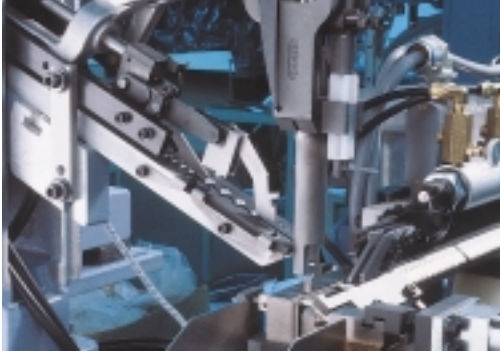


TEXTRON Fastening Systems

TORX® DRIVE SYSTEM



THE NEED FOR AN IMPROVED DRIVE SYSTEM

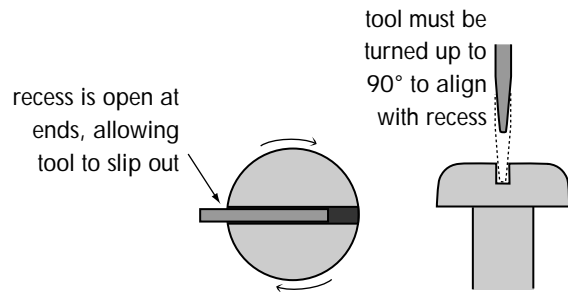


Joint reliability, worker safety, downtime, product quality – all are affected by the drive system you select for your assembly line.

There are many drive systems available today. But because of weaknesses inherent in their design, they may cause problems on the assembly line and in the field.

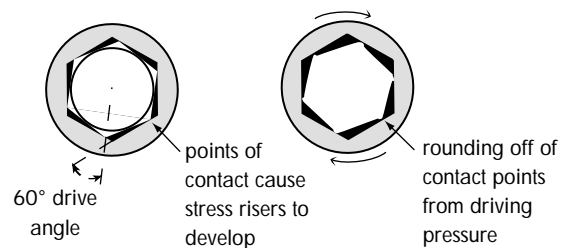
SLOTTED SYSTEMS

- Tool slippage is common, which can cause damage to surrounding surfaces
- Drive tools tend to chip or round off at corners
- Not compatible with automated assembly



HEX SYSTEMS

- Point-to-surface contact between hex drive tool and fastener head often leads to rapid tool wear and can distort the fastener head as torque increases
- 60° drive angle is inefficient for torque transfer
- Stress is concentrated at corners of hex socket, which can cause the socket to fail at these stress points
- Diameter of the hex drive socket is normally greater than the bearing surface of fastener, forcing engineers to design for socket clearance



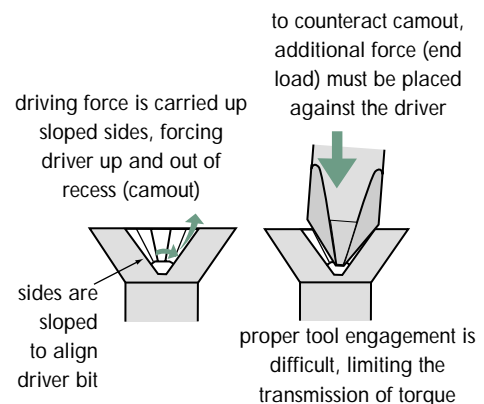
12-point Drive

- Since the 12-point drive is simply a double hex drive, the problems of point-to-surface contact, inefficient 60° drive angle and stress risers still exist



