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Swagers

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

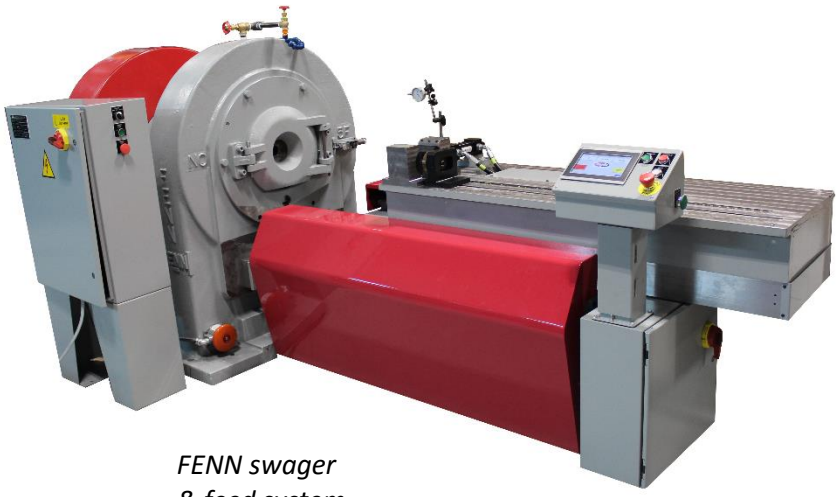
For over 100 years, FENN has been the leader in providing high quality swaging equipment for a variety of industries across the globe. Swaging is metal forming without cutting chips for reducing wire, tube or rod. It is a special type of forging in which metal is formed by rapid succession of hammer blows. It is a highly economical method to point tubing, rod, and wire for redraw- and to size, shape reduce, taper and bond or form metal parts, hot or cold. Swaging benefits include:

- ***Improves physical characteristics*** because metal is forged with improved grain structure, and increased elastic limit and tensile strength.
- ***Imparts a high finish***, which in most cases eliminates finishing operations.
- ***Permits control*** of wall thickness through the use of a mandrel.
- ***Speeds assembly*** where tubes are to be crimped together, fittings attached to tubing, rod, hose, flexible tubing, or wire cable.
- ***Permits lower stock inventory:*** Swaging to the required size and finish permits stocking fewer sizes.
- ***Saves on material*** because metal is displaced longitudinally as it is hammered…not wasted into chips by removal.
- ***Tooling is relatively low in cost:*** Dies are quickly changed and tooling is extremely flexible.
- ***Saves on labor*** because highly skilled operators are not essential. Several machines incorporating mechanical feeds can be tended by a single operator.

Forming

Pointing

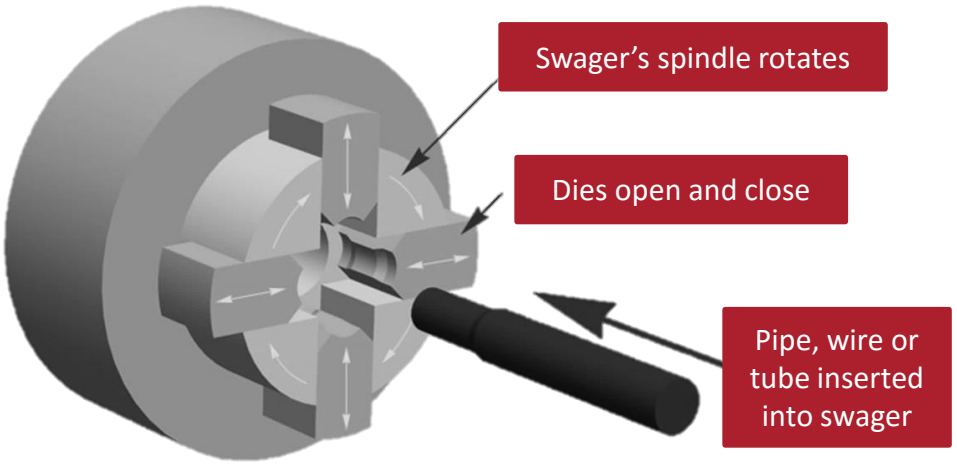
Assembling



FENN swager & feed system

Rotary Swagers:

