



# Swagers

An efficient, low cost way to point, reduce & form rod, wire or tube.

## Types of Swagers include:

**Stationary Swagers:** Complete parts can be made from entry rounds, squares, or rectangles – hot or cold.

Types include simultaneous blow used to create fluted shapes & cross-circular sections and alternate blow used to create rectangular shapes, squares, & hexagons.

- This method is capable of any cross-section other than perfect circle.
- In stationary die swaging the spindle assembly remains stationary and the roller cage rotates.
- *Examples include: Aerospace tube components and fluid control tubes.*

**Rotary Swagers:** Pointing, sizing and forming wire, rod and tube. With a rotary machine the swaged section is always circular.

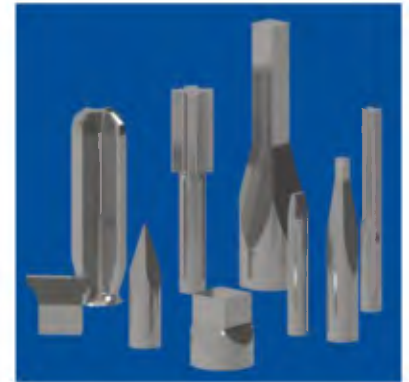
- In rotary swaging, forming dies backed by hammer blocks revolve around the work. As the spindle revolves, centrifugal force throws the hammers and dies outwards against a series of rollers surrounding the spindle. Each time the hammer blocks strike diametrically opposed rollers, they are driven inward, causing the die halves to close and compress the metal being swaged. (See diagram inside)
- Types include 2 die and 4 die. (see diagram on back page)
- *Examples include: Cartridge heaters, hyperemic tubing, piping, armaments, and logging industry applications.*

**Hydroformers:** For assembling parts, such as fittings to cable, and for making reductions between shoulders such as on convoluted tubing.

- Hydroforming is a modification of the rotary swaging principle where wedges are used to open the dies while the spindle is rotating so the work can be inserted before and removed after swaging.
- *Examples include: Sailing rigging equipment, architectural cable railings and recreational ropes course cables.*

**Long Die Swagers:** Using the same principle as rotary method to produce long, shallow tapers for items such as furniture legs, sporting goods and aerospace products.

- Serve a wide variety of materials: both welded & seamless tubing of either ferrous or nonferrous metals, from stainless steel to aluminum.
- For tapering tubing up to 24" long.
- Only needed when taper length exceeds standard die length on rotary swager.



## Additional Swager Offerings

### Spare Parts:

Every swager, die, hammer or wear part is crafted in-house at FENN with your machine and application in mind. Our application specialists and spare parts department are available to assist you with a full range of stocked parts ready for shipment.

**Coolant/Slushing Systems:** Available as an option on all sized swagers.

- The use of a self-contained FENN Slushing/Coolant System will help lubricate critical wear parts and keep the cage assembly free of foreign materials.

**Sound Enclosures:** Reduce the sound of your swaging operation to below OSHA's permissible exposure limit for hearing protection

- **Quality Construction** – Welded 14-gauge steel, paired with 2 3/8" of soundproofing foam
- **"Clamshell" Style Enclosure** – two sections join to make one unit for a non-disruptive installation
- **Customized** – designed to meet each customer's specific swaging requirements
- **Access Ports for features such as** – exhaust fans, wiring in & out, through swaging & feeder tables
- Sound environments for **multiple swagers**, tandem swaging, and through swaging operations
- **FENN recommends** for most swagers, as health and safety benefit

### Turn-Key Automated Solutions

FENN designs and fully integrates solutions to maximize efficiencies and ultimately reduce operating costs. In addition to designing brand new systems, FENN can also retrofit an integrated system around an existing piece of FENN equipment.

#### Turn-Key System Benefits:

- Single source supplier eliminating the need for multiple vendors to produce one system
- Improve equipment safety & save time with collaborative robotics

#### Integrated Solutions can Include:

- Swaging Machine
- Hydraulic Feeder
- Integrated Robotics
- Sound Enclosures

#### Dozens of Secondary Operations:

- Laser engravers
- Cutters
- Buffering Systems & Welding systems



Sound Enclosure shown with port for feed mounting



Example of a FENN Turn-Key Automated Swaging Solution: FENN Swager, Sound Enclosure, Feeding System, & Integrated Automation.

