|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Princeton Plasma Physics Laboratory**  **Procedure** | | | | | | |
| Procedure Title:  **Installation of the Upper and Lower MGIs** | | | | | | |
| Number:  **D-NSTX-IP-3637** | | Revision:  **1** | | | Effective Date: 10/29/14  Expiration Date: 10/29/17  *(3 yrs. unless otherwise stipulated)* | |
| **Procedure Approvals** | | | | | | |
| Author: | | | | | | Date |
| ATI: | | | | | | Date |
| RLM: | | | | | | Date |
| Responsible Division: **NSTX Operations** | | | | | | |
| **Procedure Requirements**  Designated by RLM  **1101\*\*\*\*MGI1**  LABWIDE: | | | | | | |
| x | Work Planning Form (ENG-032) | |  | Lockout/Tagout (ESH-016) | | |
|  | Confined Space Permit (5008, Sec 8, Chap. 5) | |  | Lift Procedure (ES-MECH-007) | | |
|  | Master Equip. List Mod (GEN-005)) | | x | ES&H Review (NEPA, IH, etc.) | | |
|  | RWP (HP-OP-20) | |  | Independent Review | | |
|  | ATI Walkdown | | x | Pre-Job Brief | | |
| x | Post-job Brief | | x | Hazard Analysis | | |
|  | Run Copy Required (performance of procedure must be documented and archived per ENG-030 page 10) | |  | Special archiving requested for completed Run Copies: | | |
| D-SITE SPECIFIC: | | | | | | |
| x | D-Site Work Permit (OP-AD-09) | |  | Door Permit (OP-G-93) | | |
|  | Tritium Work Permit (OP-AD-49) | |  | USQD (OP-AD-63) | | |
| x | Pre-Job Brief (OP-AD-79) | |  | T-Mod (OP-AD-03) | | |
|  |  | |  |  | | |

|  |  |
| --- | --- |
| **REVIEWERS** (designated by RLM) | |
| Accountable Technical Individual | J. Winston |
| Test Director |  |
| Independent Reviewer |  |
| D-Site Shift Supervisor |  |
| NSTX | M. Cropper |
| Work Control Center | D. McBride |
| Vacuum |  |
| Computer |  |
| Health Physics | HP rep |
| Quality Assurance/Quality Control | QA rep |
| AC Power |  |
| Maintenance and Operations Division |  |
| Energy Conversion System/Motor Control System |  |
| Engineering |  |
| Environmental Restoration & Waste Management Division |  |
| Water |  |
| Neutral Beam Heating (Heating Systems Branch of Electrical Engineering) |  |
| Radiofrequency (Heating Systems Branch of Electrical Engineering) |  |
| Facilities |  |
| Diagnostics | R. Raman |
| Environmental, Safety, & Health | IH rep |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **TRAINING** (designated by RLM) | | | | |
| No training required \_\_\_\_\_\_x\_\_\_\_\_ | Instructor \_\_\_\_\_ \_\_\_\_\_ | | | |
| Personnel (group, job title or individual name) | | Read Only\* | Instruction | Hands On |
|  | |  |  |  |
|  | |  |  |  |
|  | |  |  |  |
|  | |  |  |  |
|  | |  |  |  |
|  | |  |  |  |
|  | |  |  |  |
| RLM | | | | |

\*”Read Only” training for Administrative, Alarm Response, and Emergency Operations procedures must be documented on a Record of Training form (attachment 6). The completed Run Copy will serve as the documentation of “Read Only” training for all other types of procedures.

1. PURPOSE

The purpose of this procedure is to give guidance for the installation of the upper Massive Gas Injector (MGI) and supports and the lower MGI supports to the TIV.

2. SCOPE

This procedure includes the installation of the upper MGI, support brackets, TIV, air lines and gas delivery lines from the MGI to outside the umbrella structure. For the lower MGI, this procedure includes the installation of the injection tube/bellows inside the umbrella, the tube support bracket, TIV and air lines. The installation of the lower MGI and support brackets will be covered in a separate procedure.

3. REFERENCES

E-EA3502 Upper MGI System Details

E-EA3504 Lower MGI System Details

E-EA3506 MGI Valve Adapter Spool Piece

A-EA3507 Custom Flange

A-EA3508a Bolt Insulator

A-EA3508b Bolt Insulator

E-EA3510 Upper MGI Support Assembly

E-EA3511 Lower MGI Assembly

E-EA3513 Upper MGI Assembly

E-DC1738 TF Inner Core and Center Stack Assembly

4. PRECAUTIONS

#### Individuals are not permitted to lift more than 50 lbs. at any one time. If an object weighs in excess of 50 lbs., then it shall be lifted by more than one individual, or with the aid of mechanical system(s).

