TS-SSC 91-081

Fermilab

April 25, 1991

TO: E. G. Pewitt

FROM: Gregg Kobliska Gregg

SUBJECT: Trip Report Teledyne Roll Forming
J & L Steel 50MM Dipole Cold Mass Skins

Dick Mau, John Zweibohmer, and myself traveled to Senatobia, MS. to see and discuss the status of our order to produce the aforementioned parts. J & L distributed their test results on the precision 304LN SS that was specifically made for the order. A copy of this data is attached for everyone's reference. I should note the following regarding this data:

1. Heat 910748 was a slab which J & L had on hand which was processed so that we could have material quickly for our short magnet program. The balance of this material was used for proving the tooling on the 50MM long program.

2. Heat 911659 was specifically melted for our order. They felt the chemistry and mechanical properties are typical of what could be expected during production.

3. A few words about yield strength. The yield strength on heat 911659 varies from 54,400 to 57,200 psi. Typically the yield increases an additional 2-3000 psi due to cold working during the roll forming process (data from the 40MM project). I asked about the yield strength in the annealed condition. Jay Meta, metallurgist from J & L, stated that yield strength in the annealed condition ranged from 46-48,000 psi. He will have the report typed up and sent to me in the next week or so. So we should see yield strength on a finished 50MM cold mass ranging from 46-48,000 localized near the weld area of the keys to 56-59,000 psi in the balance of the skin.

4. The coils identified as lite gauge were used as additional tryout material, however, coils still remain. This thinner condition is near the outer edge which tends to thicken approx. .001" during roll forming. We will measure the skins and distribute data on the finished product. I don't see any reason for concern at this point.

5. J & L has an extra coil weighing 22,000# that they produced as backup material in case there is reject material or the project needs more skins.

6. We have seen some surface imperfections that we believe occurred during slitting. I don't know how wide-spread this will end up being. So far it is not a major concern.

We had to reject the three skins that were run prior to our arrival. There were marks on the radius due to their tooling. There were marks on the inside radius of the first two pieces due to the bottom rollers driving the parts. While this worked okay on the 40MM skins, it was necessary to drive the upper rollers on the current skins. Also, all of the rollers needed to be stoned and cleaned because of foreign material. This was accomplished Tuesday afternoon - evening. Adjustments had to be made to the radius to bring the part into a better form in the free state. While the part could be constrained to the proper position, this was only in localized areas where measurement took place. In reality, John Carson's group would have had serious problems laying the first shell into the skinning tooling.

I was able to verify one skin as being acceptable, with the machine producing a good product as I left. There are some concerns relating to the drawing that should be addressed. They are as follows:

1. The 20 microinch finish is not attainable. The raw steel was measured in the mid to upper 20's by Teledyne prior to roll forming. We should do our own measurements at Fermi, but a more realistic number on the drawing is probably somewhere between 25-35 microinches. The drawing should also state the finish is required on both sides of the part.

2. The tolerance on the flat of the weld prep detail is not achievable. Currently this is .020" plus/minus .005". Teledyne has asked for plus/minus .020" on this. The variation on this is because it is machined in the free state. Since Teledyne can do better than they're asking, I suggest plus/minus .010 or .015.

3. Due to the way stresses are introduced into the part during roll forming, the trailing end of the part has more end flaring than we experienced in the 40MM program. We're seeing this condition extending aprox. 18-24" into the part. Again, I think the drawing should reflect this.

Ed Killian and Mel Lindner from Brookhaven as well as Mike Oged from Don Warner's group came the second day of my visit. Their purpose was to verify the quality of the skins. Mike was also auditing Teledyne's quality program. SSCL has an order with Teledyne to produce some short skins using material we purchased. Teledyne was asked to send us a letter stating the amount of material required to do this. There is always material at the end of a coil that is too short to make another full length skin. I requested that this material be used for SSCL's short skins to optimize material usage.

Although it was not discussed, I think we should consider sending the skins we're furnishing BNL direct from Teledyne. Maybe John Z. could discuss this with Bill Stokes.

