

<3D MECANICAL EQUIPMENT INTEFACE >>

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Sections changed in this revision are identified with a vertical line in left margin

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ATTACHMENT 1

1. SCOPE:

This document is a **requisition** for vendors who would be in charge of provided geometric models of *mechanical equipment* and an internal **procedure** about how to integrate this model into a 3D model.

2. VENDOR REQUISITION:

VENDOR is responsible to provide standard neutral files for a suitable interface. These files must have the following requirements:

1. Standard neutral file must be **STEP AP203**.
2. The files size must not exceed **30 MB** to ensure data integrity. VENDOR can scatter the 3D model file in several files in order to reduce the size of each submitted file. For example, ten files of 30MB are preferable than 1 file of 300 MB.

Name	Date modified	Type	Size
2021_02_25_VendorName_V856500_1of3_Rev01.STEP	25/02/2021 7:58	STEP File	17.050 KB
2021_02_25_VendorName_V856500_2of3_Rev01.STEP	25/02/2021 7:54	STEP File	22.581 KB
2021_02_25_VendorName_V856500_3of3_Rev01.STEP	25/02/2021 7:59	STEP File	13.864 KB

Figure 1. Name and size of files

3. The **FILE NAME** must show at least, the vendor name, date, revision and the sequential number in the split (it could be 1of1)
4. The allowed orientation is: **Z is UP**. Mostly Mechanical Programs have an orientation where Y is Up. Please mind in change after sending the interface.

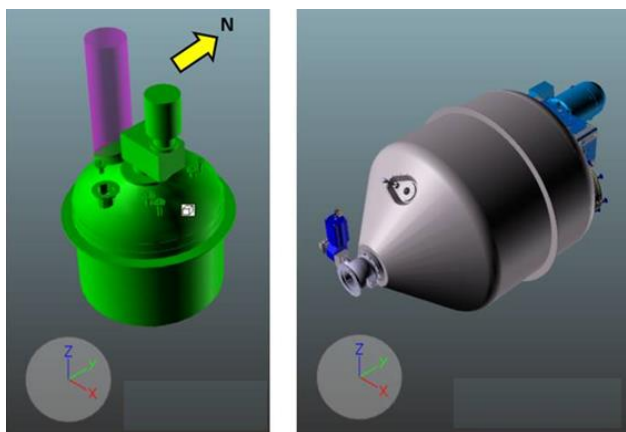


Figure 2. Z is UP

5. The model must have an adequate **DATUM POINT**. The contractor uses this Datum Point as a reference in the Equipment Layout. Please, check Attachment 1; EQUIPMENT ARRANGEMENT DATUM POINT LEGEND SHEET for any advice.

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6. Interface files must be always **NATIVE FILES**. That means, interface files never contains external data, like reference models and so on. If some external data could be necessary, please, including only native files.
7. A **NAVISWORK FILE** could be sent to show the equipment whit the mechanical design complexity. This file is included in the Naviswork Project.

3. CONTRACTOR PROCEDURE.

3.1 CHECK AND STORE.

The contractor first duty is to ensure that the points listed in Title 2 of this document are provided. For this action, Naviswork Simulate might be required.

After that, the Mechanical Equipment Interface must be stored in a logical folder system to ensure the correct uploading and also an effective interface between corporations.

In the server project, //SERVER/PROJECT/EXCHANGE/External_References there is a folder named Mechanical_Equipment_Interface. Insite this folder, a **File Storage System** where files are organized according to the "unit/process-area /construction-area /vendor etc.." as in the 3D Navigation Panel.

Es001vs0154 > BIO > EXCHANGE > External_References > Mechanical_Equipment_Interface > C1-EQ		
Name		Date modified
0_BACK_UP		26/04/2021 11:58
2021_02_25_VendorName_V856500_1of3_Rev01.STEP		25/02/2021 7:58
2021_02_25_VendorName_V856500_2of3_Rev01.STEP		25/02/2021 7:54
2021_02_25_VendorName_V856500_3of3_Rev01.STEP		25/02/2021 7:59

Figure 3. File storage System

NAMING RULE: 2021_02_25_VendorName_IdCode_1of3_REV01

This naming rule is absolutely mandatory, in order to the appropriate identification of your model within the Project Model .

3.2 IMPLANTATION AND EQUIPMENT LAYOUT.

3.2.1 Evaluate the complexity of the model.

Normally Mechanical designer works whit a level of complexity unnecessary in Plant designs. When the file is displayed in Naviswork Simulate or imported in AVEVA-3ED (**but never saved**), take into account the '**local complexity**' (the complexity in a limited chunk of space). *Figure 4* shows a level of local complexity not allowed in AVEVA-3ED.

