LIVE LOAD

Valley Forge & Bolt Newsletter

Welcome to the first edition of Live Load for 2016! It has been a busy year so far at Valley Forge even with the low price of oil and copper. We are passionate about load indicating technology and their many uses in the world. Read about some of the new Valley Forge products that are coming out on the market this year.

Rusty Flocken has written an article on our new Mini Maxbolt. We are now able to use load indicating technology in smaller diameters of fasteners with less de-ration than ever before! We are also selling the new Sealing Mill Ridgeback (Liner Bolt), another new patent from Valley Forge. This invention is going to change the mining landscape for years to come! Starting June 1st, we will be shipping samples of our Ball Lock™ Washer with orders having washers in them. The Ball Lock™ Washer takes away the need for a backup wrench and more importantly, the person holding that back up wrench! Injuries with backup wrenches slipping or moving can be eliminated altogether! Call or request your samples today and see why these washers save time, money and are so much safer.

Knowing you have to stay ahead of the competition with quality, pricing and service, we have expanded our heat treat capability with a second heat treat line just in time for a HOT Phoenix summer. We welcome Randy Stotts to the VF team. His years of experience in heat treating will be a great addition to our knowledge base.

There are many things happening in the world today that one can't control, knowing that the quality of your bolted joints are safe and loaded correctly with Valley Forge load indicating fasteners or our regular fasteners, takes one more problem off your hands. Thanks for reading Live Load and your interest in our continuing

UPCOMING EVENTS

AWEA Wind Power 2016
23 - 26 May, 2016
New Orleans, LA

Elko Mining Convention
9 - 10 June, 2016
Elko, Nevada

ASME PVP Conference
18 - 22 July, 2016
Vancouver, British Columbia
Canada

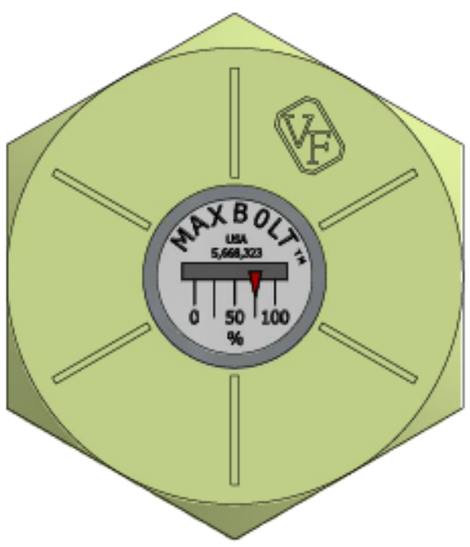
MinEXPO 2016
26 - 28 September, 2016
Las Vegas Convention Center
Las Vegas, NV
BOOTH 1142

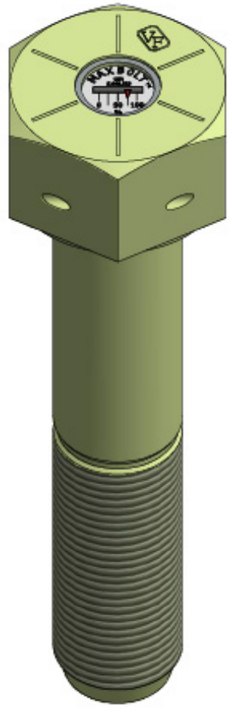
Maxbolt™ Application: Rail Industry

VFB Technical Article by President, Ron Clarke.

Assembly Description

A bracket retrofitted to a rail-car axle. The assembly consisted of four bolted bracket mounts retrofitted to the axle and the bracket then fastened to the mounts. The whole assembly used a quantity of twelve 3/4" and 5/8" Maxbolt, load indicating fasteners.





Field Tests:

Field tests were performed by OEM on the Maxbolt load indicating fasteners by gathering data from two brackets bolted onto a right and left, car axle. All twenty four Maxbolt load readings, against rail-car miles traveled during a nine week period.

Results

Summary:

Month 1

After the first month and 1350 miles later, 9 out of 12 Maxbolts ~ 40% of the total fasteners, retained their initial preload of 75%

1 (one) Maxbolt: ~ 4% of the total, was down to 70% from initial 75% preload.
5 (five) Maxbolts: ~ 20% of the total, showed a load loss down to 65%
4 (four) Maxbolts: ~16% of the total, were down to a load of 60%
5 (five) Maxbolts: ~ 20% -- were down to a low of 50%.

The fifteen bolts that had lost load were then all tightened back to 75%.