#### An approved method of fall protection shall be established for individuals working at elevated positions.

#### Use appropriate PPE (per JHA) and or per guidance from Industrial Hygiene

#### There shall be no materials removed from the NSTX Test Cell without being surveyed by Health Physics.

# 5. prerequisites

#### a. The workers and ATI have reviewed the Job Hazard Analysis for this job.

#### \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ATI

#### b. Work Control Center (WCC) has logged in this procedure and has approved the work package. Under no circumstances should the work proceed without the approved “blue or yellow folder” from the WCC. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ATI

#### c. A Pre-job Briefing must be completed prior to work starting. The only personnel allowed to work under this procedure are those that attend this briefing.

#### Completed: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_ ATI

#### d. If filing or grinding etc. is required, use vacuum cleaners to keep chips and filings to a minimum.

6. PROCEDURE - Upper MGI (MGI-3) (Attachments A & B)

|  |  |  |
| --- | --- | --- |
|  | Install 2 ¾” air valve (label AV148) with body facing radially outward (Attachment A) on 2 1/8” to 2 ¾” adapter spool piece at the Bay L top organ pipe (345 degree). |  |
|  | Loosely bolt support rod base plates (part #3 of E-EA3502) to the threaded rod on center stack structure adjacent to 2 1/8” to 2 ¾” adapter spool piece (Attachment B). |  |
|  | Thread the 3/8”-16 threaded rod (part #10) into the base plate until it bottoms out |  |
|  | Loosely double nut the tab (part #7) onto the 3/8-16 rod |  |
|  | Adjust until tab is vertically centered on the upper flange of the 2 1/8” to 2 ¾” adapter spool piece and tighten up bolts. |  |
|  | Tack weld tab to 2 ¾” flange |  |
|  | Install adapter spool piece with bolt insulators and washers (E-EA3502 and E-EA3508a), insulating flange (E-EA3507) and the MGI (Attachment A).  NOTE: Do not tighten rotatable flange until ¼” holes in center of top plate (part #5) line up with holes on top of the MGI valve. |  |
|  | Install the 1” thick G10 insulator (part #8), and the support pieces (with bolt insulators and washers) (parts 1, 5, 6 and E-EA3507b) and align ¼” holes in the center of the top plate (part #5) with the holes on the top of the MGI.  NOTE: The base plates (tabs), (part #2), are not welded to the back plate, (part #1), to allow for some field fit adjustments |  |
|  | Loosely bolt the base plate (part #2) to the CS ½” threaded rod and adjust base plate to back plate |  |
|  | Tighten 1/2” nut and tack weld base plate to the back plate. |  |
|  | Locate on the center stack structure the location where the 3/8” rod (part #11) will be welded for the base plate. |  |
|  | Disassemble the entire assembly and complete the 1/16” weld of the tab to the 2 1/8” to 2 ¾” adapter spool piece drawing (E-DC1738)  QA\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |

PROCEDURE - Upper MGI (cont.)

|  |  |  |
| --- | --- | --- |
|  | Complete the weld of the base plate tabs (part #2) to the back plate (part #1, as per E-EA3502)  QA\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
|  | Weld the 3/8” rod (part #11) to the CS structure as per drawing E-DC1738  QA\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
|  | Re-install the entire assembly and bolt a 4 ft long grounding strap to the MGI body using one of the radially outer bolts on the bottom side of the MGI casing. |  |
|  | Install the 2 gas lines (~4’ long) on the MGI with compression fittings with leads exiting the Bay L umbrella scallop. |  |
|  | Install the air lines to the 2 ¾” TIV |  |

