QA Plan Summary
NCSX Modular Coil Winding Form Machining

Spec Ref	Activity	Visual Mfg Ref.	Ref Procedure	Witness/Hold Point	Reporting/Documentation Req
	Manufacturing Planning- QA planning- Production Support	65707/5.0 -Sub:0 Op#:10			
	FINAL INSPECTION----PREPARE PART FOR SOURCE INSPECTION.----Review and complete QA data package per QAP and the requirements of the product specification NCSX-CSPEC-141-03-11 January 13, 2006.--Contact CFT to review data package prior to notifying source inspection.	65707/5.0 -Sub:0 Op#:20			
	SOURCE INSPECTION --FINAL ACCEPTANCE OF PART AND DATA PACKAGE.--HAVE SOURCE INSPECTOR STAMP AND SIGN C OF C.--	65707/5.0 -Sub:0 Op#:30		Hold Point	
5.1; 5.3; 5.4	PACKAGE AND SHIP----BUILD A BOX/CRATE SUITABLE FOR PROTECTING THE PART FROM THE ENVIRONMENT.----WEIGH THE FINISHED PART AND METAL STAMP THE VALUE IN POUNDS ON THE CASTING IN THE AREA MARKED ON THE CUSTOMER DRAWING.----PART MUST BE PROTECTED AND WRAPPED IN PLASTIC PRIOR TO INSERTING INTO THE CRATE. REFER TO PS583.----PART IS TO BE SHIPPED TO PPPL IN PRINCETON- NJ PER QAP SHIPPING ADDRESS.----CRATE MUST BE MARKED/STENCILED PER THE MTM DRAWING.--	65707/5.0 -Sub:0 Op#:40	PS583		
	RECEIVE CUSTOMER SUPPLIED MATERIAL. ----Part Number: SE141-116 Rev: 6--Part Description: PRODUCTION WINDING FORM TYPE-C	65707/5.0 -Sub:1 Op#:10			
	SETUP AND MACHINE THE FLANGE FACES AND FLANGE PERIPHERY TO WITHIN .100- STOCK.	65707/5.0 -Sub:1 Op#:18			
	SET CASTING ON RISERS WITH DATUM -E- FLANGE DOWN. ROUGH MACHINE OUTSIDE POLOIDAL BREAK FLANGES TO WITHIN .030- OF FINISH. MACHINE POLOIDAL BREAK THROUGH THE FLANGES AND CASTING WALL TO 2.050- LEAVING THE T SECTION TO BE CUT AT A LATER TIME.	65707/5.0 -Sub:1 Op#:20			
	USING TABS CUT FROM CUSTOMER SUPPLIED MATERIAL- WELD TEMPORARY SHIM IN PLACE. WELD TABS TO SHIM AND TABS TO CASTING. (DO NOT WELD SHIM DIRECTLY TO CASTING)--USE MACHINED QUALIFIERS TO HELP POSITION THE SHIM.	65707/5.0 -Sub:1 Op#:25			
	SET UP FIXTURE PLATE MTMFX-3099 AND MACHINE LOCATING PADS AS NECESSARY.--SET UP CASTING WITH DATUM -E- AGAINST THE FIXTURE.--- MACHINE THE REMAINING PORTION OF THE POLOIDAL BREAK TO 2.050-.--- FINISH MACHINE DATUM -D- WING SURFACES AND ALL AREAS BELOW THE T SECTION.--- MACHINE T SECTION TO WITHIN .030-.--- FINISH MACHINE DATUM -D- FLANGE.--	65707/5.0 -Sub:1 Op#:30			
	SET UP FIXTURE PLATE MTMFX-3100 AND MACHINE LOCATING PADS AS NECESSARY.--SET UP CASTING WITH DATUM -D- AGAINST THE FIXTURE.--- FINISH MACHINE DATUM -E- WING SURFACES AND ALL AREAS BELOW THE T SECTION.--- MACHINE T SECTION TO WITHIN .030-.--- FINISH MACHINE DATUM -E- FLANGE.--	65707/5.0 -Sub:1 Op#:35			