Month 2

After the second month, and an additional 2557 miles later, 22 out of 24 Maxbolts ~ 92% of the total fasteners, showed no load loss with readings unchanged at 75%.

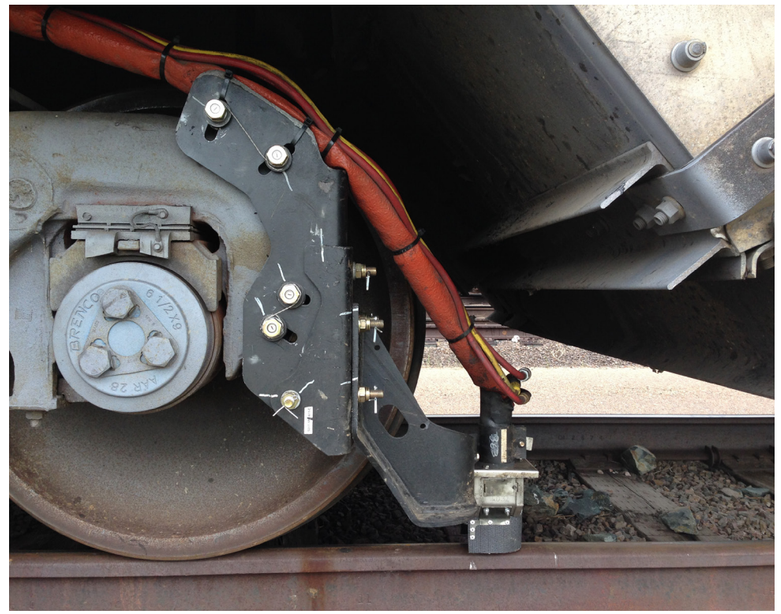
Only 2 (two) maxbolts: ~ 8%, were down slightly with readings of 70%.

At this stage the two bolts were tightened back to 75% and the car run for a further 2860 miles when another load check was conducted.

This check showed 23 out of 24 Maxbolts ~ 96%, holding load at 75%. With one bolt down at 50%.

Conclusion

Specifically with this OEM's railroad bolting assemblies, safety is a first consideration. For this application, Valley Forge's Load Indicator Technology not only assures this safety with an accurate and instantly readable assembly preload, but also ensures quick maintenance, with no further need for routine re-torquing, other than those individual bolts reading low on the Maxbolt dial. Load indicating bolts are not for all applications but their ability to read accurate bolt load at a glance or during tightening, makes it ideal for this critical bolted assembly. The quantitative clamp load readings displayed for this test, would have been by any other method, difficult and extremely expensive, if not impossible to obtain, without the Valley Forge Maxbolt™ Load Indicating System.



Guest Anecdotes

with Glenn Snowberger

When it was suggested that I pinch hit for Ron as the Guest Anecdote writer I was immediately struck with fear. I felt like a new stand-up comedian making his first appearance at a comedy club. I was waiting to take the mic following someone like Jerry Seinfeld: "A tough act to follow".

What could I possibly contribute that was worthy of the invitation?

Well perhaps almost 57 years in the Fastener Industry should allow me to come up with something. Certainly I have experienced and seen many things, and met many people in this time, but what could be of interest to our readers. Then it struck me "why not tell how by chance I found myself in the fastener industry so long ago".

As an Mechanical Engineering student about to graduate it occurred to me that I should consider how to use my degree and pick an industry that would provide me with opportunities. I only had to look around at my family and their friends and the jobs and the companies they worked for. One of my uncles stood out as he always had a new car, a nice house and a lake cottage, plus took great vacations. None of the others even compared. What was his secret to success? Well he was the Chief Electrical Engineer for a division of a major steel company. This made my decision easy, as the steel industry was big in the country back then, so I went about obtaining campus interviews with steel companies, and other industries. It turned out that I received several job offers, one of which was from a steel company with headquarters in my home town. I was on my way to follow my dream.

A short two weeks after graduation I started as an Industrial Engineer and attended an introductory session at the corporate office. This was then followed by notification of your permanent location assignment. "Great, here comes a job at a major steel producing facility". No such luck. My assignment was to a steel processing plant making bolts and nuts. So began my sojourn in the Fastener Industry.

This then was my first exposure to making bolts and nuts, but certainly not my last. Perhaps at some later date I can tell you how vibrant and alive the Fastener Industry was, with some 1,000 plus manufactures in the United States alone, and how the industry was always looking for experienced people.

