



ED FAGAN INC.

General Guide to Machining Soft Magnetic Alloys

769 Susquehanna Avenue, Franklin Lakes, NJ 07417 • **phone 201.891.4003**
10537 Humbolt Street, Los Alamitos, CA 90720 • **phone 562.431.2568**

GENERAL

Soft Magnetic alloys can be machined by all of the common metal machining processes. No special equipment or procedures are required to produce parts with accurate dimensions with excellent finishes.

Soft Magnetic alloys that are primarily Nickel-Iron alloys (e.g. EFI Alloy 79, aka Magnifer 7904, HyMu 80, Hipernom, Moly-Permalloy and Permalloy 80, EFI Alloy 50, aka Magnifer 50, High Permeability 49 and Alloy 47-50 and Radiometal 4550) can be machined in accordance with the information found in our Machining Nickel-Iron Alloys available from our website.

This machining guide covers the machining of Hiperco 50, Hiperco 50A, and VIM VAR Core Iron.

HIPERCO 50/50A

TOOLS

The choice between high-speed steel and carbide tools depends largely on production quantities. When using carbide tools, surface speed feet/minute (SFPM) can be increased between 2 and 3 times over the high-speed suggestions, Feeds can be increased between 50 and 100%.

The following charts include typical machining parameters used to machine Hiperco 50A. The data should be used as a guide for initial machine setup only.

TURNING – SINGLE POINT & BOX TOOLS

	SFPM	IPR
High Speed Tools	30 - 40	.003 - .010
Carbide Tools	120 - 130	.005 - .010

DRILLING

Drill Diameter	SFPM	IPR
3/8"	30	.005
3/4"	30	.010

TURNING – CUT-OFF & FORM TOOLS

Cut-Off Tool Width	SFPM	IPR
1/16"	25	.001
1/8"	25	.002
1/4"	25	.003
Form Tool Width	SFPM	IPR
1/2"	25	.004
1"	25	.0025
1-1/2"	25	.002

REAMING

	SFPM	IPR
Under 1/2"	65	.005
Over 1/2"	65	.010

HIPERCO 50/50A *continued*

DIE THREADING

Threads per Inch	SFPM
3 – 7-1/2	8
8 – 15	10
Over 16	15

MILLING

SFPM	IPR
20 - 30	.001 - .005

TAPPING

Threads per Inch	SFPM
3 – 7-1/2	6
8 – 15	7
16 – 24	11
Over 25	15

BROACHING

	SFPM	IPR
Chip Load	8 - 15	.002
Over 25	15	

VIM VAR CORE IRON

The following charts include typical machining used to machine Electrical Iron. The data listed should be used as a guide for initial machine setup only.

TURNING

SINGLE POINT & BOX TOOLS

Depth of Cut, in.	High-Speed Tools			Carbide			
	Speed, ipm	Feed, ipr	Tool Material	Speed, ipm		Feed, ipr	Tool Material
				Brazed	Throw Away		
.150	80	.015	M-2	350	400	.020	C-6
.025	110	.007	M-3	400	490	.007	C-7

CUT-OFF & FORM TOOLS

Speed, fpm	Feed, ipr							Tool Material
	Cut-Off Tools Width, Inches			Form Tool Width, Inches				
	1/16	1/8	1/4	1/2	1	1-1/2	2	
70	.001	.0015	.002	.0015	.001	.001	.0007	M-2
250	.003	.0045	.006	.003	.0025	.0025	.0015	C-6

DRILLING

Speed, fpm	Feed, ipr								Tool Material
	Nominal Hole Diameter, Inches								
	1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
70	.001	.002	.004	.007	.010	.012	.015	.018	M-42

VIM VAR CORE IRON *continued*

TAPPING

Speed, fpm	Tool Material
15 - 20	M-1; M-7; M-10

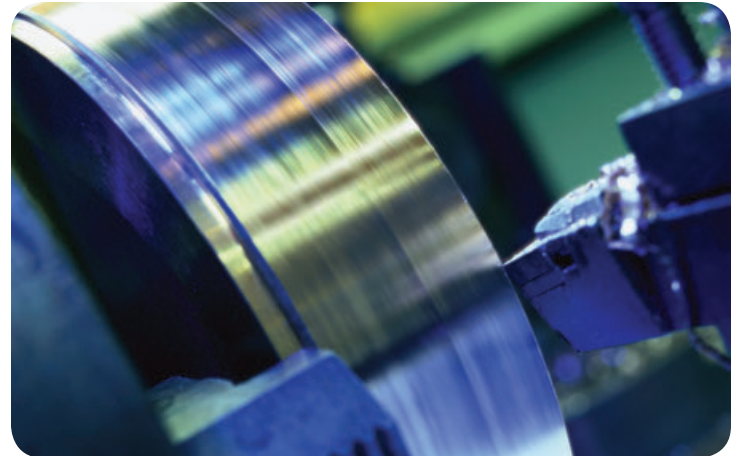
DIE THREADING

Speed, fpm				Tool Material
7 or less	8 to 15	16 to 24	25 and up, T.P.I.	M-1; M-2; M-7; M-10
8 - 20	10 - 25	15 - 30	20 - 35	

MILLING – END PERIPHERAL

Depth of Cut, In.	High Speed Tools						Carbide Tools					
	Speed, fpm	Feed - Inches per tooth Cutter Diameter, Inches				Tool Material	Speed, fpm	Feed - Inches per tooth Cutter Diameter, Inches				Tool Material
		1/4	1/2	3/4	1 - 2			1/4	1/2	3/4	1 - 2	
.050	60	.002	.003	.005	.006	M-42	300	.0025	.004	.006	.008	C-6

Figures used for all metal removal operations covered are average. On certain work, the nature of the part may require adjustment of speeds and feeds. Each job has to be developed for best production results with optimum tool life. Speeds or feeds should be increased or decreased in small steps.



HEAT TREATING FOR OPTIMAL MAGNETIC PROPERTIES

Items as supplied from the mill exhibit only a fraction of the soft magnetic properties which they are capable of attaining. To optimize their full magnetic properties, further heat treatment is a necessity.

Optimal heat treating procedures vary depending on the type of soft magnetic alloy – recommended heating temperatures, hold times, cooling rates, cycles, and types of atmospheres are all specific to each alloy. For the recommended heat treatment procedures for your material, please contact your Ed Fagan Inc. sales representative.



**THE MATERIALS YOU NEED,
WHEN YOU NEED THEM**



toll free 800.348.6268
www.edfagan.com
sales@edfagan.com
 international sales
 +44 (0) 1548 858 770

efi
 ED FAGAN INC.

6/2016