Section 7 VLER Magnets

The magnets in VLER will come mostly from new construction but with existing lamination types. All the steel dipole and quadrupole magnets listed in Table 5-2 can be made from laminations developed for the PEP-II LER, which are shown in Figure 7-1. The dies for stamping the laminations are shown in Figure 7-2. Sufficient laminations are on site to build full magnets for field tests. In Table 7-1 magnetic calculations are shown which describe the coils needed for these magnets. Aluminum or copper coils can be made depending on which is less expensive.

The dipole corrector (steering) magnets need for the VLER exist and are shown in Figure 7-3. The “C” shaped poles allow a vacuum pumpout port to be located in their throats.

The two permanent magnet quadrupoles near the interaction point are much smaller versions of successful magnets built for PEP-II. All the computer codes and stacking and measurement fixtures exist to make these magnets.

The sextupole magnets can made from recycled laminations from the old sextupoles from the original PEP which are now presently in storage. New coils must be constructed.

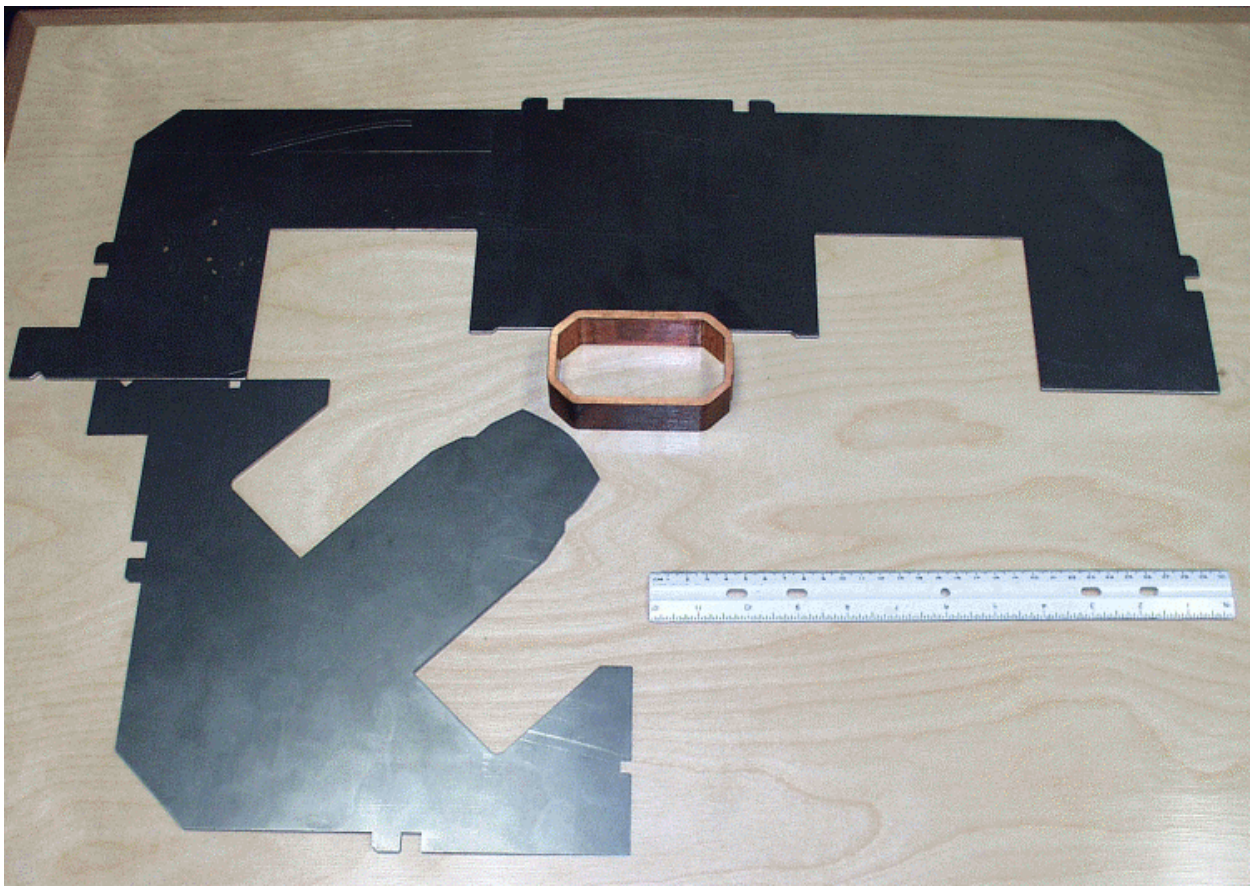

Fig. 7-1: VLER dipole and quadrupole laminations from early PEP-II LER studies.

Fig. 7-2: Existing dies for VLER dipole and quadrupole laminations.

Table 7-1: Field and conductor calculations for the VLER dipole and quadrupole laminations.