	CD-1 (SETUP 1)--SET UP MTMFX-3099 ON ANGLE PLATE.--LOAD PART WITH DATUM -D- FLANGE UP.--VERIFY FLATNESS OF DATUM -D- FACE AND RECORD RESULTS IN IDC (SEE LINKED DATUM -D- MAP)--RECORD TOOLING BALL LOCATIONS IN IDC.--COMPLETE ALL PROGRAMS FOR SETUP 1.	65707/5.0 -Sub:1 Op#:50			IDC: 18
	CD-2 (SETUP 2)--SET CASTING ON RISERS WITH DATUM -D- FLANGE UP. --RECORD TOOLING BALL LOCATIONS IN IDC. COMPLETE ALL PROGRAMS FOR SETUP 2.	65707/5.0 -Sub:1 Op#:55			IDC: 4
	CE-2 (SETUP 4)--SET CASTING ON RISERS WITH DATUM -E- FLANGE UP. --RECORD TOOLING BALL LOCATIONS IN IDC. --COMPLETE ALL PROGRAMS FOR SETUP 4.	65707/5.0 -Sub:1 Op#:60			IDC: 4
	CE-1 (SETUP 3)--SET UP MTMFX-3100 ON ANGLE PLATE.--LOAD PART WITH DATUM -E- FLANGE UP.--VERIFY FLATNESS OF DATUM -E- FACE AND RECORD RESULTS ON IDC (SEE LINKED DATUM -E- MAP)--RECORD TOOLING BALL LOCATIONS IN IDC.--COMPLETE ALL PROGRAMS FOR SETUP 3.--	65707/5.0 -Sub:1 Op#:70			IDC: 18
	POLOIDAL BREAK OPERATION (SETUP 5)--- INSTALL MTMFX-3099 ON RISERS. --- TACK WELD FIXTURE TO RISER BLOCKS TO PREVENT MOVEMENT.--- LOAD PART ON FIXTURE WITH DATUM -D- FLANGE UP. --- TACK WELD DATUM -E- FLANGE TO THE FIXTURE ON EITHER SIDE OF THE POLOIDAL BREAK.--- TACK WELD BRACING TO PREVENT MOVEMENT OF THE POLOIDAL BREAK WHEN THE TEMPORARY SHIM IS REMOVED. TABS MADE FROM THE CASTING MATERIAL ARE TO BE WELDED TO THE BRACING AND THEN THE TABS WELDED TO THE CASTING.--- RECORD TOOLING BALL LOCATIONS IN IDC. --- REMOVE SHIM AND FINISH MACHINE POLOIDAL BREAK.--- INSTALL DRILL FIXTURE AND COMPLETE GUN DRILLING OPERATION.--- COMPLETE ALL REMAINING PROGRAMS FOR SETUP 5.--- REMOVE THE DRILL FIXTURE AND INSTALL THE TWO TAPERED PINS. PLACE ALUMINUM BLOCKS IN THE POLOIDAL BREAK AND CLAMP OVER THE BLOCKS TO MINIMIZE ANY MOVEMENT DURING HANDLING. --- VERIFY THAT QUALIFIERS HAVE BEEN CUT ON THE OUTER DIAMETERS OF THE -D- AND -E- FLANGES ACROSS THE POLOIDAL BREAK. THIS WILL BE USED FOR ALIGNMENT DURING THE ASSEMBLY OPERATION.--- CUT THE TACKS AND BRACING LOOSE AND REMOVE THE PART FROM THE FIXTURE.--	65707/5.0 -Sub:1 Op#:80			IDC: 4
