

Measuring Bolt and Stud Threads When Held Vertically Improves Gage R&R

NEW ADDRESS!

Greenslade & Company

2234 Wenneca Street

Fort Worth, TX 76102

817-870-8888, 817-870-9199 Fax



A simple solution that yields significant improvements in gage accuracy and repeatability.

Since their development in the late 1940s, variable thread gages have been normally setup so that the screws, bolts and studs being measured are held in the horizontal position.

In working with bolt and stud manufacturers in recent years we have learned that it is difficult to achieve good gage accuracy and good Gage Repeatability & Reproducibility (GR&R) results when the fasteners exceed a diameter-to-length ratio of about 1:5.

The reason for these difficulties is that the weight of the bolts or studs held in the horizontal orientation tend to pry the gage's traveling arm upward when the inspector's hand is taken away from the part. This upward prying action is due to the effects of gravity. In our extensive study of what provides good Gage R&R in general, we learned that it is extremely important for the gage, rather than the operator to hold the part when measurements are being taken. When inspectors hold parts being measured, they tend to influence the gage's reading even when they take great care not to.

A Simple Solution

We discovered a very simple solution that completely remedies this prying force problem:

We learned that by adding an "L" bracket to the gage's base and mounting the gage body horizontally, the detrimental effect of gravity is removed from the measurement process because the parts are held vertically. By placing the bolts in a vertical orientation there is no prying force operating on the traveling arm of the gage. When measuring bolts and/or studs in this manner the Gage R&R results are approximately 20%.

In the accompanying pictures, the measurement difference can be plainly seen. The gage body was mounted so that the bolt was held vertically first and the gage's indicator was set to zero. The gage's setting was not changed, but its orientation was changed to the vertical plane. When the part was placed back in the gage and released by the inspector, the indicator's reading increased to 0.0015". This measurement difference is totally attributable to the effect of gravity on the unsupported end of the bolt.

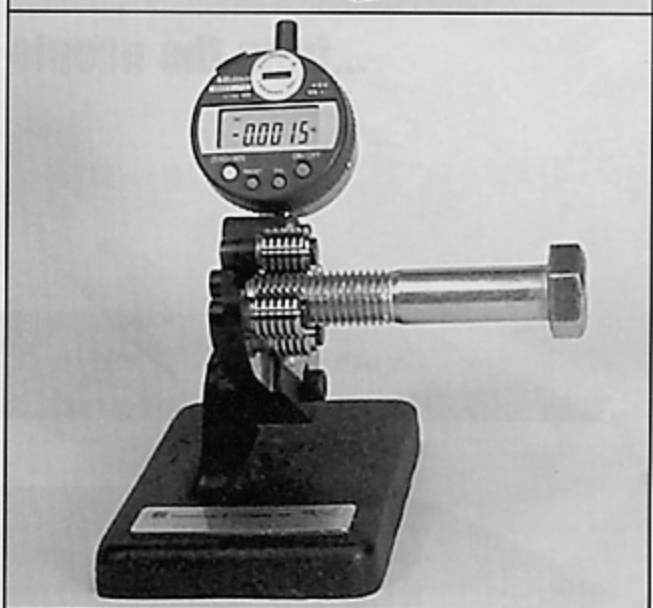
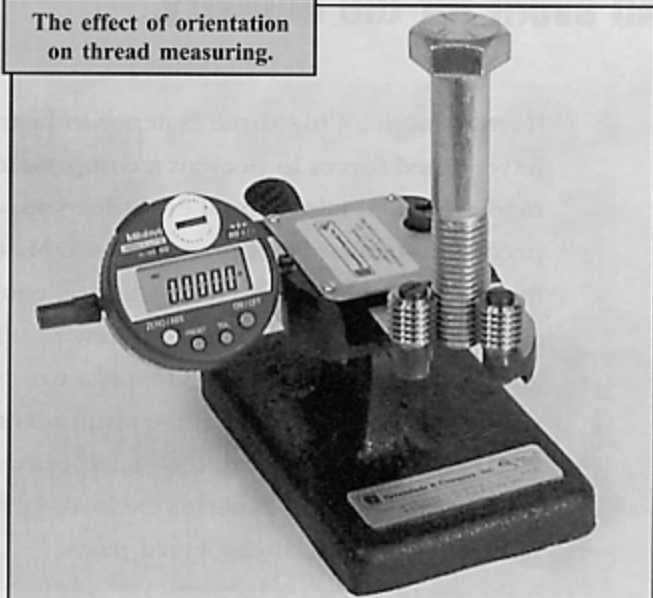
Conclusion

Bolt and stud manufacturers that have been measuring the threads of their products in variable gages holding parts in the horizontal plane should try changing the mounting of their gages so that the parts are held vertically.

They are likely to achieve a significant improvement in gage accuracy and repeatability. For more information contact the author or **Circle 211**.

FTI

The effect of orientation on thread measuring.



Greenslade & Company, Inc. is a supplier of gages, tooling and other equipment to the fastener manufacturing industry.

Joe Greenslade is a regular contributor of articles to this magazine. He has been active in the fastener industry since 1970 and has held positions with major fastener producers.