TYPE		dipole	quadrupole	sextupole	octupole
B at pole	(Tesla)	1.3711	0.435		
Radius at pole	(m)	.036	0.05	0.05	0.05
Gradient	(T/m)		8.7		
NI/pole	(Amp-turns)	39279.1	8654.1		
N turns/pole	(turns)	84	81	20	16
I	(Amp)	467.6	106.8	0	0
Length	(m)	0.9	0.3	0.2	0.2
Strength $B*L/r^{n-1}$	(T/m^{n-2})	1.23399	2.61		
p	(GeV/c)	0.5	0.5	0.5	0.5
Kn	(m^{-n})	0.823	5.22		
Kn*L	($m^{-(n-1)}$)	0.74	1.566		
Min Coil Cross Section/pole	(m^2)	.0039279	.0008654		
	(cm^2)	39.279122	8.65405		
Min Conductor Size (area)	(cm^2)	.4676086	.106884		
(linear if square)	(cm)	.6838191	.3268641		
	(in)	0.269	0.129		
Conductor Size	(in)	0.375	0.25	0.25	0.25
Conductor Hole Size	(in)	0.15	0.125	.0125	.0125
Conductor Area	(in^2)	0.123	0.05	0.05	0.05
	(cm^2)	0.793	0.324	0.324	0.324
Current Density	(A/cm^2)	589.5	329.7		
	(A/m^2)	5.89e+06	3.3e+06		

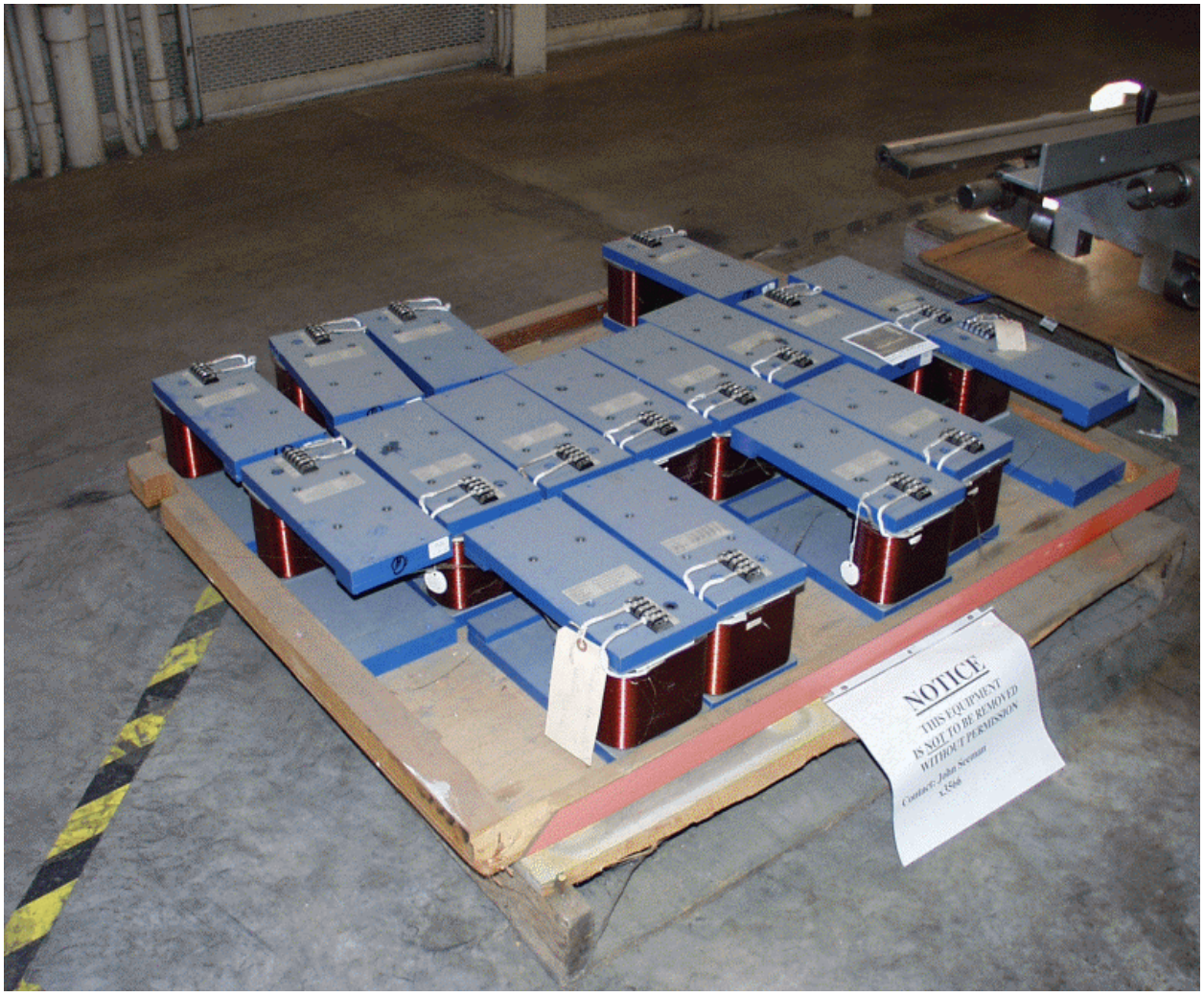

Fig. 7-3: Existing corrector magnets for VLER.