

NATIONAL COMPACT STELLARATOR PROJECT

Engineering Change Proposal (ECP)

COVER PAGE

(TO BE COMPLETED BY SYSTEMS ENGINEERING SUPPORT MANAGER)

Originator: Tom Brown

Date: 11/17/2003

ECP No: ECP-04-002

ECP Title: Rescinding approval for fabrication for current models/drawings of the prototype MCWF

Required Reviewers

Required Reviewers for this ECP:

W. Reiersen (Engineering Manager)

ECP Approval Level

Expedited ECP? ☒ Yes ☐ No

Change Level: 4

Approving Official: NCSX Engineering Manager

Actions

1. Change affected drawings from "Approved for Fabrication" to "Not Approved for Fabrication" (or equivalent) via an ECN. (Brown)
2. Expedite release of updated models and drawings. Conduct FDR for revised prototype design. (Williamson)
3. Update product spec for Prototype Modular Coil Winding Form (NCSX-CSPEC-141-01-02) with reference to updated models and drawings. (Heitzenroeder)
4. Advise suppliers of the revised plan of action. Initiate review of updated models and drawings by suppliers to identify potential problems with the updated models as soon as possible. (Heitzenroeder)

APPROVALS

(TO BE COMPLETED BY APPROVING OFFICIALS)

Change Level	Approving Official	Approval?	Signature
4	NCSX Project Manager	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4 (Expedited ECP)	NCSX Engineering Manager	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
3	NCSX Federal Project Manager	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2	Associate Director OFES	<input type="checkbox"/> Yes <input type="checkbox"/> No	
1	Under Secretary	<input type="checkbox"/> Yes <input type="checkbox"/> No	

NATIONAL COMPACT STELLARATOR PROJECT

Engineering Change Proposal (ECP)

PART I *(TO BE COMPLETED BY ORIGINATOR)*

Originator: Tom Brown

Date: 11/17/2003

Overview of Change

Type of ECP: ☒ EXPEDITED ☐ STANDARD

Type of Change: ☒ TECHNICAL ☐ COST ☐ SCHEDULE ☐ EDITORIAL

(Check all that Apply)

Reason for Change:

Our suppliers have identified problems in the models/drawings for the prototype modular coil winding form that was provided to them. These problems include:

- Shell surfaces were “bumpy”. Although acceptable, it is highly undesirable for pattern making, casting, material utilization, part fit-up and appearance.
- This model was significantly different from the one that was expected to be the ‘production’ casting, whereas the new one is expected to be very similar to the production one. Thus, the prototype effort is more representative of the production manufacturing effort and therefore is better at risk mitigation.
- Excessive weight. (The “old” casting was 7100 lbs.; the new one is 5600 lbs. The lighter weight of the new model is an advantage both for one of the foundries (which was up against pour weights with the previous model) and for NCSX assembly where we are up against crane lift limits.
- The model had “Pro/E” errors which were problematic when the model had to be converted to a .stl file. This file is required for flow solidification analysis.

The purpose of this ECP is to change the status of the models/drawings that we supplied from “Approved for Fabrication” to “Not Approved for Fabrication” (or equivalent). The models/drawings that are affected are listed below.

Table -1 List of Pro/ENGINEER Models and Drawings
(From NCSX-CSPEC-141-01-02)

Document Type	File Name	Rev	Description
Part (.prt)	se141-113p.prt	0	Type “C”: Winding Form
Drawing (.drw)	se141-113p.drw.	0	8-sheet Type C winding Form drawing file.
Acrobat (.pdf)	se141-113p.pdf.	0	8-sheet .pdf file, Type C winding Form
STEP (.stp)	se141-113p.stp	0	Full featured Type C part.
STEP (.stp)	se141-113p_rep.stp	0	Reduced featured Type C part

Impacted WBS Elements:

WBS 141 Modular Coil Winding Forms

Impacts of Change (Briefly Describe):

The prototype winding form is based on the Type C production winding form. Since the models/drawings for the prototype winding form were approved for fabrication, the Type C production winding form has been significantly improved. It has a different drawing number than before. The plan is to disapprove the existing prototype winding form for fabrication and to approve new models/drawings for fabrication based

Updated: 10/5/03

on the improved Type C production winding form. Since these new models/drawings have different drawing numbers, an ECP is not required. A final design review will be conducted prior to authorizing them for fabrication. The scope of this ECP is thus limited to changing the status of the models/drawings that we supplied from “Approved for Fabrication” to “Not Approved for Fabrication” (or equivalent). This change should allow the suppliers to expeditiously overcome the problems listed above and avoid further delays.