-- TECHNICAL ARTICLE --

SPC4™ Data Logging and Remote Monitoring Assembly

by Mircea Iclozan, Senior Hardware Design Engineer

Billions (trillions?) of bolted joints hold together the world we live in. The project designers base calculations on numbers they know can be achievable in the field, or they think they know, when it comes to bolts being installed to design. However, because we live in an imperfect world, the variations and variables will always exist and designers must do their best to compensate for fasteners being installed poorly or correctly, but not achieving design load.

An old military saying goes, "on the battlefield, anything you do can get you killed; and that includes doing nothing".

What does this have to do with load indicating fasteners and bolting? Maybe more than we think.

If we look around, we do not often see wondrous structures crumbling to the ground, bridges falling into the rivers, or more spectacular and frightening failures. The sky isn't falling yet, but this does not mean that everything is perfect. Maintenance crews and engineers will agree, without constant and regular maintenance, all these "wonders" would quickly cease to be so "wondrous".

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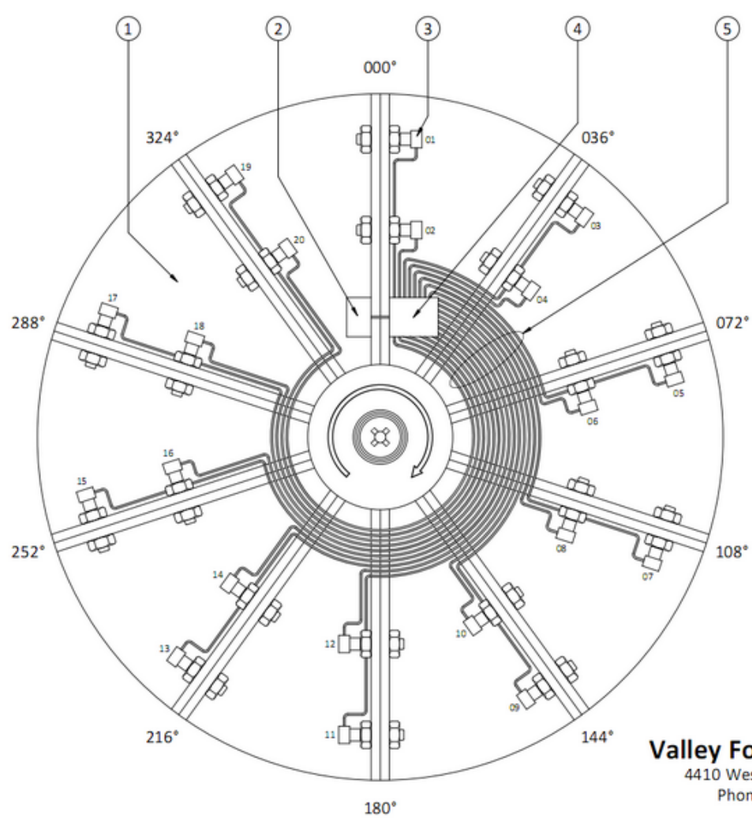

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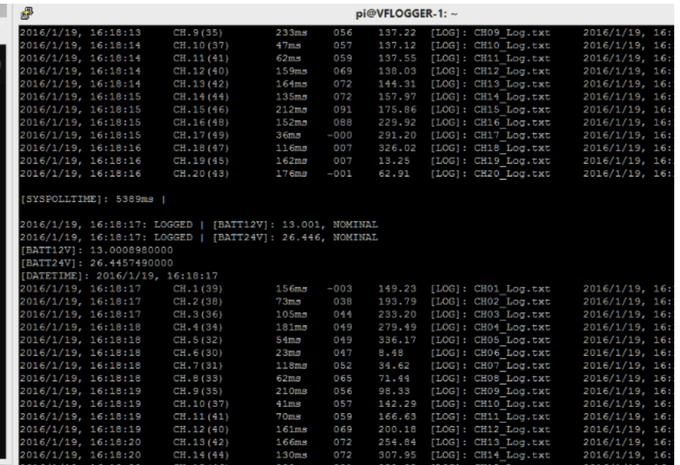
One small, but very important, and sometimes overlooked detail, is how tight the bolts holding joints together really are. Most of the time, the fasteners are installed using a torque setting or limiting type of tool and hoping that the loads attained will be as expected. Unfortunately, in the real world, the torque method, while relatively cheap and easy to implement, could leave you with a 30 to 40% deviation from the expected value.

One of the most important questions to ask is how much, and more importantly, how repeatable, over time and the number of bolts of that torque value is "lost" to friction? This is important so a user can theoretically compensate. We are talking about friction between the nut and the surface the nut is tightening against: nut and bolt. Why? Because, while tightening, most of the energy going into clamp force is lost to friction. Only about 10% of the energy is leftover for clamp load. Another set of important questions could be asked about joint relaxation and about bolt crosstalk, but we will save these for another time.