3.1.1.4 4.2.6	PROTECT PART FROM METAL CONTAMINATION DUE TO CONTACT WITH IRON- SPECIFICALLY WHEN RIGGING PART FOR MOVEMENT.--ALL GRINDING WHEELS AND DISKS MUST BE VIRGIN MATERIAL NOT PREVIOUSLY USED ON ANY OTHER MATERIAL TO AVOID MATERIAL CONTAMINATION.----- FINISH HAND TAPPING OF 3/8-16 HOLES USING TAP GUIDE (IF REQUIRED)--- START BLENDING T-SECTION--- HAND GRIND 1/16 CHAMFER ON ALL SPLIT LINE EDGES OF POLOIDAL BREAK AND ON ALL THRU HOLES AT POLOIDAL BREAK.--- HAND GRIND VPI GROOVE WHERE REQUIRED.--- DEBURR WING AREAS TO REMOVE ANY SHARPNESS FROM MACHINING (SCALLOPS DO NOT NEED TO BE REMOVED).--- CHECK ALL ACCESSIBLE T CLEARANCES USING MTMFX-3473 CHECKING FIXTURE--- HAND GRIND 1/16 TO 3/32 CHAMFER ON OUTER EDGE OF T IN ALL ACCESSIBLE AREAS.--- FINISH ALL OTHER REQUIRED DEBURRING ON DATUM -D- SIDE PRIOR TO MOVING PART TO PLANT 2 FOR FLIPPING.	65707/5.0 -Sub:1 Op#:85			
3.1.1.4 4.2.6	PROTECT PART FROM METAL CONTAMINATION DUE TO CONTACT WITH IRON- SPECIFICALLY WHEN RIGGING PART FOR MOVEMENT.--ALL GRINDING WHEELS AND DISKS MUST BE VIRGIN MATERIAL NOT PREVIOUSLY USED ON ANY OTHER MATERIAL TO AVOID MATERIAL CONTAMINATION.----- FLIP PART AND SET UP ON DATUM -D-.--- START BLENDING T SECTION--- DEBURR WING AREAS TO REMOVE ANY SHARPNESS FROM MACHINING (SCALLOPS DO NOT NEED TO BE REMOVED).--- CHECK ALL ACCESSIBLE T CLEARANCES USING MTMFX-3473 CHECKING FIXTURE--- HAND GRIND 1/16 TO 3/32 CHAMFER ON OUTER EDGE OF T IN ALL ACCESSIBLE AREAS.--- STAMP NUMBERS ON FACE OF T PER DRAWING. USE DRAWING SE141-116 2MTM REV 6A FOR STAMPING NUMBERS.--	65707/5.0 -Sub:1 Op#:88			

QA Plan Summary
NCSX Modular Coil Winding Form Machining

Spec Ref	Activity	Visual Mfg Ref.	Ref Procedure	Witness/Hold Point	Reporting/Documentation Req
5.2	PROTECT PART FROM METAL CONTAMINATION DUE TO CONTACT WITH IRON- SPECIFICALLY WHEN RIGGING PART FOR MOVEMENT.--MOVE PART INTO WASH BOOTH. --THOROUGHLY CLEAN AND DRY ALL SURFACES AND HOLES PER SECTION 9 OF PS583. --PARTS TO BE WASHED USING HEATED- DE-MINERALIZED WATER- AND IF NECESSARY- A MILD NON-CHLORINATED CLEANING SOLUTION (E.G. SIMPLE GREEN®- OR AUTHORIZED EQUIVALENT)- USING MTM'S HIGH PRESSURE WASHER. THE SPRAY PRESSURE AT THE NOZZLE WILL BE APPROXIMATELY 1-000 TO 1-500 PSI AND THE CLEANING SOLUTION TEMPERATURE WILL BE APPROXIMATELY 150°F.--HAVE INSPECTION VERIFY THE CLEANLINESS OF THE CASTING PRIOR TO REMOVING FROM THE WASH BOOTH.--	65707/5.0 -Sub:1 Op#:90	PS583		IDC: 1
4.2.7.1 4.2.7.2.2	PT 100% OF THE AS-CAST SURFACES AS WELL AS FINISHED MACHINE SURFACES. SEE PS582 FOR PROCESSING INSTRUCTIONS. ----SPECIFICATION: ASTM A903/A903M----METHOD: ASTM E165----ACCEPTANCE CRITERIA: ASTM A903/A903M LEVEL II FOR AS CAST SURFACES----ACCEPTANCE CRITERIA: ASTM A903/A903M LEVEL I FOR MACHINED SURFACES INCLUDING THE ENTIRE -T- SECTION (HIGH STRESS AREAS)----CERTIFICATION: MTM CERTIFICATION TO INCLUDE THE INFORMATION PER SUPPLEMENTARY REQUIREMENTS S1 OF ASTM A903/A903M----MTM NDT Cert: LPI CERTIFICATION	65707/5.0 -Sub:1 Op#:100	PS582		MTM NDT Cert