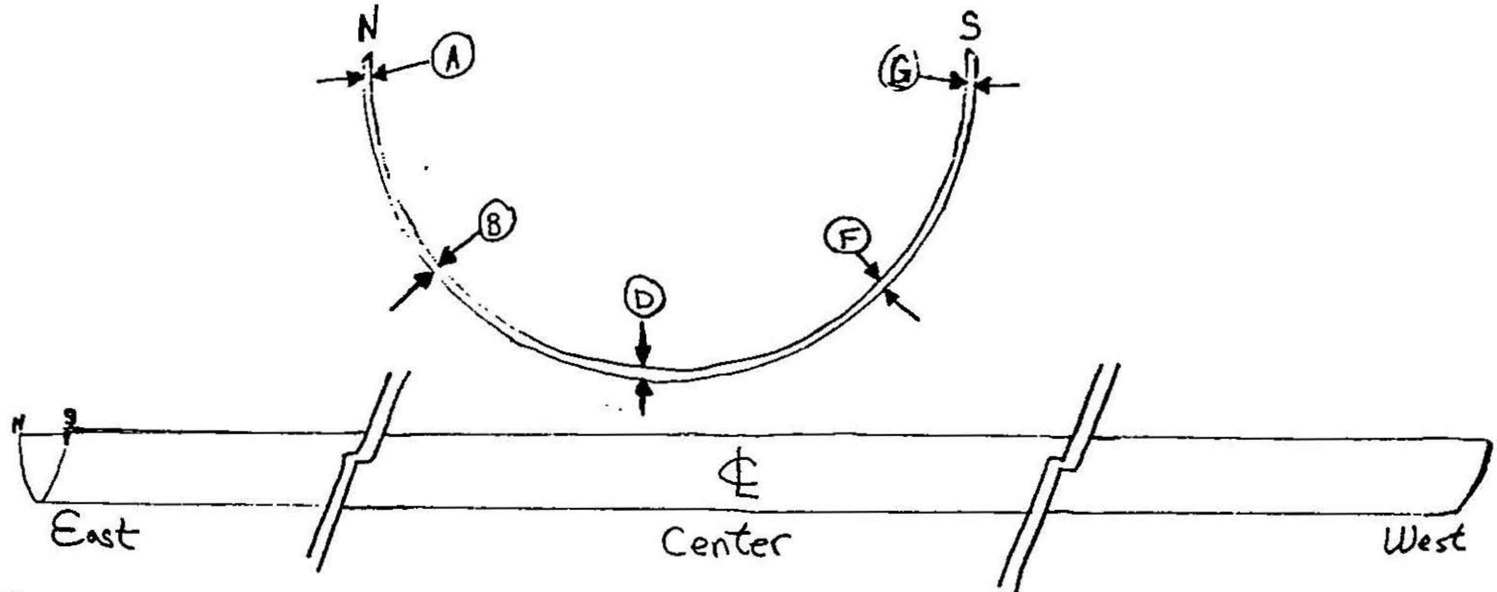
Attachment

c: L. Alsip
J. Carson
P. Mantsch
R. Mau
W. Robotham
J. Strait
J. Zweibohmer

242156 – Rev [illegible] [illegible]

Scott/[illegible]

Material thickness



#1

	N← (A)	(B)	(D)	(F)	(G) →S
E	.1966	.1962	.1958	.1956	.1945
C	.1967	.1959	.1955	.1954	.1947
W	.1967	.1963	.1959	.1957	.1951

#2

	N← (A)	(B)	(D)	(F)	(G) →S
E	.1961	.1958	.1950	.1952	.1948
C	.1964	.1959	.1956	.1950	.1944
W	.1965	.1960	.1955	.1953	.1948

4-24-11

Microfinish - Part # 292156.

#1 - inside - 11 to 24

outside - 10 to 20

#2 inside - 14 to 32

outside - 8 to 26

GREGG
Z

TYPE 304LN STAINLESS - MAGNET OUTERSHELL
FOR FERMI NATIONAL ACCELERATOR LABORATORY -
SUPERCONDUCTING SUPERCOLLIDER PROJECT

RECENT MATERIAL DATA

MATERIAL T304LN
2B Finish
Gauge: .195" ± .004 ± .0025 within a coil
Width Tolerances: + .000
- .010

shipped in Dec '90 from one slab on hand.

1. Heat 910748 Chemistry:

C	Mn	P	S	Si	Cr	Ni	Mo	Cu	Co	N_2
.017	1.60	.031	.018	.70	18.21	8.59	.37	.33	.10	.113

COIL 7519397

MON 71772 .1950" X 47.000" X 72.000"
2,875 lbs.

MON 71109B .1950" X 20.133" X Coil
9,400 lbs.

	Hardness Rb	0.2% Yield Strength psi	Tensile Strength psi	Elongation %
Head	90	50,000	89,000	52
Tail	89			

COIL WIDTH & GAUGE DATA (Slit on 3-21-91 at Uniserve) cut from double width master coil

COIL 7519397

	STRAND 1				STRAND 2			
	Width	Gauge			Width	Gauge		
Head 1	20.127	.192^{5}	.193^{4}	.194^{2}	20.124	.194^{2}	.194^{4}	.192^{9}
2	20.126	.191^{1}		.193^{6}	20.133	.194^{3}		.191^{4}
3	20.127	.191^{2}		.193^{5}	20.132	.194^{2}		.192^{5}
4	20.128	.191		.192^{5}	20.129	.193^{1}		.191^{9}
5	20.128	.191^{5}		.194	20.126	.194		.192^{4}
6	20.127^{5}	.191^{5}		.194^{3}	20.125	.194^{2}		.192^{8}
7	20.128	.192^{1}		.194^{8}	20.127	.194^{9}		.193^{8}
Tail 8	20.127	.192^{2}	.192^{4}	.192^{8}	20.132	.191^{6}	.193^{6}	.192

specifically melted for our order

2. Heat 911659 Chemistry:

C	Mn	P	S	Si	Cr	Ni	Mo	Cu	Co	N_2
.021	1.59	.029	.010	.65	18.28	8.64	.28	.26	.12	.136

COILS 7569950, 7570225, 7573689, 7570256 +.000 -.010

MON 71110 .1950" X 20.162" X Coil
Shipped Coil 7569950 4 pieces 21,660 lbs.
7570225 4 pieces 23,150 lbs.
7570256 4 pieces 22,360 lbs.
67,170 lbs.