Assessment of Other Options:

A change in the models/drawings of the prototype winding form is required. There is no other option.

List Attachments, Impacted Documents, etc.

Product Specification NCSX-CSPEC-141-01-02 (“Product Specification - Prototype Modular Coil Winding Form”) will be revised to reflect the adaptation of the new Type “C” winding form model for use in the manufacture of the prototype.

Table -2 List of Pro/ENGINEER Models and Drawings

(From NCSX-CSPEC-141-01-02)

Document Type	File Name	Rev	Description
Part (.prt)	se141-113p.prt	0	Type “C”: Winding Form
Drawing (.drw)	se141-113p.drw.	0	8-sheet Type C winding Form drawing file.
Acrobat (.pdf)	se141-113p.pdf.	0	8-sheet .pdf file, Type C winding Form
STEP (.stp)	se141-113p.stp	0	Full featured Type C part.
STEP (.stp)	se141-113p_rep.stp	0	Reduced featured Type C part

Description of Change:

The approach used to model the winding forms was changed, adopting a more simplified method to define the shell surfaces and component features. To decrease the part weight, the shell thickness was reduced to 1.375” from 1.5” with the intention of adding material around shell penetrations as required to meet the part stress requirement. A new model of the Type “C” prototype winding has been completed. A comparison of the baseline and revised winding form is shown in the figure below. It is expected that the fabricated parts made using the new prototype winding form could possibly be used for the production article with little or no modifications made to them. Features defining the machine cuts to the winding form need to be added to the revised model as well as developing a new drawing package.

NATIONAL COMPACT STELLARATOR PROJECT

Engineering Change Proposal (ECP)

PART I CONTINUATION SHEET *(TO BE COMPLETED BY ORIGINATOR)*

Originator: Tom Brown

Date: 11/17/2003

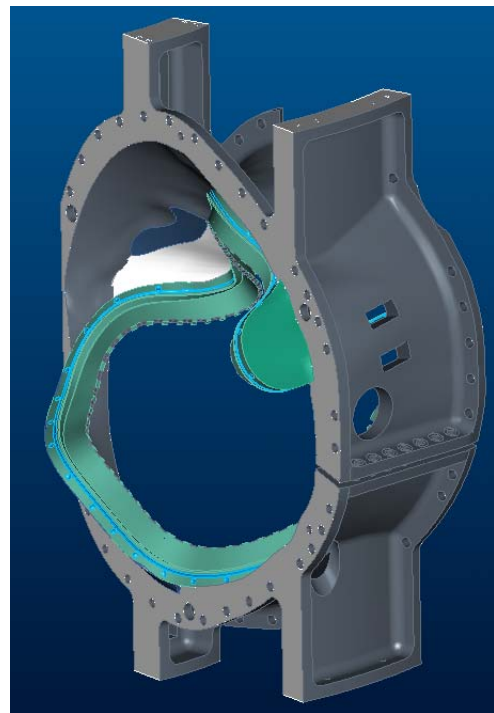
Revised Type "C" Model

Total Weight: 5571 lbs
1.375" basic shell thickness



Baseline Type "C" Model

Total Weight: 7001 lbs
1.5" basic shell thickness



NATIONAL COMPACT STELLARATOR PROJECT

Engineering Change Proposal (ECP)

PART II ***(TO BE COMPLETED BY REVIEWERS)***

ECP No: ECP-04-002

ECP Title: Rescinding Approval for Fabrication for current models/drawings of the prototype MCWF

Reviewer: Wayne Reiersen

Corrections Needed? ☐ Yes ☒ No

- If yes, identify corrections needed:

Concur? ☒ Yes ☐ No

- Provide reasons for concurrence/rejection:

Change necessitated by difficulties encountered by supplier and benefits derived from making the prototype representative of the final article.

Other Recommendations? ☐ Yes ☒ No

- Identify Recommendations

NOTE: Forward completed Part II to Systems Engineering Support Manager via e-mail indicating that your review is completed.