	GOVERNMENT SOURCE INSPECTOR TO WITNESS PT RESULTS.	65707/5.0 -Sub:1 Op#:101			
3.1.1.8	THE -T- AREAS DEFINED AS -HIGH STRESS- ARE TO BE RT 100%. SEE PS581 FOR PROCESS INSTRUCTIONS.----HAND SKETCH A LAYOUT OF ALL FILM LOCATIONS ON SHEET (1) OF THE CUSTOMER DRAWING SE141-116 TO MAINTAIN SHOT AND FILM TRACEABILITY.----ALL FILM IS TO BE DOUBLED UP IN ORDER TO SUPPLY THE CUSTOMER WITH A COMPLETE SET OF FILM.----SPECIFICATIONS: ASTM A703/A703M SUPPLEMENTARY REQUIREMENT S5----PROCEDURE/METHOD: ASTM E94 AND ASTM E142 (USE OF A WIRE PENETRAMETER MAY BE NECESSARY INSTEAD OF THE HOLE TYPE TO ENSURE OBJECTIVE 2% OF THICKNESS RESOLUTION/SENSITIVITY)----ACCEPTANCE CRITERIA: NO DEFECT LARGER THAN .080-MAJOR DIMENSION IS ALLOWED.----SCAN RT CERTIFICATION- AND HAND SKETCHED MAP AND LINK IN QAP TO THIS OPERATION.----Certification: RADIOGRAPHIC INSPECTION--Map(s): CUSTOMER DRAWING Rev: --Part Number: SE141-116 Rev: 7--Part Description: WINDING FORM TYPE-C--Material Type: 316 SST--Material Thickness: VARIES	65707/5.0 -Sub:1 Op#:110	PS581		Certification / Map(s)
	GOVERNMENT SOURCE INSPECTOR TO WITNESS RT RESULTS.	65707/5.0 -Sub:1 Op#:111		Hold Point	
4.25 4.2.5.3	PERFORM A MAG PERMEABILITY CHECK OF THE MACHINED SURFACES USING A SEVERN PERMEABILITY INDICATOR GAGE. PERMEABILITY SHOULD BE NO GREATER THAN 1.02µ.----CHECK THE PERMEABILITY IN 3 PLACES ON EACH SIDE OF THE T SECTION AT LOCATIONS ADJACENT TO EVERY 5TH HOLE STARTING WITH HOLE 5 AND ENDING WITH HOLE 95. INSPECT ONE POINT ON THE T SECTON- ANOTHER BELOW THE VPI GROOVE AND THE LAST POINT ON THE FLANGE. REPEAT THIS PROCESS ON BOTH SIDES OF THE PART. THERE WILL BE A TOTAL OF 57 POINTS INSPECTED PER SIDE. ----COMPLETE THE IDC INDICATING THE PERMEABILITY RANGE.--Part Number: SE141-116--Part Description: PRODUCTION WINDING FORM TYPE-C	65707/5.0 -Sub:1 Op#:120	PS584		IDC: 2
	SOURCE FOR MAG PERMEABILITY	65707/5.0 -Sub:1 Op#:121		Hold Point	
	SET PART ON RISERS WITH EITHER DATUM -D- FLANGE DOWN. PLACE A RISER ON EITHER SIDE OF THE POLOIDAL BREAK TO ENABLE CLAMPING TO ENSURE THAT THE DATUMS ARE COPLANER. LAY A STRAIGHT EDGE ACROSS THE DATUM -D- FLANGE TO VERIFY ALIGNMENT. ENSURE RADIAL ALIGNMENT BY LAYING A STRAIGHT EDGE ACROSS THE QUALIFIERS CUT ON THE OD OF EACH FLANGE. USE CLAMPS AS NECESSARY TO FORCE THE CASTING INTO POSITION. ONCE THE ALIGNMENT IS SET, INSTALL THE POLOIDAL BREAK SHIM ASSEMBLY AND ACCOMPANYING HARDWARE AND INSULATION PER THE ASSEMBLY DRAWING. VERIFY CLEARANCE OF Ø.001" - Ø.002 BETWEEN BUSHING AND BOLT PER DRAWING NOTE 13. RECORD RESULTS IN IDC. APPLY THRED-GARD ANTI-SEIZE TO HARDWARE PER DRAWING NOTE 10. TORQUE THE ASSEBMLY TO 1500 FT-LBS. VERIFY GAP AT POLOIDAL BREAK PER IDC.	65707/5.0 -Sub:1 Op#:130			IDC: 2