Comments: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. PROCEDURE - Lower MGI (MGI-1) (Attachments C & D)

|  |  |  |
| --- | --- | --- |
|  | Bolt the G10 bracket (E-EA35604, part #8) to the SS bracket (part #9) (Attachment D). |  |
|  | Bolt the feed tube (parts 1, 2, 3, and 4 of E-EA3504) to the 2 1/8” to 2 ¾” adapter elbow at the lower 180 degree organ pipe (Attachment C). Do not tighten the elbow to allow for angular adjustment. |  |
|  | Adjust the feed tube angular location such that the G10 bracket (part 8) is flush with the outside of the umbrella and clamp brackets to the umbrella. Ensure this location is clear of the PF bus work going through the Bay F scallop. |  |
|  | Install 2 ¾” CFF air valve, label AV140 and ensure clearance with the dust collector.  Note: If there is an interference with the dust collector, contact C. Skinner and W. Blanchard prior to making and modifications |  |
|  | Locate on the umbrella the location of the (4) 3/8-16 studs (part #10, as per E-EA3502) to be welded to the umbrella |  |
|  | Tack weld the SS bracket (part #9) to the 1 ½” tube |  |
|  | Disassemble the injector and weld the SS bracket to the 1 ½” tube per drawing E-EA3504  QA\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
|  | Weld the (4) 3/8-16 studs (part #10, as per E-EA3502) to the umbrella per drawing E-EA3511  QA\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
|  | Reinstall the assembly and install the air lines to the TIV |  |

# 8. Completion signoff

This procedure and post job brief has been completed and verified by the signatures below.

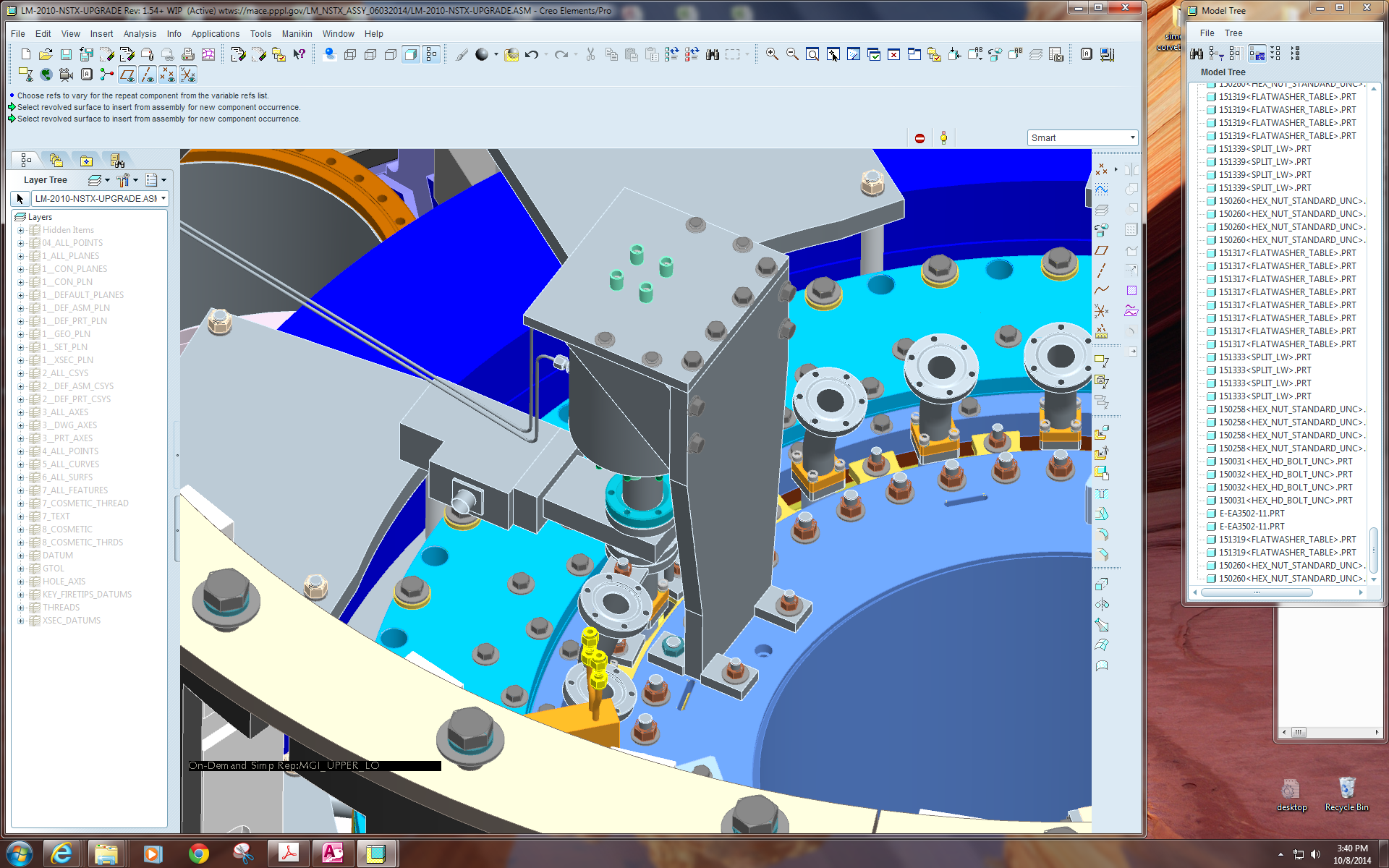
|  |  |  |  |
| --- | --- | --- | --- |
| Lead Technician |  |  |  |
|  | Signature |  | Date |
| ATI |  |  |  |
|  | Signature |  | Date |
| QA/QC Representative |  |  |  |
|  | Signature |  | Date |
| Field Supervisor |  |  |  |
|  | Signature |  | Date |

