

Robotic Savings



A TriMas Company



Easy Automation

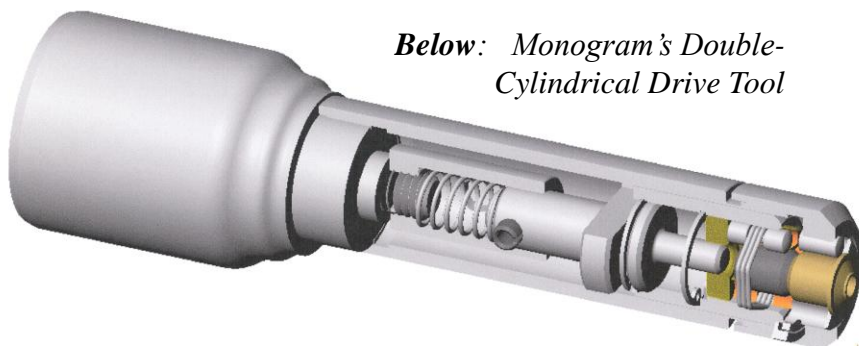
Monogram's family of robotic fasteners greatly simplifies fastener installation with the use of a **double cylindrical** drive system. Unlike other fasteners, which require individual tooling nose pieces for every head style and fastener diameter, the double cylindrical drive system provides a single drive mechanism common to all head styles, grips and diameters for four different Monogram products. This gives users a **simple, low cost solution** to robotic assembly.

HOW IT WORKS:

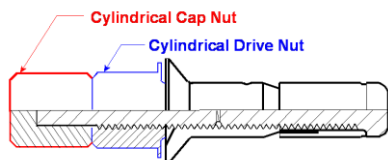
Because the cap nut and drive nut are cylindrical, there are no tool orientation problems. The tool's roller bearing drive accepts the fastener without regard to radial orientation. The cylindrical drive nut is threaded over the screw and acts as a jam nut against the head of the fastener. This nut is put under torsion within the tool head, preventing rotation of the fastener. The cylindrical cap nut, which is press-fit onto the flattened part of the screw, acts as a wrench. Torque is transferred to the cap nut, which turns the core bolt to form a sleeve on the blind side of the structure.

Monogram's Double-Cylindrical Drive System

Shown below is the double cylindrical drive system created by Monogram Aerospace Fasteners. This system installs blind fasteners of any size, variety, or length with the same tool.



Below: Monogram's Double-Cylindrical Drive Tool



Left: A conceptual drawing of Monogram's Robotic Composi-Lok®

FAMILY OF ROBOT-READY FASTENERS



VISU-LOK®



COMPOSI-LOK®



RADIAL-LOK®



OSI-BOLT®



Automation

The simplicity of Monogram's Double Cylindrical Drive system allows for labor **savings** and **superior fastening**.

The DCD hand tool, available from Monogram, enables manufacturers to implement robotic production in **stages**. The hand tool supplements automated tasks using the same fastener inventory. Production personnel can install fasteners with the hand tool, while robots install the **same fasteners** elsewhere with the **identical nose piece**.

Technical issues can be resolved for robots, gantries, and controls without putting the production line in jeopardy. *Use the DCD hand tool while your robot is being developed.*



The DCD-MP550 hand tool.

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Robotics

Monogram's drive tool and fastening system can also be incorporated into production line automation with **fixed** manufacturing gantries or **mobile** robotic end-arms.

This robotic tooling is designed specifically for installation of:

- **Temporary** one-sided work-holding devices (*Wedgeloek*®)
- Or **Permanent** blind fasteners.

One tool...



