

NCSX Work Approval Form (WAF)

WBS Number: 133

WBS Title: External Trim Coils

Job Number: 1354

Job Title: Trim Coil Design and Procurement

Job Manager: Mike Kalish

Description:

The external trim coil set is intended to provide low poloidal mode number ($m=2,3$) field error correction. These will be conventionally wound coils in a windowpane configuration. They are provided at the top, bottom, and outside perimeter of the Coil Support Structure (WBS 151) primarily to reduce low poloidal mode number (m) resonant errors that may result from manufacturing or assembly errors in the modular coil geometry.

Schedule:

See Attached

Approvals:

Job Manager

Date

Responsible Line Manager

Date

Project Manager

Date

Engineering Department Head

Date

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TABLE III - Fabrication/Assembly Installation

In-house Fabrication and Assembly and Installation																	
Description: Incl in M&S Table II																	

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TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

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Uncertainty of the Estimate

	<u>High</u>	<u>Medium</u>	<u>Low</u>	<u>Uncertainty Range (%)</u>	<u>Comments/Other Considerations</u>
Design Maturity		X			Early stages of determining trim coil requirements - but costs small (probably under \$100K)
Design Complexity			X	-10%/+15%	Present requirement is for a round two turn coil. Simple coil design.

Other comments: Although price of Cu variable (see Job 1352 discussion), so little Cu needed for these coils, no considered a significant uncertainty

Note: High/Medium/Low uncertainty assessment from Job Manager. Uncertainty range based on AACEI recommended practice 18R-97 as amended for NCSX.

Residual Impacts

Job	Risk Description	Likelihood of Occurring	Mitigation Plan	Basis of estimate	Cost Impact		Schedule Impact	
					Low	High	Low	High
1354	Additional trim coils may be required to suppress field errors from n>1 modes	U	Analysis being performed to firm up requirements	Costs could more than double the present estimate	+\$200	+\$400	+ 0.00	+ 0.00

Notes:

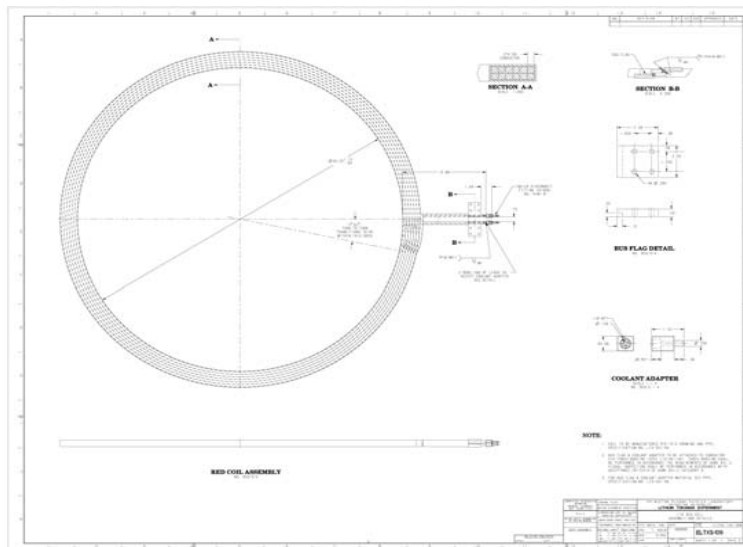
- [1] Low cost and schedule impacts are considered the minimum (0-percentile) impacts should the event occur.
High cost and schedule impacts are considered the maximum (100-percentile) impacts should the event occur
- [2] Cost impacts should be entered as man-hours (by demographic) and M&S direct cost under basis of estimate.
Cost impacts should NOT include standing army costs which are separately calculated from the schedule impact
Project control is responsible for quantifying the low and high cost impacts based on the labor hours and M&S identified
- [3] The schedule impacts should be entered as the min and max impacts on the critical path.
If there is no critical path impact then the schedule entries should be zero.
- [4] Likelihood of occurrence should be entered consistent with our risk classification methodology, i.e.
VL= Very Likely (P>80%), L=Likely (80%>P>40%), U=Unlikely (40%>P>10%), VU=Very Unlikely (P<10%), NC=Non-credible (P<1%)

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M&S Estimate Backup

Estimate for More Complex Coil (based on Jupiter II)
 Drawing of 4th LTX Coil



Backup for LTX Costs

PRICE ANALYSIS WORKSHEET

DATE	REQUESTION NO. / AHEAD	REQUESTOR / 07-018-W	POSUBCONTRACT
COMPARISON OF COMPETITIVE QUOTES OR COMPARISON TO PRICE HISTORY FOR SAME/SIMILAR ITEMS			
ITEM	DESCRIPTION	QTY	Supplier/Prices
1	LTX RED COIL	2	New England Trim Coil \$3,180.00 Elevation Trim \$10,250.00
2	LTX BLUE COIL	2	\$8,900.00 \$12,400.00
3			
4			
5			
6			
7			
8			
9			
10			
Total:			\$24,080.00 \$45,970.00
FOR PAID:		Date	Date
DELIVERY:		As required	12 wks
PAYMENT TERM:			
FOR PRICE HISTORY COMPARISON, IF APPLICABLE, DESCRIBE IMPACT OF TIME, QUANTITY, OR PRODUCT DIFFERENCES:			
USE OF ROUGH YARDSTICKS (DESCRIBE BASIS BELOW OR ON ATTACHED SHEETS)			
INDEPENDENT PRICE ESTIMATE (DESCRIBE BASIS BELOW OR ON ATTACHED SHEETS)			