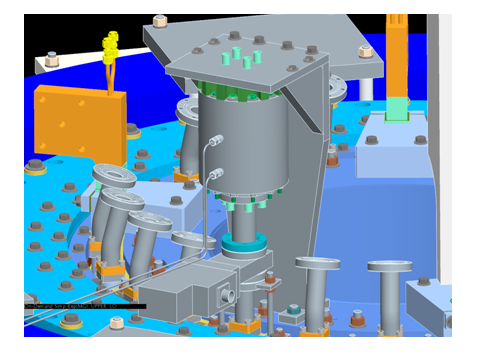
Return this completed procedure to the Work Control Center

|  |
| --- |
| Comments: |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |

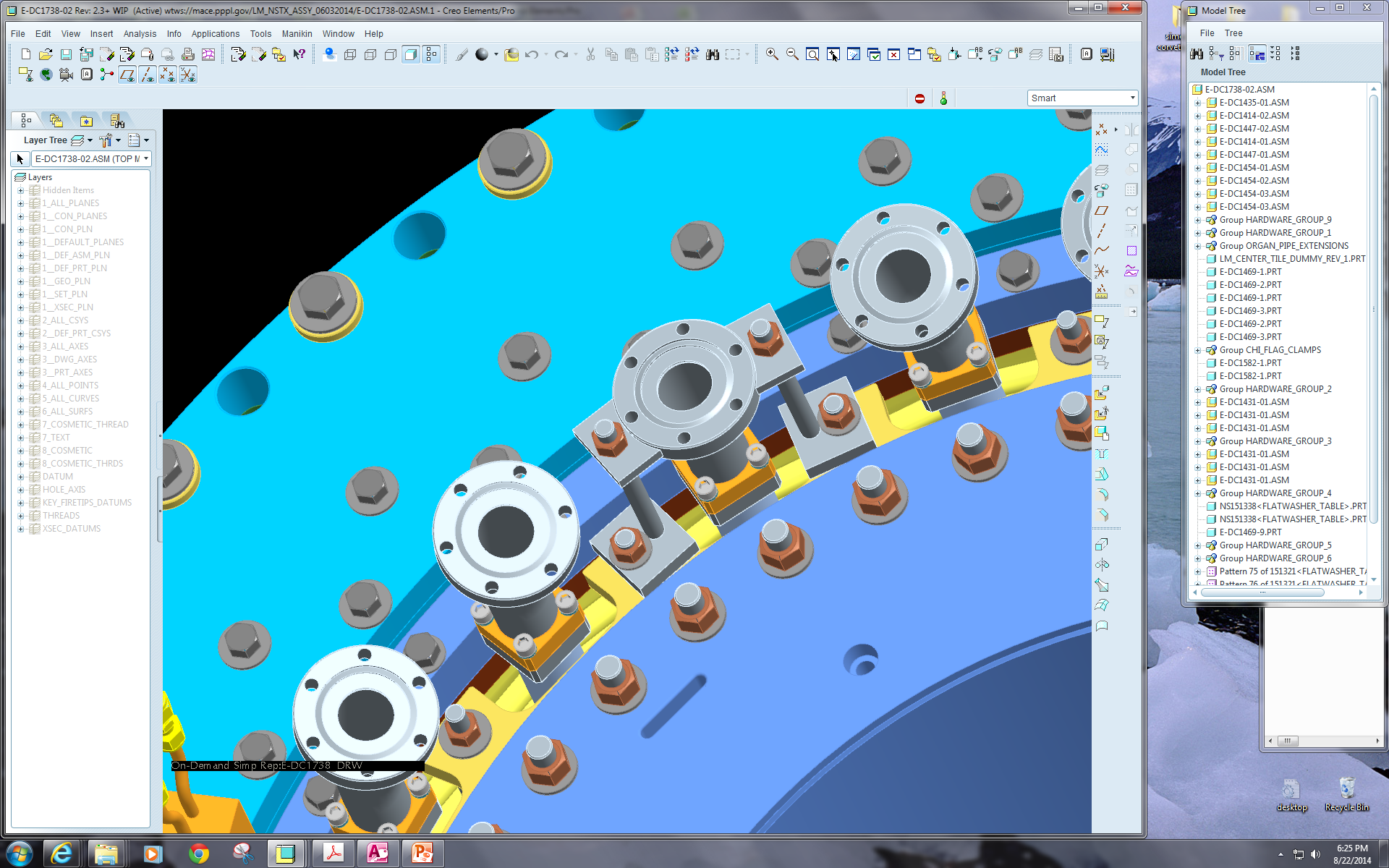
Note: The run copy of this procedure shall be returned to the operations center upon completion