The reason why we're using bolts and bolted joints is because they offer us a way to clamp objects together. So, noticeably, it's the clamping force or clamp load that is of utmost interest to us.

Using torque tables and values, and trying to correlate these to reach a theoretical clamp value, really does not make much sense. Not these days anyways, with numerous much better alternatives. It's relate-able to trying to drive a car, blindfolded and having somebody in the passenger seat telling you how you should drive an ever-changing road: "A little more to the left here, slow down there, take a hard right in about 3 seconds..." While being feasible, it is doubtful that anybody would think about this process as reliable or desirable.

If we are interested in clamp load, then we should directly measure clamp load! This can be done using an electronic instrument that is also capable of logging the data being measured for further analysis or troubleshooting purposes. Knowing exactly what the clamp load is, either static or dynamic, in each and every case could even reduce the need for over-sizing and over-dimensioning, giving us lighter, but at the same time, stronger assemblies and structures: inevitably saving money and precious resources. Enter the newest addition to our SPC4™ Load Indication System: data logging and remote monitoring.



We designed and built this assembly intended to be mounted on a rotating mill or other rotating hardware, which will monitor and log the data from 20 load indicating bolts. At the same time, the assembly will monitor and log each fastener's positional (angular) information. The system does not necessarily have to be mounted on a mill, and the number of bolts can be different. The final platform can be developed for a modular and extensible application as well. We specialize in providing quality solutions for industrial fastening applications and that is precisely what this data logging and remote monitoring system does.

The assembly contains a Real Time Clock (RTC) which stamps all the readings with a date and time when the reading was taken. The speed/acceleration of the bolts, at the time of reading, can also be documented. All the readings are saved on a SD card that is mounted in the data-logger and can be removed and read on a computer after the data acquisition phase is over. The data from each bolt is saved into a separate, clearly named file and is in a coma-delimited format that is Excel® friendly. Each file contains the same type of fields: date and time when that particular reading was taken, the load information the bolt was seeing at the specific time and the angular information. The final number of samples can be quite large depending on how long the data-logger is left to run. After importing all data to Excel, it is quite simple to setup a filter to only show specific load boundaries that the customer is interested in.

Other customers may seek a way to access the logged data in real time or check on what is going on from a remote location. The system has the capability to do this from the project site or from where the company headquarters is located. This system can be equipped with an optional wireless transceiver (Wi-Fi) that relays data over the network through an Access Point that is responsible for creating the whole sub-local network, to either a local PC or an already existing on-site local network. Another option, for places without wired Internet access, or for a "moving" platform, would be to use a cellular modem and take advantage of data transmission capability over the cellular network.

The data logging assembly is equipped with wireless programmable video camera(s) that send alerts or determine the need to automate tasks when some expected or pre-defined conditions are or are not met. Also, the local PC could be used to control external loads to perform the intelligent, automated tasks. This option is very useful for remote/unattended sites. Having all this information instantly available on the Internet using secure communication channels and logins is very beneficial to assist in trouble-shooting and maintenance/warranty tasks. The way the data is formatted and displayed will be tailored to each application, the images included are examples.

In conclusion, as bolting experts, our priority should be striving to improve our procedures and eliminate as many as possible variables in order to make sure we are getting the results we expected. Using torque in critical assemblies, without measuring and monitoring the final clamp load while still in use, is an outdated method.

Sources (further reading)

Research Council on Structural Connections
http://www.boltcouncil.org/
The Research Council's Specifications have been endorsed by the Industrial Fasteners Institute and endorsed and published by the American Institute of Steel Construction, and they form the basis of the technical requirements of other national standards.

Guide to Design Criteria for Bolted and Riveted Joints
http://www.boltcouncil.org/files/2ndEditionGuide.pdf

Torque Trade-Offs
http://www.assemblymag.com/articles/85410-torque-trade-offs

Torquing for Tightness
http://www.assemblymag.com/articles/82787-torquing-for-tightness

Fastening: How Tight Is Tight?
http://www.assemblymag.com/articles/84026-fastening-how-tight-is-tight

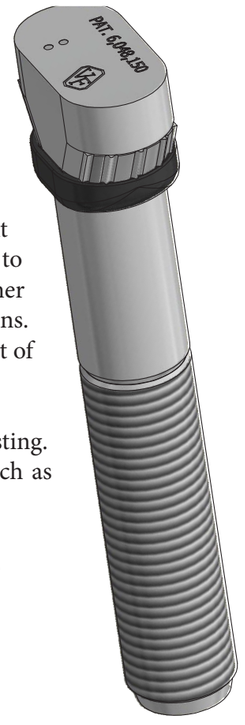
Torque Measuring Wrench Patent (US 2074079 A)
http://www.google.com/patents/US2074079