3.1.1.4 3.2.2.1 3.2.2.2 4.2.6	SETUP AND INSPECT THE PART 100% PER THE DRAWING REQUIREMENTS. REFER TO PS593.--INSPECT FIDUCIALS THAT ARE LOCATED AROUND THE PERIPHERY OF BOTH FLANGES. --RECORD DIMENSIONS AS REQUIRED PER THE IDC'S.--EVALUATE INSPECTION DATA USING VERISURF AND REPORT FINDINGS TO ENGINEERING.--	65707/5.0 -Sub:1 Op#:132	PS593		IDC: 137
	SOURCE FOR DIMENSIONAL	65707/5.0 -Sub:1 Op#:133		Hold Point	
3.1.1.3 4.2.3.1 4.2.3.2	THE RESISTANCE OF THE MID-PLANE ELECTRICAL INSULATION SHALL BE GREATER THAN 500 KOHMS WHEN TESTED AT 100 VDC. TEST 1: THE INSULATION RESISTANCE BETWEEN THE MID-PLANE POLOIDAL BREAK SHIM AND WINDING FORM SHALL BE MEASURED. DURING THIS TEST, THE BOLTS SHOULD BE IN THEIR NORMAL STATE (I.E., ELECTRICALLY "FLOATING"). THE MID-PLANE SHIM SHALL BE CONNECTED TO ONE SIDE OF THE MEGGER, AND THE CASTING SHALL BE CONNECTED TO THE OTHER. RECORD RESULTS IN IDC. TEST 2: ALL OF THE BOLTS SHALL BE ELECTRICALLY CONNECTED (JUMPERED) TOGETHER IN ONE GROUP. THE MID-PLANE CASTING (SHIM) AND THE WINDING FORM SHALL BE ELECTRICALLY CONNECTED TOGETHER IN A SECOND GROUP. THE INSULATION RESISTANCE BETWEEN THE JUMPERED BOLTS (GROUP 1) AND THE JUMPERED WINDING FORM AND MID-PLANE (GROUP 2) SHALL BE MEASURED FOR COMPLIANCE. RECORD RESULTS IN IDC.	65707/5.0 -Sub:1 Op#:140			IDC: 2

QA Plan Summary
NCSX Modular Coil Winding Form Machining

Spec Ref	Activity	Visual Mfg Ref.	Ref Procedure	Witness/Hold Point	Reporting/Documentation Req
	SOURCE FOR ELECTRICAL TEST	65707/5.0 -Sub:1 Op#:150		Hold Point	
	BURNOUT RECTANGLE PER MATERIAL CARD.	65707/5.0 -Sub:8 Op#:10			
	MACHINE BOTH SIDES OF SHIM TO A FULL CLEAN UP. THICKNESS TO FINISH AT 2.050 +0/-.003. MACHINE ONE OF THE LONG SIDES TO A CLEAN UP. 4 INCH WIDTH DIMENSION IS NOT CRITICAL.----NO IDC IS NECESSARY. THIS IS A TEMPORARY SHIM PIECE.	65707/5.0 -Sub:8 Op#:20			
	SAW 20 PIECES TO .5-x1-x3.5- FROM CUSTOMER SUPPLIED MATERIAL. DELIVER SHIMS TO RON BACK IN HIGH BAY MACHINING.	65707/5.0 -Sub:11 Op#:10			
	RECEIVE CUSTOMER SUPPLIED CASTING	65707/5.0 -Sub:2 Op#:10			
	MACHINE THE SHIM COMPLETE PER THE DRAWING AND CNC PROGRAMS.	65707/5.0 -Sub:2 Op#:20			