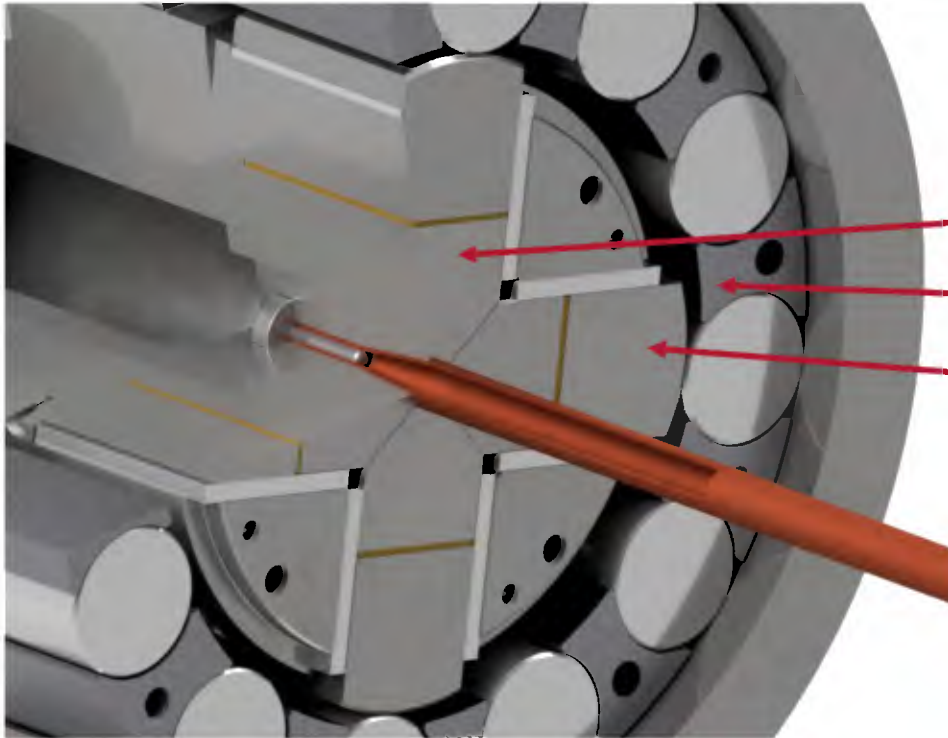
## Industries Served by Swagers

- **Materials Research** – Development related to improving grain structure and finish
- **Aerospace** – Wire rope flight control cable assemblies, control rods, fluid transfer tubing
- **Medical** – Catheter band assemblies, hypodermic needles, optical instruments
- **Automotive** – Drive shaft, half shaft/ axels, emergency brake cables assemblies, steering components
- **Renewable Energy** – Superconducting material, zirconium rod and cartridge heaters
- **Military** – Anti-tank rocket tips, gun barrels, MS-spec fittings swaged into cable





## Rotary Swaging Diagram



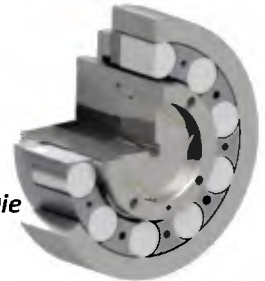
Dies open and close

In rotary swaging,  
spindle rotates

Hammers



4-Die



2-Die

## Swager Feeder Options

Optimize your Swaging operation and increase operator safety with feeders, automation, and sound enclosures – all from FENN!



Pictured with NF Swager

### Custom Application Feeder

FENN can design a customized feeder to meet your unique and demanding production needs. Systems are available for unique shapes, varying sizes or high capacity products. Available for all FENN Swagers; sizes NF–8F.

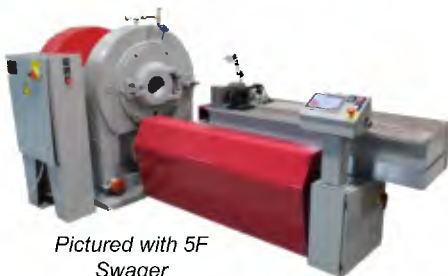


Driven rolls  
feed material into a  
5F Swager



### Door Mounted Feeder (DM500 – DM1250)

Mounted to the door of the Swager and feeds material using hydraulically powered pinch rolls. This feeder is engineered to work well with wire & rod customers to point material for drawbench use. Also ideal for continuous thru-swaging of spool material such as high tensile wire rope. Available for FENN Swagers 3F–8F, others upon request.



Pictured with 5F Swager

### Hydraulic Table Feeder (25H, 45H & 60H)

This table feeder uses a rigid base with a hydraulically powered, accurate, sliding top for precision applications. Ideal for high accuracy products and high reduction applications, such as aerospace. The system is controlled using an HMI touch screen with Allen Bradley or Siemens components. Available for FENN Swagers 3F–8F, others upon request.