RESEARCH & DEVELOPMENT

The Sealing Mill™ Ridgeback®

by Rusty Flocken, Mechanical Engineer

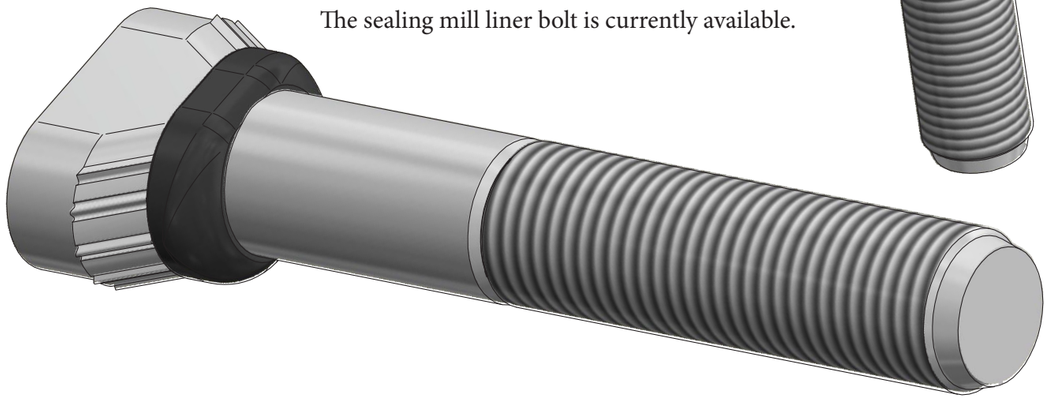
Valley Forge has recently developed a liner bolt innovation to improve the reliability of mill liners and liner bolts in ore grinding mill applications. Recently, concern has been raised about liner breakages triggered by stress concentrations found at the base of the liner pocket where contact is typically made with the bolt head. Liner bolt customers have also reported problems of 'racing' due to leakage of slurry between liner pocket and bolt head. This phenomenon can cause wear and premature failure to bolts and the mill shell alike.



The Sealing Mill™ Ridgeback® liner bolt has been designed and evaluated to prevent problems related to load distribution, as well as slurry leakage, which can lead to 'racing'. The Sealing Mill™ Ridgeback® produces effective sealing of the bolt to liner pocket throughout the full range of bolt capacity, including very low loading conditions. Additionally, the polymer bushing is designed to transfer a pre-determined amount of bolt load while remaining load is distributed higher up on the head.

The polymer bushing was selected with a durometer rating based on results from testing. In order to achieve the best balance of load distribution and part life, factors such as memory retention, compliance and load bearing capacity were all considered.

The sealing mill liner bolt is currently available.