In a Rotary Swager, the dies and hammers revolve around the work, producing perfect symmetrical pieces with an exceptional finish. FENN offers nine basic sizes of Rotary Swaging machines ranging in capacity from needle size to 6” O.D. tubing. Rotary Swagers are available in two types: 2-die or 4-die, which can swage harder materials and generally achieve greater reductions per pass. See back page for capacities of all models.



Model	NF	2F	3F	4F	5F	6F	7F	8F
Capacity-Solid	1/16”	13/32”	5/8”	15/16”	1-1/2”	2-1/4”	2-3/4”	3-3/8”
Capacity-Tubing	1/4”	1”	1-3/4”	2-1/4”	3-3/8”	4-1/2”	5-1/2”	6”

*PLEASE NOTE: Swager capacities listed above are for normal reductions on low-tensile material. Capacity must be reviewed for each specific application.

Stationary Die Swagers:

For non-circular cross sections: because the dies and hammers do not revolve in a Stationary Die Swager, it is possible to forge asymmetrical shapes never before produced by swaging. Two basic types are available: simultaneous blow (fluted shapes, circular cross sections) and the patented alternate blow (rectangular shapes, squares and hexagons).

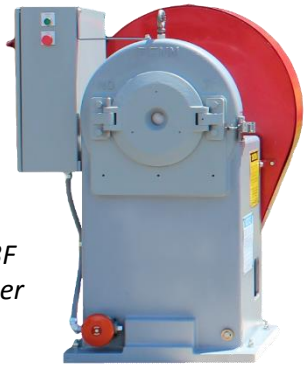
Machine	2FS & 2FSA	4FS & 4FSA	5FS & 5FSA	6FS & 6FSA	8FS & 8FSA
Capacity-Solid	13/32”	15/16”	1-1/2”	2-1/4”	3-3/8”
Capacity-Tubing	1”	2-1/4”	3-3/8”	4-1/2”	6”

Long Die Swagers:

For tapering tubing up to 24” long. FENN Long Die Swaging Machines produce long, shallow tapers for items such as furniture legs, sporting goods, aerospace products economically and rapidly. These machines serve a wide variety of materials: both welded and seamless tubing of either ferrous or nonferrous metals, from stainless steel to aluminum. Coolant/Slushing Systems are available as an option on all size swagers.

Swaging Dies for Most Makes of Machines:

Dies are the very heart of swaging machines. Production of precision parts requires high quality dies. It’s no coincidence that FENN, the leading supplier of swaging machines, is also the leading supplier of swaging dies. Whether your swager is small or large in size, your swager dies, hammers and other wear parts are made specifically with your machine and application in mind. All of our FENN made spare parts are crafted with expertise, accuracy and pride in the USA.

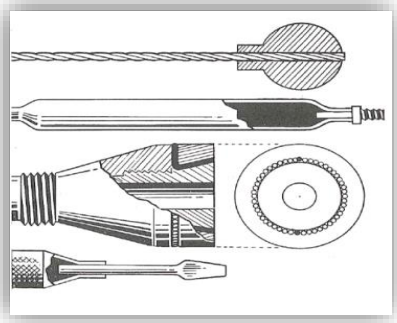


Size 3F Swager

Basic Types of Swaging

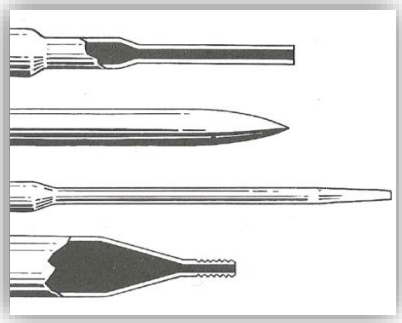
Assembling:

A few typical assembling applications shown in the illustration are a cable and ball fitting, calrod unit, sleeve on armored cable, and screw driver shank and handle.