PPF-P04 (Rev. 9, 06/20/04)

Assumed 2 coils

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Outomumpo Estimate

PRINCETON PLASMA PHYSICS

FAX 609-243-3248
Tel 609-243-2277



1 (1)
May 9, 2007

RFO on copper conductor

Dear Mike,

Please find our offer as follows:

Product specification and quantity:

- * CDA102 Copper, soft temper
- * Size 20mm Square with round 9mm ID, Outokumpu tool # 8456
- * In pancake coils of approximately 100 ft
- * Qty to be determined later.

Pricing:

Fabrication cost:	Up to 500lbs	One lump sum \$3,980 plus copper value
	1,000lbs	FAB \$ 4.90/lb plus copper value
	2,000lbs	FAB \$ 3.10/lb plus copper value

For Silver-bearing copper (CDA 107) add \$0.16/lb

The copper value based on the Comex market for November 2004 shipments is currently \$ 1.57/lb.

The copper value may be firmed for the month of shipment the day an order is placed, up to two weeks prior to the confirmed ex mill date, or will be automatically firmed at Outokumpu published price the Friday preceding the confirmed ex mill date.

Payment terms:

60 days from the date of invoice. Subject to credit approval.

Lead time and delivery terms:

Ex mill Pori, Finland, November 4, 2004 plus 4 weeks (estimated) ocean transit. Delivered Duty Paid (DDP Incoterms 2000) to Princeton, NJ.

Other Terms:

According to the Outokumpu Foricopper Oy's General Terms for Sales (has been supplied earlier). The interest rate in the USA for overdue payment is 12%.

Sincerely,

Outokumpu Copper – Electrical Power & Components

Petri Nordling
Sales Manager

Cc: Asko Hakkinen, Paivi Nieminen, Denise Nolan

OUTOKUMPU COPPER – EPC Europe Division
801 Pittsburgh Drive, Delaware OH 43015 / Tel. 740-368-7946 / Fax 740-363-3847

PPPL Calculation for Conductor Procurement

Copper Cost Estimate for Trim Coils
Note : Includes 25% spare in final cost calculation

$$\text{Circumference} = (.5m) \times \pi$$

$$\text{Length} = 4 \times \text{Circumference}$$

$$.323 \frac{\text{lb}}{\text{m}^3} \left[(.797\text{m})^2 \times \pi \left(\frac{.354\text{in}}{2} \right)^2 \right] \text{Length} = 41.624\text{lb}$$

$$\text{Weight} = .323 \frac{\text{lb}}{\text{m}^3} \left[(.797\text{m})^2 \times \pi \left(\frac{.354\text{in}}{2} \right)^2 \right] \text{Length}$$

For 2 coils using Outo Kumpu Quote

$$\text{Weight} = 2 \times 1.25 \left(\frac{3.10 + 1.57}{\text{lb}} \right) = 485.958 \text{ dollars at time of quote}$$

$$\text{Weight} = 2 \times 1.25 \left(\frac{3.10 + 3.14 + 16}{\text{lb}} \right) = 165.98 \text{ dollars}$$

inflated to 407
2.10=engineering
3.14=copper
16= silver bearing

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Basis of Tooling Estimate

RFQ-23-2004 14:30 6107465230 P.02/03



April 22, 2004

Ms. Ariene White
Princeton University
Plasma Physics Laboratory
PO Box CN-17, MS-12
Princeton, NJ 08543

Subject: RFQ Req. # 04-042-W
Everson Tesla Quotation No. 4039

Ms. White,

Thank you for your interest in Everson Tesla, Inc. and your Request for Quotation for the Jupiter 2 Electro Magnetic Coils. We are pleased to provide the following offer.

Jupiter 2 Electro Magnetic Coils:

Quantity: 10 each
Unit Price: \$4,775.00 USD each
Total Price: \$47,750.00 USD

Tooling Charge: \$12,450.00 (Non-recurring one time charge for 1 combination winding mandrel/mold and lead formers)

Scope of Work: Manufacture 10 each, Jupiter 2 Electro Magnetic Coils per Drawing # B-J2P001 and # B-J2P002, Rev. 0, dated 3.23.04

Delivery: 16 weeks ARO

Payment Terms: Net 30 days
FOB Destination
Freight Terms: Prepaid & Included

Tooling: Will be invoiced upon completion, Net 30 days

Price Validity: 60 days

We thank you for your inquiry and look forward to working with you on this project. Please feel free to call with any questions or concerns.

610 Daniels Road - Nazareth, PA 18066 • (610) 766-1530 • FAX (610) 766-4830
www.evertesla.com