Fastening Tools Require Inspection

by Larry Borowski

檢測緊固工具的重要性

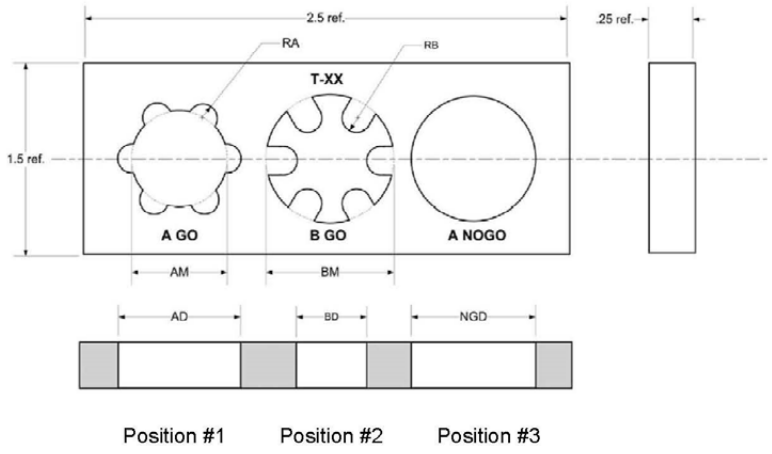
In order to achieve efficiency during the assembly process, the quality of the fastening tools being used is critical. Fastening tools can range anywhere from the driving motor to the driver bit that engages the recess or drive mechanism of a screw. Driving motors come in all shapes and sizes, from the high speed/torque air driven installation tools to battery operated drivers. The key is to choose the right driver for the application. Things to consider when choosing a driving mechanism are necessary torque, required installation speeds, availability of air or electric, and configuration of the device. All require maintenance and upkeep by making sure moving parts are properly lubricated, periodically verified for torque and speed, as well as making sure the environment is not detrimental to the life of the tool. A properly maintained tool will provide years of service and reliability.

This article will focus on the quality and inspection of the driver bits used to engage the recess of the fastener, rather than the driving motor itself. One can have a top of the line driving motor, but experience all kinds of assembly problems if the drive bits are worn or broken. Worn out driver bits can not only cause frustration for the operator, but can permanently damage an assembly should the drive strip out and the fastener cannot be removed. It can also lead to serviceability issues down the road if overlooked upon initial installation. A stripped out screw recess can lead to a costly repair, and is not worth chancing when the bit inspection process and related gages are inexpensive and easy to use.

Below are some examples of driver bits that are commonly used in assembly. They range from the common Cruciform (Phillips) to the more obscure Clutch bits. Depending on the industry and application some shapes and sizes are more favorable and perform better than others.

Whether the assembly requires a tamperproof or regular style driver bit, they should all be periodically inspected for basic form and fit. The majority of driver bit gages are of the Go/Nogo or fixed limit style. This means there is a “hole” or series of “holes” that the driver bit must either enter freely or not enter at all to be deemed acceptable. As a gage supplier, one of the more common styles of gage we see

6 Lobe Driver GO/NOGO Gage



Position #1.
This position determines the acceptability of the size of the outer lobes.

The driver should freely enter this position the full length of the 6 Lobe design up to the transition area.

Position #2.
This position determines the acceptability of the size of the inner lobe configuration.

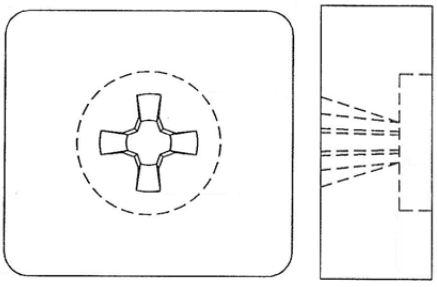
The driver should freely enter this position the full length of the 6 Lobe design up to the transition area.

Position #3.
This position detemines that the outer lobes are not under the minimum required size.

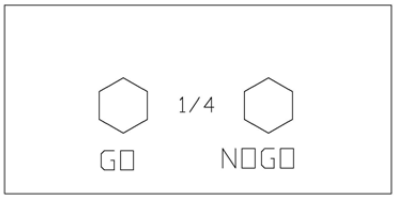
The driver configuration must NOT enter beyond the lead-in chamfer or radius on the nose of the driver.

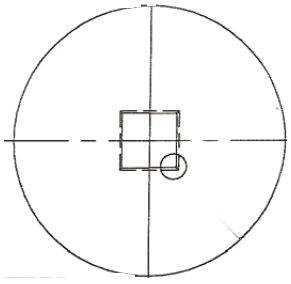
are the 6-Lobe Driver Bit Gages. These are also known as Hexalobular or more commonly "Torx". The Gage below represents the most commonly used gage to check the dimensional integrity of a 6-Lobed driver gage.

Another common bit used across multiple industries is the Cruciform or more commonly known as the Phillips bit. Below is a representation of a typical Phillips Driver Bit gage. The bit is simply inserted into the front of the gage and must not protrude past the counterbore on the back side of the gage. Should the tip protrude past the counterbore, it would indicate a worn tip and potentially strip the screw recess because it would have a loose or sloppy fit.



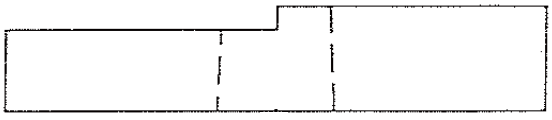
Hex keys or Hex driver bits are typically used in cap screws which require significant torque to properly secure. An ill formed or worn out Hex bit can round out the Hex recess rendering it ineffective or useless. A typical Hex driver bit gage is pictured below. The bit must freely enter the Go "hole", and must not enter the NoGo "hole".





Square driver bits also need to be inspected for the same reasons a Hex bit requires inspection. A bad square driver bit can round out the screw recess resulting in an ineffective drive.

This style of gage has a step on the back side. As the bit is inserted into the front of the gage, the tip of the bit has to fall between the stepped area. Too deep indicates and undersized condition, while too shallow indicates and oversized condition. Both can result in an ineffective assembly operation.



The above examples represent the different approaches to Driver Bit Gaging. The gages are tailored to suit the particular drive and to optimize the inspection process by focusing on the key features of the drive. Some are simple single step processes, while others have multiple "holes" to isolate important features by checking them independently of each other. It is very important to be diligent in periodic inspection of assembly tools. It will not only make the assembly job more efficient, it may also save on rework and scrap charges. The cost of gaging and the associated time to perform the inspection, far out weighs the potential problems that could arise from a stripped screw recess. Gaging of Driver bits is often overlooked as end users don't always know such gaging exists. The hope is that this article will serve to educate those that are performing assembly operations using driven fasteners, and help bolster the quality of the assemblies being produced.