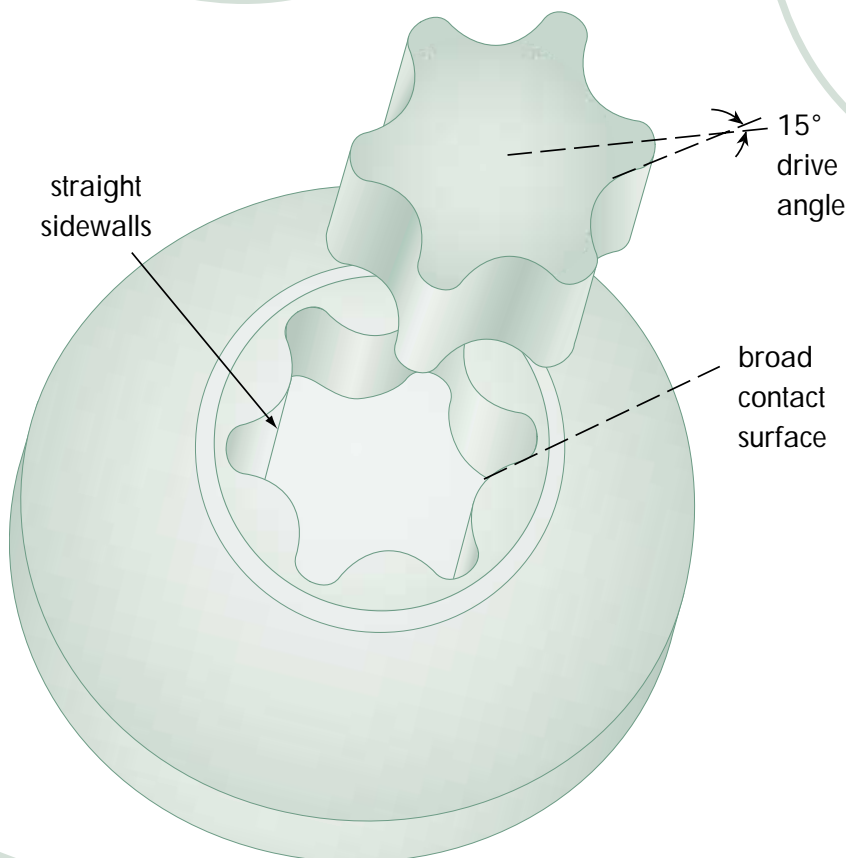
CRUCIFORM SYSTEMS

- Inclined side walls of the cruciform drive deflect torque upwards which causes the driver to “camout”
- Camout and its limits on torque transfer can prevent a fastener from being fully seated
- Excessive end loads, required to prevent camout, can reduce bit life and cause worker fatigue and injury



FEATURES & BENEFITS OF THE TORX® DRIVE SYSTEM

The TORX® Drive System was specifically designed to **provide a simple, cost-effective solution** to the problems inherent in the process of installing and removing fasteners. Used in a multitude of industries, the TORX Drive System can **enhance product reliability, increase productivity, and reduce total assembly costs** — all of which are keys to remaining competitive in today's marketplace.



TORX® DRIVE SYSTEM

15° Drive Angle

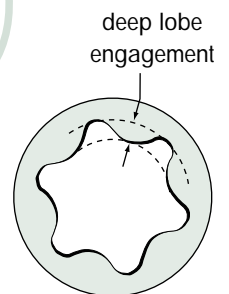
- Provides high torque transfer
- Radial forces are drastically reduced, resulting in a longer tool life

Straight, Vertical Sidewalls

- Increases tool engagement
- Unlike cruciform drive systems, no camout forces are created to push the driver up and out of the fastener
- Since camout is virtually eliminated, little or no end load is required
- Ergonomic studies have shown the TORX Drive System can reduce fatigue and muscular stress during the manual assembly of fasteners
- Recess completely encloses drive bit, minimizing tool slippage and the damage and injuries it can cause

Broad Contact Surface

- Provides greater depth of lobe engagement between the driver and the fastener
- Allows driving forces to spread over a broader surface, as opposed to the point contact of many drive systems
- Allows more efficient torque transfer
- Extends tool life



Inch and Metric in One Drive Tool

- Same-sized drive tool seats both inch- and metric-sized fasteners
- Add or convert to metrics later without a tooling change

VARIATIONS OF THE TORX® DRIVE SYSTEM

EXTERNAL TORX® DRIVE

- Provides an excellent alternative to hex or 12-point drives
- External TORX sockets are smaller in diameter than standard hex sockets used for the same-size fastener
- Provides greater flexibility when designing for drive socket clearance



TORXSTEM® DOUBLE-END STUDS

Since most double end studs lack a drive system, it is necessary to grip the threaded portion of the stud in order to drive it, which can result in thread damage. A special external TORX configuration extruded onto one end of the TORXSTEM® double end stud simplifies driving.

- TORXSTEM studs are installed using a TORX socket to increase productivity and reduce thread damage and rework



TAMPER-RESISTANT TORX DRIVE

This unique TORX variation incorporates a solid post formed in the center of the recess during the heading process.