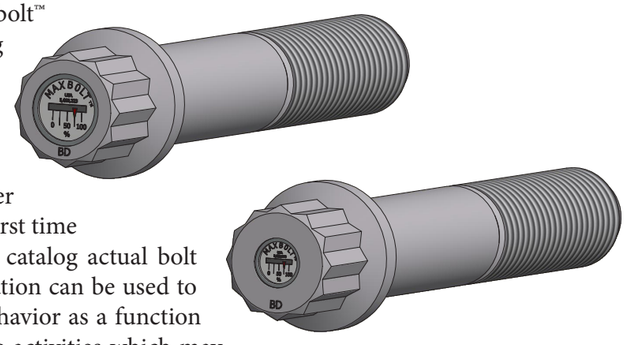


RESEARCH & DEVELOPMENT

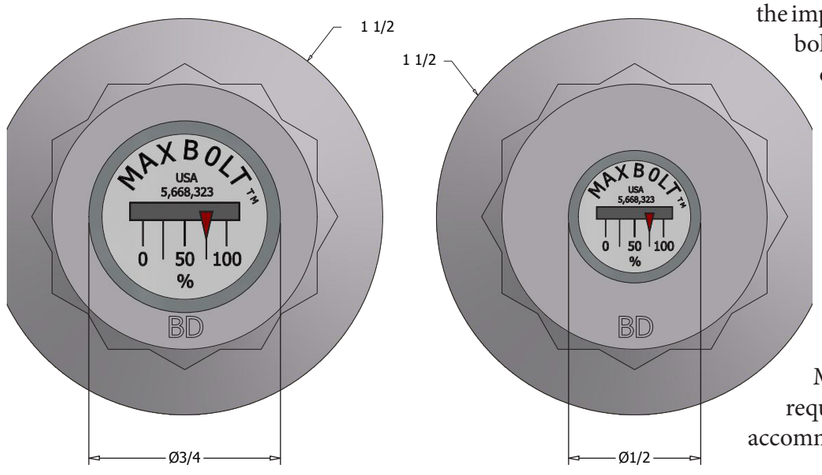
The Miniature Maxbolt

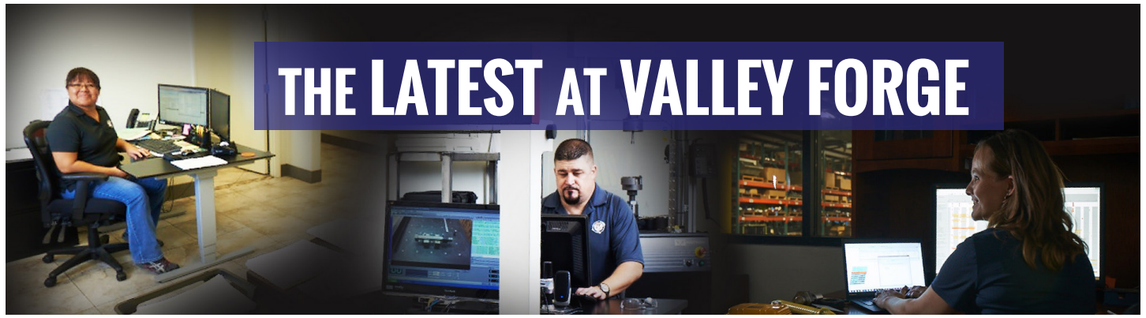
by Rusty Flocken, Mechanical Engineer

For over a decade, Valley Forge has offered Maxbolt™ load indicating fasteners to customers requiring direct load indication. Now the same technology can be installed in fasteners which were previously too small to accommodate a Maxbolt™ indicator. The Miniature Maxbolt™ was originally developed for a customer requiring fitment into a 5/8" diameter hex cap screw for mounting on a rail-car. For the first time ever, this customer has been able to record and catalog actual bolt loads over time using a spreadsheet. This information can be used to highlight special characteristics such as a bolt's behavior as a function of its position within an assembly, or maintenance activities which may change bolt loads. The information can also be used, in general, to categorize overall behaviors of the joint such as embedment. This phenomenon and others occur on an average over the sum of all bolts in the joint, and can greatly affect joint performance over time.



The Miniature Maxbolt is set apart from previous Maxbolt™ designs in that the primary goal was to create the most compact indicator possible in order to reduce the impact of material removal on small bolts. This is our only Maxbolt™ designed to use a smaller 0.1875 diameter gage pin, allowing for less reduction in cross-sectional area. The Miniature Maxbolt™ can be installed into bolts as small as 5/8" [M16], installations can also be made in 3/4" [M20] bolts, with the added benefit of less de-ration when compared to a standard Maxbolt™. Both sizes of bolts will require an increased head height to accommodate the Maxbolt™ indicator.





ASTM Fall Meeting of F16 Committee on Fasteners

The semiannual meeting of F16 was held the week of November 16th in Tampa, Florida. Valley Forge was represented by committee member Glenn Snowberger who attended the main and subcommittee meetings.

ASTM F16 meets to update, review and establish new standards for fasteners. The various subcommittees meet over two (2) days during which ballot results pertaining to the proposed update or new standards are discussed. Any negative ballots from committee members are discussed and resolved, which can lead to a new round of balloting, before the standard is approved.

The closing meeting is the Main Committee Meeting, F16: Mechanical Fasteners. Each subcommittee chair reports on their respective efforts during the review process and any working group results. Of note was the announcement of the earlier approved new standard F3125 was not published in 2015, and will be available from ASTM in 2016. This standard, Specification for High Strength Structural Bolts (replacing A325 & A490), is now being referenced by some purchasers. It must be noted that the two (2) former standards will still remain within ASTM for years to come and will be valid references for purchases. It is recommend that this new standard be obtained and become a part of the Standards Library.