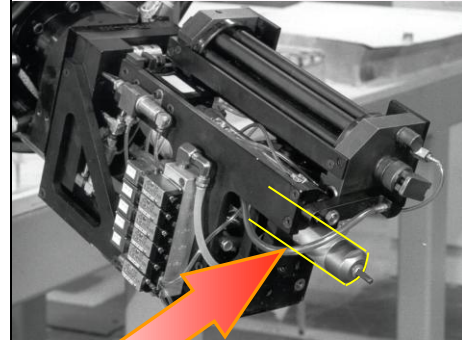
...Many applications

Benefits of this simple blind fastening system:

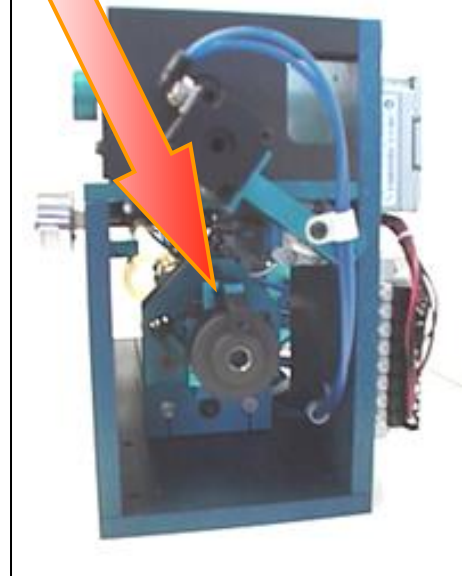
- The ability to drill, inspect, and fasten with the identical programmed motion.
- Quick fastener feed to the tool.
- Uniform drive nut OD for pneumatic bowl-to-tube feeding of several different fasteners.
- Lighter weight of a small drive unit. This reduces frequent calibrations of the end-arm.
- A spring-mounted compliance device on the tool slide which compensates for misalignment.

End-effectors

A variety of end-effectors can be created using the versatile Monogram drive tool.


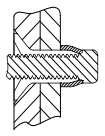

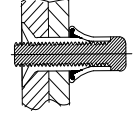

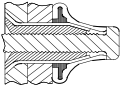

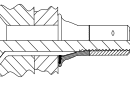


*Monogram's robotic drive tool can be incorporated into mobile or fixed end-effectors. This light weight fastening tool can be **magazine** fed (see picture above), or it can be connected to a vibrating bowl feeder with a forced air **tube** or gravity slide.*



FAMILY OF ROBOT READY FASTENERS

(BASIC CHARACTERISTICS OF 3/16" NOMINAL FASTENER DIAMETER)

Fastener (Titanium Nut Component)	Grip Range (inches)	Nominal Shank Diameter (inches)	Double Shear	Tensile Strength (pounds)	Preload (pounds)	Footprint (inches)	Oversize Availability	Interference Fit	Application	Backside Maximum Slope
  Visu-Lok®	.062	.1990 .1970	4,600 minimum required ~ 5,300 typical	1,400 minimum required ~ 1,600 typical	280 minimum required ~ 1,200 typical	.300 maximum allowed ~ .250 typical	1st (1/64) and 2nd (1/32)	Yes. Close tolerance ground shank. ~ Interference to .0035"	Metal	Seven degrees
  Composi-Lok®	.050	.1985 .1970	4,600 minimum required ~ 5,200 typical	1,400 minimum required ~ 1,950 typical	560 minimum required ~ 1,000 typical	.300 minimum required ~ .315 typical	-07 (7/32") -09 (9/32") -11 (11/32")	No	Metal or Composite	Seven degrees
  Radial-Lok®	.100	.1970	4,800 minimum required ~ 5,300 typical	1,700 minimum required ~ 2,300 typical	700 minimum required ~ 1,000 typical	.290 minimum required ~ .310 typical	-07 (7/32") -09 (9/32") -11 (11/32")	Via radial expansion during installation	Metal or Composite	Seven degrees
  OSI-Bolt®	.062	.1895 .1885	5,360 minimum required ~ 6,000 typical	1,600 minimum required ~ 2,400 typical	800 minimum required ~ 1,200 typical	.290 minimum required ~ .305 typical	X (1-64") and Y (1/32")	Yes ~ Up to .003" in steel and .006" in aluminum	Metal or Composite	Seven degrees