	ASSEMBLE (5) OF THE INSULATING SLEEVES INTO THE SHIM AND BOND USING LOCTITE 411. DO NOT INSTALL THE BUSHINGS IN THE OUTSIDE HOLES. THEY WILL BE INSTALLED LATER.	65707/5.0 -Sub:2 Op#:30			Certificate of Conformance
	SAW OFF 16- AND MOVE TO NEXT WORK CENTER.	65707/5.0 -Sub:3 Op#:10			Certificate of Conformance
	MACHINE PER THE DRAWING FOR A SLIP FIT WITH MATING DETAIL. OBTAIN FINISHED MACHINED CASTING SHIM BEFORE FINAL SIZING THE O.D. OF THE SLEEVE.	65707/5.0 -Sub:3 Op#:20			
	RECEIVE MATERIAL--NOTIFY CFT AND FORWARD MATERIAL STORES.	65707/5.0 -Sub:4 Op#:10			Material Certification
	SAW OFF 30- LENGTH AND MOVE TO NEXT WORK CENTER.	65707/5.0 -Sub:5 Op#:10			Certificate of Conformance
	MACHINE PER THE DRAWING FOR A SLIP FIT WITH MATING DETAIL. CHECK FINISHED MACHINED CASTING BEFORE FINAL SIZING THE O.D. OF THE SLEEVE.	65707/5.0 -Sub:5 Op#:20			
	SAW 13- LENGTH AND MOVE TO NEXT WORK CENTER.	65707/5.0 -Sub:6 Op#:10			
	RECEIVE MATERIAL	65707/5.0 -Sub:7 Op#:10			
	MACHINE THE PROFILE LEAVING STOCK PER PROGRAM.----ALSO MACHINE OUT FLAT STOCK PIECES FOR SHIMS BEHIND THE OUTSIDE OF POLOIDAL BREAK FLANGE PER CNC PROGRAM.	65707/5.0 -Sub:7 Op#:20			
	SAW TO A LENGTH OF 6.75-.	65707/5.0 -Sub:9 Op#:10			Material Certification
	MACHINE BEARING PLATES COMPLETE FROM MATERIAL SUPPLIED BY MAJOR TOOL.--VENDOR TO SUPPLY DIMENSIONAL INSPECTION REPORT.--MTM TO DO ALL NDT TESTING PER NOTE 5.--Part Number: SE141-137 Rev: 1--Part Description: BEARING PLATE--Dimensional Report: VENDOR SUPPLIED--Dimensional Report: VENDOR SUPPLIED	65707/5.0 -Sub:9 Op#:30			Dimensional Report
4.2.5 3.1.1.5.2	PERFORM A MAGNETIC PERMEABILITY CHECK USING A SEVERN PERMEABILITY INDICATOR GAGE. PERMEABILITY SHOULD BE NO GREATER THAN 1.03µ.--Part Number: SE141-137 Rev: 1--Part Description: BEARING PLATE DETAIL	65707/5.0 -Sub:9 Op#:40	PS584		IDC: 3
	SAW TO A LENGTH OF 10.5-.	65707/5.0 -Sub:10 Op#:10			Material Certification
	MACHINE BEARING PLATES COMPLETE FROM MATERIAL SUPPLIED BY MAJOR TOOL.--VENDOR TO SUPPLY DIMENSIONAL INSPECTION REPORT.--MTM TO DO ALL NDT TESTING PER NOTE 5.----Part Number: SE141-138 Rev: 1--Part Description: BEARING PLATE--Dimensional Report: VENDOR SUPPLIED--Dimensional Report: VENDOR SUPPLIED	65707/5.0 -Sub:10 Op#:30			Dimensional Report
4.2.5 3.1.1.5.2	PERFORM A MAGNETIC PERMEABILITY CHECK USING A SEVERN PERMEABILITY INDICATOR GAGE. PERMEABILITY SHOULD BE NO GREATER THAN 1.03µ.--Part Number: SE141-138 Rev: 1--Part Description: BEARING PLATE DETAIL	65707/5.0 -Sub:10 Op#:40	PS584		IDC: 3