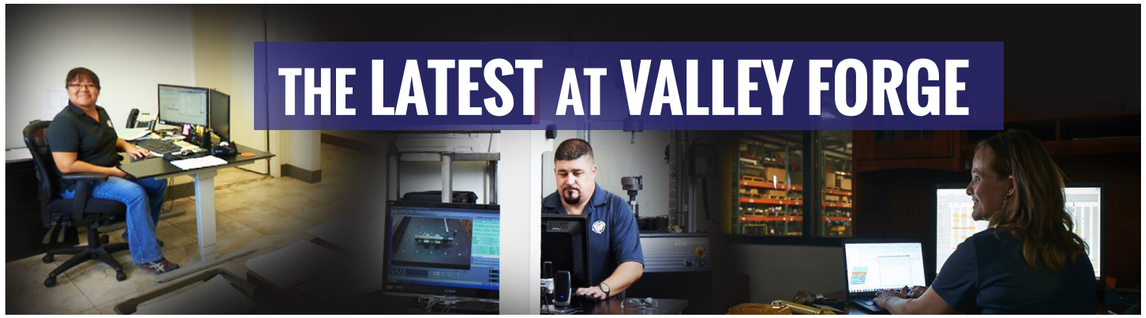
Several notable items from the meeting were as follows.

A dinner meeting honoring and recognizing Joe Greenslades was held on the occasion of his retirement as IFI Technical Director. He has held this position for years in addition to his serving on F16 committees and ISO committees for additional years.

A slate of nominees for Main Committee Officers was announced for the term beginning January 1, 2016 to December 31, 2017. The ballots were sent to all F16 voting members in late November. The results of the voting have yet to be announced.

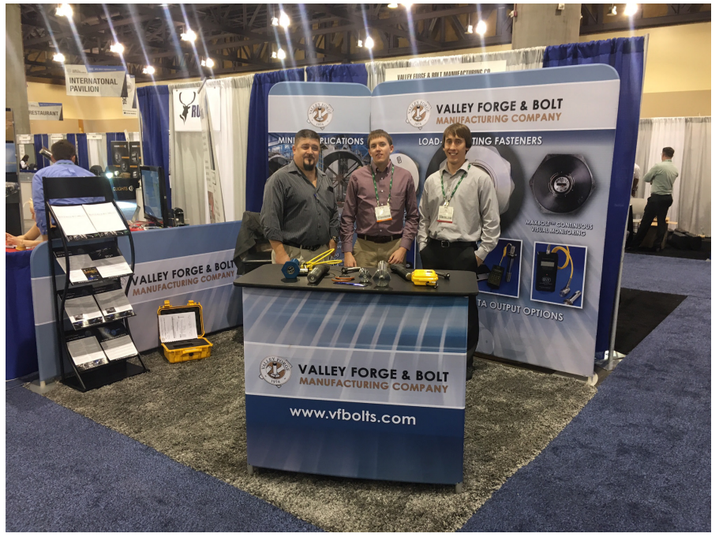
A special presentation during the F16.96 Bolting Technology meeting was put on by Eric Straus of KEM Plate. It described a new surface treatment process called AmorGalv® which is an updated process of the old British process called Sherardizing. A visit to the Kem Plate website could be rewarding.

The next committee meetings will be held in May 2016.



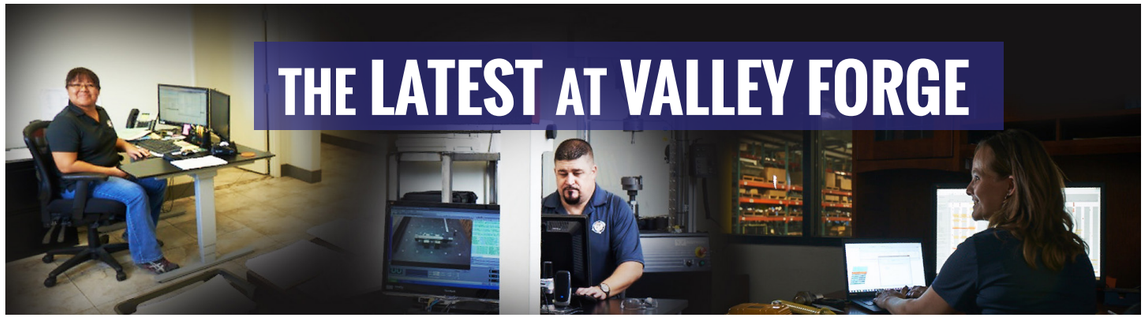
January 2016 Quarterly Meeting

After the holidays screamed by in a tinsel and scrumptious sweets filled manor, everyone here at Valley Forge took the opportunity to slow it down for a day and reflect on the final quarter of 2015. The desert winter brought warm food and much discussion on our goals for the upcoming year. We have a few new focuses and recently revived past efforts to keep moving towards.