- When combined with a countersunk or button head design, the fastener is extremely difficult to remove without a special tamper-resistant TORX Drive tool.
- Unlike some other tamper-resistant fasteners, installation on the production line is easy with the proper tool



DUAL DRIVE SYSTEMS

The TORX Drive System can be combined with either an external hex or a slot to provide a dual drive system.

- Provides the option of driving or removing the fastener with commonly available TORX tools or with a hex socket or slotted screwdriver
- Slotted TORX recess has a slot which is enclosed at the ends, so the driver is less likely to slip out and damage surrounding surfaces



AUDITORX® AND TAMPER-RESISTANT AUDITORX DRIVES







Automatic torque monitoring is made possible by the AUDITORX® Drive head which is designed to break off at a pre-determined torque level.

- The standard AUDITORX Drive leaves a standard hex drive for later field service
- The tamper-resistant AUDITORX fastener leaves a rivet-like head to prevent removal

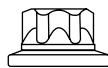


INTERNAL & EXTERNAL TORX® DRIVE SELECTION GUIDES

INTERNAL TORX® DRIVE SYSTEM STANDARD DRIVE SIZE SELECTION

											
	inch	metric	inch	metric	inch	metric	inch	metric	inch	metric	inch
T1		M0.9		M0.9 & M1.0		M0.9					
T2		M1.0		M1.2		M1.2					
T3		M1.2		M1.4		M1.2					
T4											
T5	#0	M1.4 & M1.6	#1	M1.6 & M1.8		M1.4 & M1.6	#1				
T6	#1	M1.8 & M2	#2	M2	#0	M1.8					
T7					#1		#3		#2		#1
T8	#2 & #3	M2.5	#3 & #4	M2.5	#2 & #3	M2.0 & M2.5	#4	M3	#3		#2
T9									#4		#3
T10	#4 & #5	M3	#5 & #6	M3	#4 & #5	M3	#5 & #6	M3.5	#5 & #6	M3.5	#4 & #5
T15	#6	M3.5	#8	M3.5	#6	M3.5	#8	M4	#8	M4	#6
T20	#8	M4	#10	M4					#10	M5	#8
T25	#10	M5	#12	M5	#8	M4	#10	M5	#12		#10
T27	#12		1/4"		#10	M4.5 & M5	1/4"	M6	1/4"		#12
T30	1/4"	M6	5/16"	M6	1/4"	M6				M6	1/4"
T40	5/16"	M8	3/8"	M8		M7	5/16"	M8	5/16"	M8	5/16"
T45	3/8"		7/16"		5/16"	M8	3/8"	M10	3/8" & 7/16"		3/8"
T50	7/16"	M10	1/2"	M10	3/8"	M10			1/2"	M10	7/16"
T55	1/2"		9/16" & 5/16"		7/16" & 1/2"	M12	1/2"	M12 & M14	9/16" & 5/8"	M12	1/2" & 9/16"
T60			3/4"		9/16"	M14	5/8"	M16	3/4"		5/8"
T70					5/8"	M16					3/4"
T80						M18					
T90					3/4"	M20					
T100					7/8" & 1"	M22 & M24					

EXTERNAL TORX® DRIVE SYSTEM STANDARD DRIVE SIZE SELECTION



	inch	metric		inch	metric
E4	#6	M3	E18	9/16"	M14
E5	#8	M4	E20	5/8"	M16
E6	#10	M5	E24	3/4"	M18 & M20
E8	1/4"	M6 & M7	E28	7/8"	M22
E10	5/16"	M8	E32	1"	M24 & M27
E12	3/8"	M10 & M11	E36	1-1/8"	M30
E14	7/16"	M12	E40	1-1/4"	M33
E16	1/2"		E44	1-3/8"	M36

For information on styles and sizes not shown here, please contact Textron Fastening Systems.



IF IT DOESN'T SAY TORX® DRIVE, WILL IT DO THE JOB?

Around the world, the TORX® Drive System is recognized as one of the most efficient fastening systems available, because of its ability to transfer greater torque, reduce end load and virtually eliminate tool slippage. However, this international acceptance has fostered look-alike TORX fasteners and drivers that frequently don't meet the quality and performance specifications of authentic TORX Drive products.