Coil		Hardness Rb	0.2% Yield Strength psi	Tensile Strength psi	Elongation %
7569950	Head	91	55,200	95,600	48
	Tail	92	54,500	94,400	48
7570255	Head	91	54,400	94,900	48
	Tail	91	55,200	94,200	50
7573689	Head	91	~~54,400~~ 57,200	~~94,900~~ 94,400	~~48~~ 49
	Tail	91	~~55,200~~ 55,600	~~94,200~~ 93,700	50

COIL WIDTH & GAUGE DATA (Slit on 4-8-91 at Uniserve)

COIL 7569950A (2 pcs)

~ 11,000 # on A1 B1 coil but light 9th

		STRAND A1				STRAND A2			
		Width	Gauge			Width	Gauge		
Head		20.160	.192[1]	.194[3]	.194[8]	20.159	.195[2]	.194	.192
	*	20.159	.190[1]		.195[3]	20.154	.195[2]		.192[9]
	*	20.156	.190[3]		.195[5]	20.157	.195[3]		.192[1]
		20.156	.191		.195[3]	20.155	.195[1]		.193
	*	20.156	.190[4]		.195[1]	20.155	.195[3]		.192[2]
Tail		20.159[5]	.191	.194	.194[5]	20.157	.194[6]	.194[1]	.192[7]

0-9, 10-10 are the coil # Tabulyne assigned to these coils

*NOTE: Lite Gauge (Edge of A1 Coil Only)

COIL 7569950B (2 pcs)

		STRAND B1				STRAND B2			
		Width	Gauge			Width	Gauge		
Head		20.159	.191[3]	.194[4]	.195[2]	20.154	.195[4]	.194[5]	.192[3]
	*	20.158	.189[9]		.194[1]	20.154	.195[2]		.192[8]
		20.157[5]	.191[2]		.195[4]	20.156	.195[6]		.193[3]
	*	20.156[5]	.190[4]		.195[4]	20.155	.194[5]		.193
		20.157[5]	.191[4]		.195[7]	20.154	.194[5]		.193[1]
Tail		20.160	.194[2]	.196[1]	.196[3]	20.159	.196[5]	.195[8]	.194[3]

*NOTE: Lite Gauge (B1 Coil Only)

COIL 7570255A (2 pcs)

	STRAND A1				STRAND A2			
	Width	Gauge			Width	Gauge		
Head	20.160	.193[1]	.194	.194[3]	20.158	.193[8]	.193.1	.191[7]
	20.157	.191		.194[6]	20.155[5]	.194[7]		.191[7]
	20.156	.192[7]		.195[4]	20.154[5]	.194[7]		.192[7]
	20.155	.192[1]		.194[8]	20.154[5]	.195[2]		.192[5]
Tail	20.157	.192[6]	.194[5]	.195[3]	20.156	.195[3]	.194[7]	.193[2]

COIL 7570255B (2 pcs)

	STRAND B1				STRAND B2			
	Width	Gauge			Width	Gauge		
Head	20.159	.192[4]	.194[5]	.195[2]	20.157	.195[2]	.194[4]	.193[3]
	20.156	.193[4]		.194[8]	20.155	.194[6]		.192[3]
	20.158	.192[4]		.194[5]	20.158	.194[6]		.192[2]
	20.157	.192[6]		.194[7]	20.156	.194[7]		.191[6]
Tail	20.159	.193[6]	.195[3]	.195[5]	20.157	.195[4]	.194[6]	.193[4]

COIL 7573689A (2 pcs)

	STRAND A1				STRAND A2			
	Width	Gauge			Width	Gauge		
Head	20.160	.193[3]	.194[2]	.193[7]	20.159	.194	.193[6]	.191[9]
	20.156	.193[3]		.195[3]	20.155	.195[2]		.191[9]
	20.156	.193		.195[4]	20.157[5]	.195[2]		.192[4]
	20.155[5]	.193[4]		.195[3]	20.158[5]	.195[4]		.191[7]
Tail	20.158	.193[7]	.194[4]	.195[2]	20.157	.195	.194[3]	.191[8]

COIL 7573689B (2 pcs)

	STRAND B1				STRAND B2			
	Width	Gauge			Width	Gauge		
Head	20.157[5]	.193[5]	.194[4]	.195[3]	20.157	.195[2]	.194[5]	.191[9]
	20.155	.193[5]		.195[2]	20.158	.195[4]		.192[2]
	20.156	.192[8]		.195	20.157	.195[3]		.191[8]
	20.155	.193[2]		.195[3]	20.156	.195[6]		.192[4]
Tail	20.157	.193[1]	.194[1]	.194[6]	20.159	.194[6]	.193[4]	.192

J. M. Mehta/J. C. Bruno
4/11/91

3224L

have 1 22,000# master coil left @ plant
that is essentially extra
Initial heat = 110 tons, they yielded ~ 80%