SME Conference

The SME Conference was held in Phoenix this year, much to our enjoyment! Because it was in Phoenix and not far from the office, we took it as an opportunity for some of the VFB staff to see a conference that haven't before. The last week in February we got the chance to interact with many of our existing customers in our home town and meet plenty of new ones. This is a very looked forward to conference and one that we have been a part of for decades. Although mining may be down, we look forward to up and coming new opportunities.



IFI Annual Meeting 2016

Early in March the Industrial Fasteners Institute gathered for their Annual Meeting. This event too was hosted in Phoenix for 2016! Michele Clarke and Glenn Snowberger spent the week in meetings and attending events in true IFI fashion all around the valley. We also had the opportunity to give the IFI attendees an up close and personal facility tour and host a wine and cheese cocktail hour. A great event we look forward to hosting again!

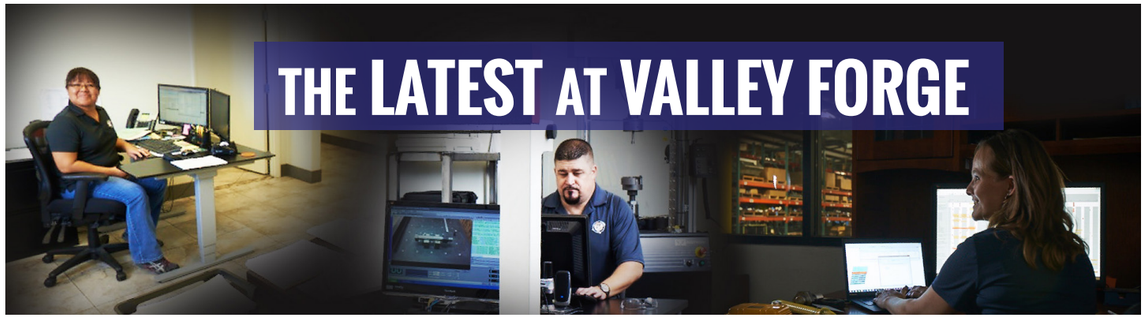
Offshore Cranes & Lifting Conference

During April, the 21st International Offshore Crane and Lifting Conference 2016 was held in Aberdeen where 18 nations were represented by a total of 190 delegates, which in the current Oil and Gas market is a success the Conference Committee and Organizers deserve a lot of credit and thanks for.

Valley Forge was represented for the second year running by Bill and Barry – our third participation in this annual event, which we feel was our best yet, helping enormously in cementing our strengthening market position after the Business Development and growth since our first attendance in 2014.

The three day event was outstanding opportunity for us to continue building relationships within the Oil and Gas Lifting and Handling community worldwide, by discussing existing and new applications, which has already resulted in new opportunities with new and current customers.

Valley Forge & Bolt are committed to attending next year at the 22nd 'North Sea Offshore Crane and Lifting Conference' in Stavanger in April 2017 where Bill and Barry look forward to seeing everyone in Norway. During April, the 21st International Offshore Crane and Lifting Conference 2016 was held in Aberdeen where 18 nations were represented by a total of 190 delegates, which in the current Oil and Gas market is a success the Conference Committee and Organizers deserve a lot of credit and thanks for.



Offshore Technology Conference 2016

For decades, Valley Forge has exhibited and attending the Offshore Technology Conference (OTC) in Houston, Texas, and this year was no different. OTC boasts as the largest oil and gas conference in the world and never disappoints.

Although the industry has seen some downturn recently, the show still proved to be a valid avenue to reach other industrial personal and to spread the load indicating technology. We were able to make contact with many leads that we hope to provide bolting solutions for in the future.

AISTech 2016

AISTech 2016, steel's premier annual technology event for 2016, took place 16–19 May at the David L. Lawrence Convention Center. The exposition was the largest yet with a total of 542 exhibiting companies. Key producers, suppliers, corporate executives, leaders, and academia gathered to exchange technical information, connect with others in their field, and see new process or product technologies. Look for a complete review of AISTech 2016 in the August issue of Iron & Steel Technology.

Valley Forge & Bolt, in association with Maintenance Reliability Solutions Inc., exhibited our patented load indicating fastening systems for the second year. The Maxbolt™, SPC4™, and Ball Lock™ designs were big hits with everyone from engineers, to maintenance, and safety groups. Since last years' formal introduction of load indicating technology to the industry, we were able to share details and data from numerous installation successes over the past year.

We look forward to presenting a technical presentation on Bolting at the AIST Maintenance & Reliability Conference in Scottsdale, AZ on November 6-9th.