Attachment A Upper MGI

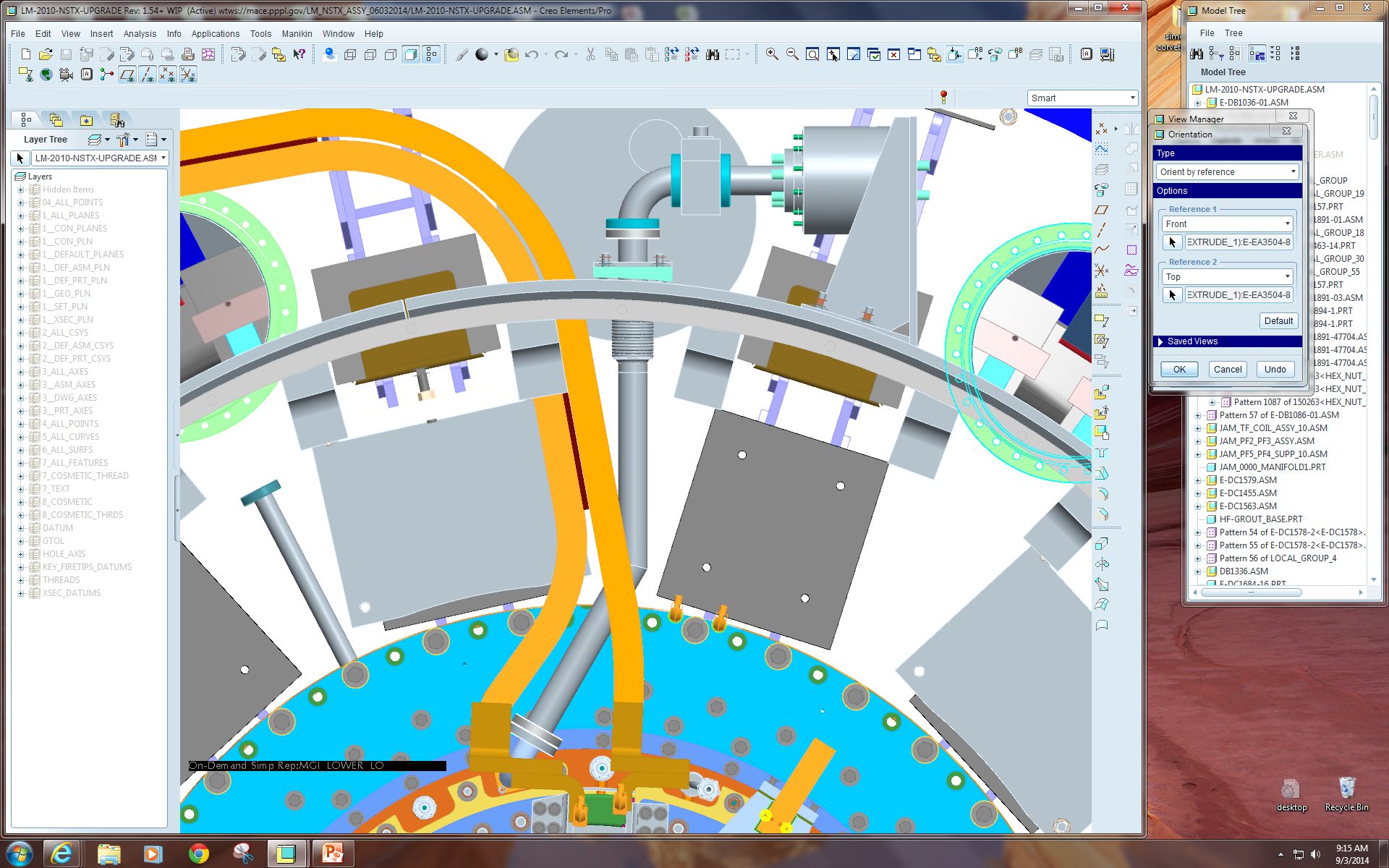


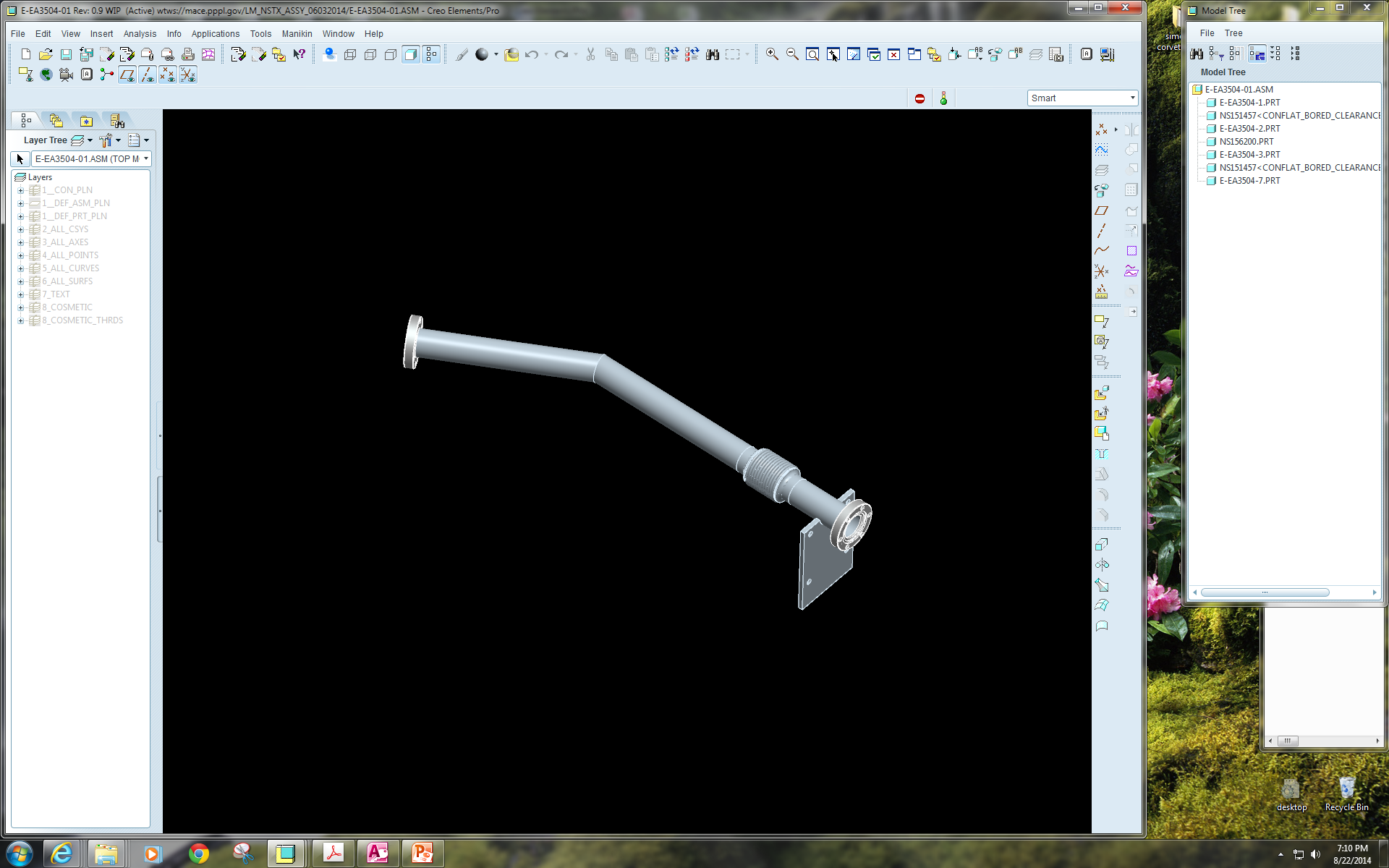
–

Attachment B Upper MGI



Attachment C Lower MGI





Attachment D Lower MGI