DON'T LET YOUR ASSEMBLY LINE SUFFER FROM LOOK-ALIKE TORX PRODUCTS

The look-alike TORX fasteners and drivers, commonly called "six-lobe" or "Type X", may be made of inferior material and cause substandard engagement, reaming and damaging of the recess and premature tool wear. This usually leads to serious assembly line problems and costly rework.

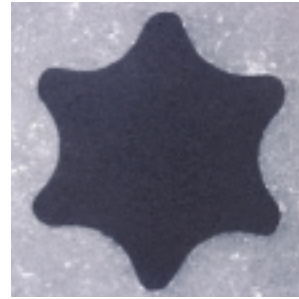
To avoid being fooled into a costly mistake, specify only authentic TORX Drive System products from licensed manufacturers.

For further assurance you are getting authentic TORX Drive products, the "TORX" name appears on product sizes T15 and larger to provide easy identification of authentic TORX fasteners and tools.

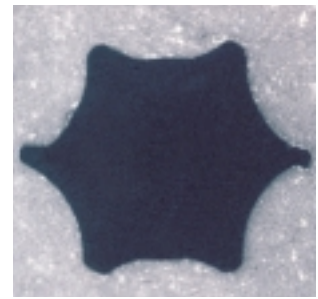
AUTHENTIC TORX DRIVE SYSTEM MANUFACTURERS

The TORX Drive System has a global network of licensed manufacturers who provide quality-assured, authentic TORX Drive products around the world. This licensing network ensures that each authentic TORX fastener and driver is made with proprietary tooling that has undergone precise dimensional inspection, and is engineered to function together properly.

The authentic TORX fasteners and drivers themselves are manufactured to very critical, proprietary tolerances, with gaging that is available only to licensed TORX Drive manufacturers.



**Authentic
TORX Drive Bit**



**Look-Alike
Drive Bit**



The TORX name appears on authentic products sized T15 and larger for easy identification.



Authentic TORX fasteners and drivers are manufactured to very critical tolerances.

CONVERSION TO TORX® DRIVE OFFERS SAVINGS



Converting to the TORX® Drive System has produced quantifiable benefits for many companies including increased productivity, reduced rework, improved working conditions, and lower tooling costs.

INCH AND METRIC IN ONE DRIVE TOOL

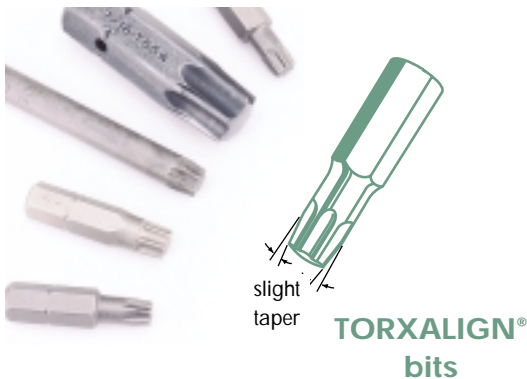
An important benefit of the TORX Drive System is that the same size TORX driver is used on both inch and metric fasteners. You can change to the TORX Drive now, and with no additional tool changes, convert to metrics later.

TORXALIGN® DRIVE TOOL

The special TORXALIGN bit is designed with a slight taper to provide a wedging effect when the bit is inserted into the fastener recess. This is particularly useful in holding non-magnetic fasteners on the driver during manual installation.

TOOL AVAILABILITY

The worldwide acceptance of the TORX Drive System has made the procurement of drive tools easy. TORX tools are readily available from thousands of retail and industrial outlets around the world. A large number of licensed distributors carry TORX sockets and standard bits in lengths from 1" to 6". TORX bits are also available for pneumatic and automatic assembly equipment, while TORX key sets can provide a convenient solution to field serviceability. TORX screwdrivers are readily available to the consumer through most hardware store chains, as well as through catalog merchants and online stores.



TORX tools are available from thousands of retail and industrial outlets around the world.

For more information on the TORX® Drive System, please contact:

TEXTRON Fastening Systems

600 Eighteenth Avenue
Rockford, Illinois 61104-5181
voice: 815.961.5000
fax: 815.961.5345

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