the company/organisation:

Name:.....
Date:.....
Signature:.....

Delegate Fee ☐ **USD 999** Per Delegate

20 USD administration charge and any applicable withholding or any other tax or fee will be applied

TERMS & CONDITIONS:

1. Payment terms: BII World LTD requires the full payment of the invoiced amount within 7 working days from the issue date of the invoice. BII World LTD reserves the right to refuse entry to any client who does not pay the invoice in full and on time. The registration fee includes: Training documentation and admission to all training sessions.

2. Cancellation by client: The client has the right to cancel his/her participation in the event. Cancellation must be received by BII World LTD in writing either by mail or fax. If the client cancels the event, he/she will get two options:

A. CREDIT NOTE: Choose 2-year credit note, BII World LTD will send all the schedule training event details throughout the year. Delegate has the right to choose and attend any of the training programs (valid 2 years).

B- NOMINATION: In this option delegate can nominate/refer someone from his/her group/company to attend the particular training program on behalf of the actual delegate.

3. Cancellation by BII World LTD : While every reasonable effort is made to adhere to the advertised program, circumstances can arise which may cause changes in the program, including but not limited to changes in the content, date(s), or special features of the planned event. Such circumstances include but are not limited to acts of terrorism, war, extreme weather conditions, compliance with government requests, orders and legal requirements, failure of third-party suppliers to timely deliver, and failure to register the minimum target number of attendees for a given event. BII World LTD reserves the right to change the content, date(s), and/ or special features of an event, to merge the event with another event, or to postpone it or cancel it entirely as appropriate under the circumstances. Client agrees that BII World LTD shall not be liable for any cost, damage or expense which may be incurred by client as a consequence of the event being so changed, merged, postponed or cancelled and client agrees to hold BII World LTD harmless and to indemnify BII World LTD in case of liability caused by any such changes, mergers, postponements or cancellations.

4. Cancellation of the event: In case BII World LTD cancels an event, then client can choose any of the below mentioned options:

(a) BII World LTD will refund full payment to the client within 15 business days.
(b) Client can choose the credit option for 2 years, for more details please read term no-2 part (a)

5. Postponement of the event : In case BII World Ltd postpones the event to a new date, then client can choose any of the below mentioned options.

(a) The client can attend the course on the postponed dates.

(b) Client can choose the credit option for 2 years, for more details please read term no-2 part (a)

6. Client's identification information. By signing of this sales contract and these terms and conditions the client gives full right to BII World LTD to share the client's identification information, i.e. client's name, address, email addresses, phone numbers and names of representatives and website with other clients who participated in the same event. The client has the right to opt out of this clause by written notice to BII World LTD.

7. Governing law: This contract shall be governed by and construed in accordance with the laws of the Pr ovince of Alberta, Canada. Any disputes arising under or in connection with this registr ation form shall be settled bef ore the competent court in Canada.

8. Indemnification: To the fullest extent permitted by the law, you agree to protect, indemnify, defend and hold harmless BII World LTD, its owners, managers, partners, subsidiaries, affiliates, officers, directors, employees and agents, from and against any and all claims, losses or damages to persons or property, governmental charges or fines, penalties, and costs (including reasonable attorney's fees) (collectively "the Claims"), in any way arising out of or relating to the event that is the subject of this contract, and regardless of negligence, included but not limited to, Claims arising out of the negligence, gross negligence or intentional misconduct of BII World LTD employees, agents, contractors, and attendees; provided, however, that nothing in this indemnification shall require you to indemnify BII World LTD Indemnified parties for that portion of any Claim arising out of the sole negligence, gross negligence or intentional misconduct of the BII World LTD parties.

9. Other currencies. In case that client requests payment in other than official currency (USD), BII World LTD reserves the right to apply 5% currency risk surcharge to the actual exchange rate.

10. Other Conditions: Any terms or conditions contained in the client's acceptance which contradict or are different from the terms and conditions of this registration document shall not become part of the contract unless individually negotiated with BII World LTD and expressly accepted by BII World LTD.