# Swager Sizing

## Capacities & Dimensions: Rotary Swaging Machines

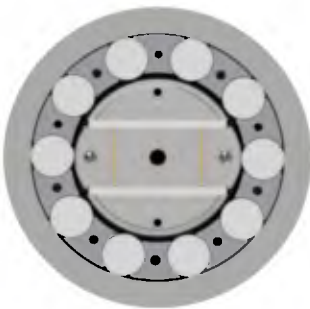
Swager capacities (\*) listed are maximums for normal reductions 60,000 PSI tensile material. Capacity must be reviewed for each specific application. Measurements are in inches.

Machine Size	NF †	1F	2F	3F	4F	5F	6F	7F	8F
*Capacity-Solid	1/16	5/32	13/32	5/8	15/16	1-1/2	2-1/4	2-3/4	3-3/8
*Capacity-Tubing	1/4	7/16	1	1-3/4	2-1/4	3-3/8	4-1/2	5-1/2	6
2 DIE									
Die Width	.437	3/4	1-5/8	2-1/4	3-1/8	4-1/2	6	7-1/8	8-1/2
Die Height	.437	5/8	1-1/8	1-19/32	2-1/4	3-1/4	4	5	6
Die Length	.750	1	1-7/8	2-1/2	3-1/2	5	6-1/2	7-3/4	9-1/2
Weight/Set (lbs.)	.08	.27	2.0	5.0	14.0	41.5	90.0	157.0	275
4 DIE									
Die Width	-	-	1-1/8	1-1/2	2-1/8	3-1/8	4	4-3/4	6-1/2
Single Die Height	-	-	1-1/8	1-19/32	2-1/4	3-1/4	4	5	6
Die Length	-	-	1-7/8	2-1/2	3-1/2	5	6-1/2	7-3/4	9-1/2
Weight/Set (lbs.)	-	-	2	5-1/4	14-1/2	43	88	160	305
Motor H.P.	1/2**	1 1/2	3	5	10	15	25	30	40
Motor Speed	850	1800	1800	1800	900	900	900	600	600
Hgt. To Spindle C.L.	-	35	35	35	35	35	35	35	35
Floor Space R to L x F to B	19 x 10.5	34 x 21	36 x 34	34.5 x 39.5	40.5 x 45.5	46.5 x 52	54 x 57	70 x 59	73 x 67
Weight - lbs.	100	625	1,600	2,100	4,500	8,000	11,500	20,000	25,350

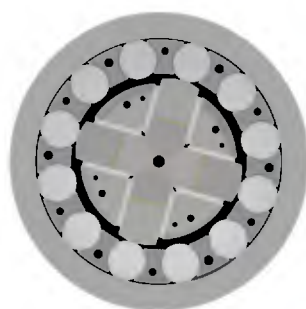
\*\*Single phase motor - 110/220V † Model NF is bench mounted

Machine Size	LONG DIE			HYDROFORMERS		STATIONARY DIE			
	3 1/2F	4 1/2F	5 1/2F	2H	3H	4FS & 4FSA	5FS & 5FSA	6FS & 6FSA	8FS & 8FSA
Capacity-Solid				15/16	2-1/4	15/16	1-1/2	2-1/4	3-3/8
Capacity-Tubing	1-3/4	2-1/4	3-3/8	2	4-1/2	2-1/4	3-3/8	4-1/2	5
Die Length	10	15	24	3-1/2	6-1/2	3-1/2	5	6-1/2	9-1/8
Motor H.P.	7-1/2	10	15	7-1/2	20	7-1/2	15	25	40
Weight (lbs.)	3,500	5,500	10,000	5,400	19,000	3,500	6,500	10,500	23,000

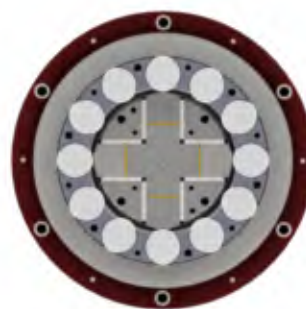
2-Die Rotary



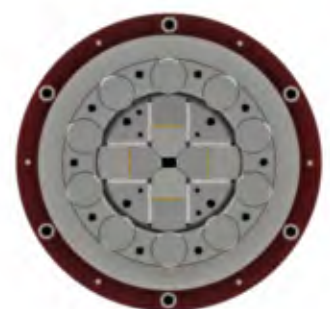
4-Die Rotary



Stationary, Simultaneous Blow



Stationary, Alternate Blow



### 2-Die vs. 4-Die: Application Specific

- 2-die is very common on small parts and creates a better surface finish.
- 4-die is commonly used for pointing and is capable of larger initial reductions on larger parts.

### Simultaneous vs. Alternate: Types of Stationary Swagers

- Simultaneous blow is used to create fluted shapes & cross-circular sections.
- Alternate blow is used to create rectangular shapes, squares, & hexagons.