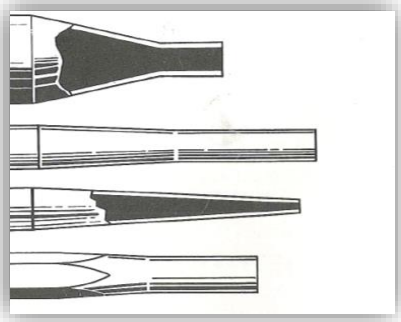
Forming:

The illustration shows several parts that were formed requiring I.D. and O.D. tolerances to be held, and finish specifications met. Parts shown are a transducer, meat hook, textile spindle, and a housewares item.

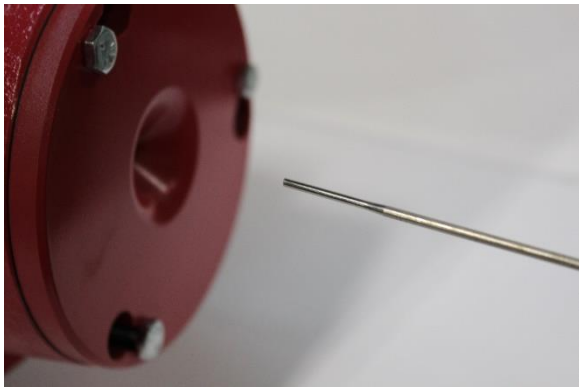


Pointing:

Round tube and rod can be easily reduced and pointed for final product requirements or for secondary drawing applications.



Size NF Swager



Example of NF Swaged part

Industries Served

Swagers regularly serve many industries in a wide variety of applications. Examples include:

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

Capacities & Dimensions: Rotary Swaging Machines

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
2 DIE									
Hammer Width	.437	3/4	1-5/8	2-1/4	3-1/8	4-1/2	6	7-1/8	8-1/2
Hammer Height	.625	15/16	1-1/8	1-17/32	2	3	4-1/8	4-3/4	5-1/2
Hammer Length	.750	1	1-7/8	2-1/2	3-1/2	5	6-1/2	7-3/4	9-1/2
Hammer Weight/Set		.4	1.8	4.5	12	37	85	140	230
4 DIE									
Hammer Width	–	–	1-1/8	1-1/2	2-1/8	3-1/8	4	4-3/4	6-1/2
Hammer Height	–	–	1-1/8	1.601	2	3	4-1/8	4-3/4	5-1/2
Hammer Length	–	–	1-7/8	2-1/2	3-1/2	5	6-1/2	7-3/4	9-1/2
Hammer Weight/Set	–	–	2.6	6.5	16	50	110	180	365
Bore thru Spindle	3/8	1/2	15/16	1-7/8	2-3/4	3-7/8	4-1/4	5	6-1/2
Cage Roll-Number	12	10	12	10	12	12	12	12	12
Spindle Speed (RPM)	850	430	380	312	215	194	185	129	112
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
Number of Belts	–	2	2	3	4	5	6	6	8
Belt Number	–	A-78	B-100	B-112	B-124	B-124	B-128	C-158	C-180
Hgt. To Spindle C.L.	–	35	35	35	35	35	35	35	35
Floor Space R to L x F to B	–	25x20 1/2	28 x 31.5	34.5 x 40	38.5 x 46	44.5 x 53.5	51.5 x 60.5	62x60	73x64
Shpg. Wgt.-lbs. Complete w/ motor	95	625	1,600	2,100	3,450	8,200	12,000	17,500	24,000

**PLEASE NOTE: Swager capacities listed above are for normal reductions 60,000 PSI tensile material. Capacity must be reviewed for each specific application in light of material, reduction, angle of taper etc.
**Single phase motor – 110/220V
† Model NF is bench mounted

	LONG DIE			HYDROFORMERS		STATIONARY DIE			
Machine Size	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

*MS/AN Type fittings through – 12 Series