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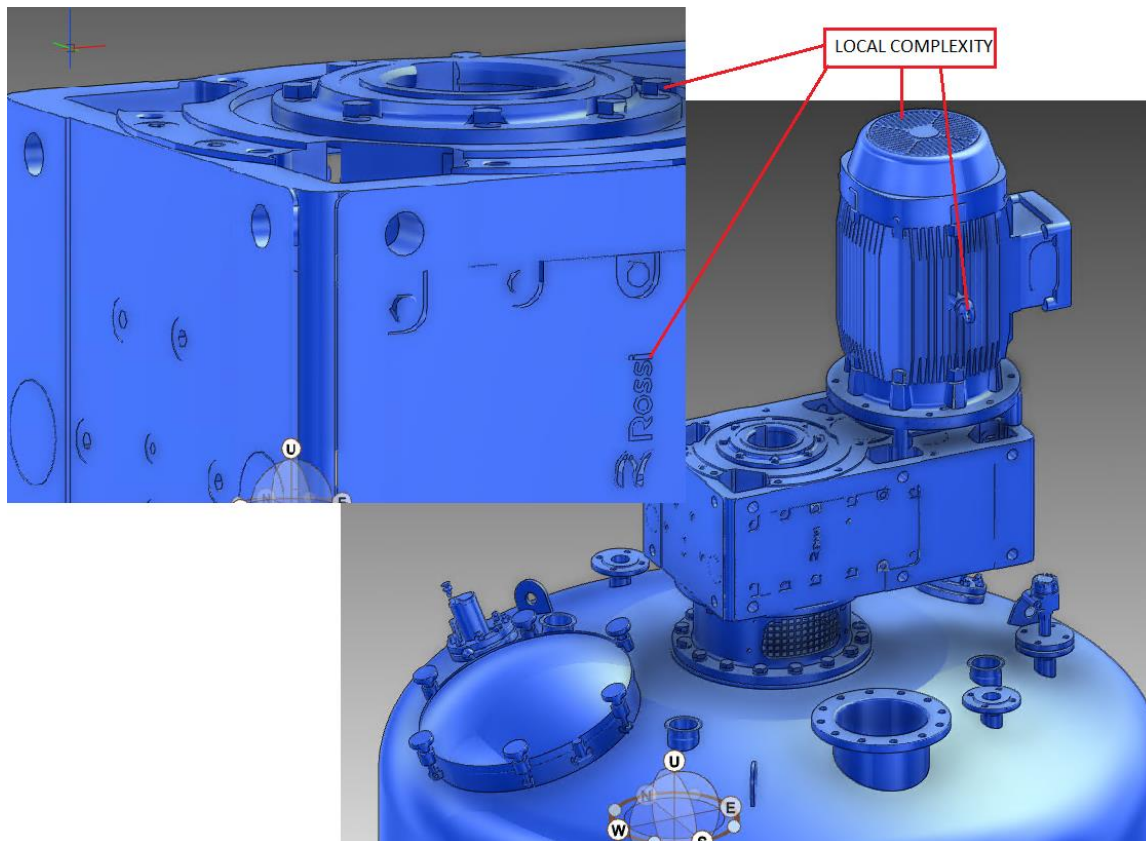


Figure 4. Local Complexity in a Model. Not allowed in AVEVA-3ED.

In certain cases, more complexity in the E3D model could be required. For instance, when an **RVM** file with more detail is necessary. But not for a more detailed Naviswork File (**NWD**) because native files should be displayed directly in a Naviswork File (See Title 3.3 of this document)

3.2.2 Mechanical Equipment Interface Import Utility

Although the complexity was high, Import into AVEVE 3ED using the MEI import utility (see [Figure 5](#)) but never save it.

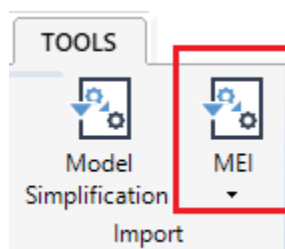


Figure 5. MEI Import utility

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If you still don't know the equipment implantation, import to the 0,0,0 coordinate and pay attention to the datum point and equipment orientation (Z is UP) (*Figure 6*). The equipment implantation must be done by the EQUI ATTRIBUTES, both position and orientation (*Figure 7*). Never move Elements in Primitive Category (*Figure 8*) because it is needed to know the position of the datum point for the Equipment Layout.

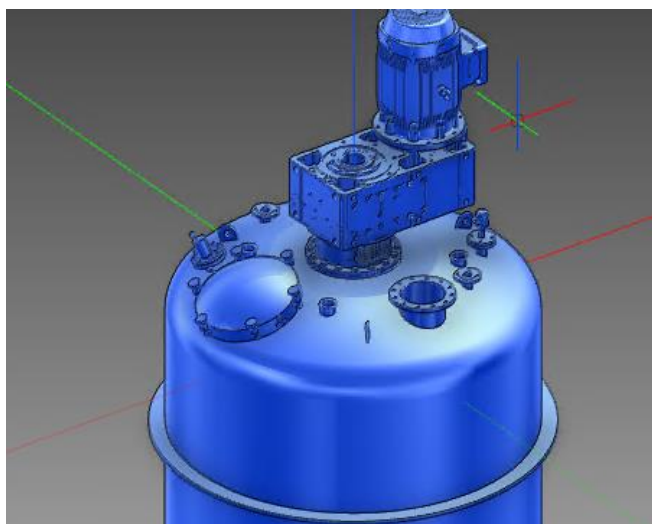


Figure 6. Datum Point defined by Vendor

Type	EQUI
Position WRT Owner	E 158160mm N 191715mm U 107050mm
Orientation WRT Owner	Y is N and Z is U

Figure 7. Datum Point is set in EQU Attributes.

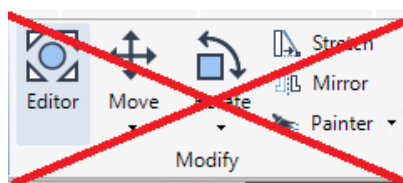


Figure 8. Never modified Elements in Primitive Category

The option default (and preferred) is to use the imported primitives (GENPRI and GENCUR) just for help in the design tasks (see *Figure 9*). The equipment must be created as indicated in the 'E3D DESIGN AND NAMING CONVENTION' of the project. An example of a structure (EQUI/SUBE) is showed in *Figure 10*, All SUBEs contain primitives like nozzle (NOZZ), box (BOX), cylinders (CYLI) and pyramids (PYRA). **Before saving work, delete the import file.**

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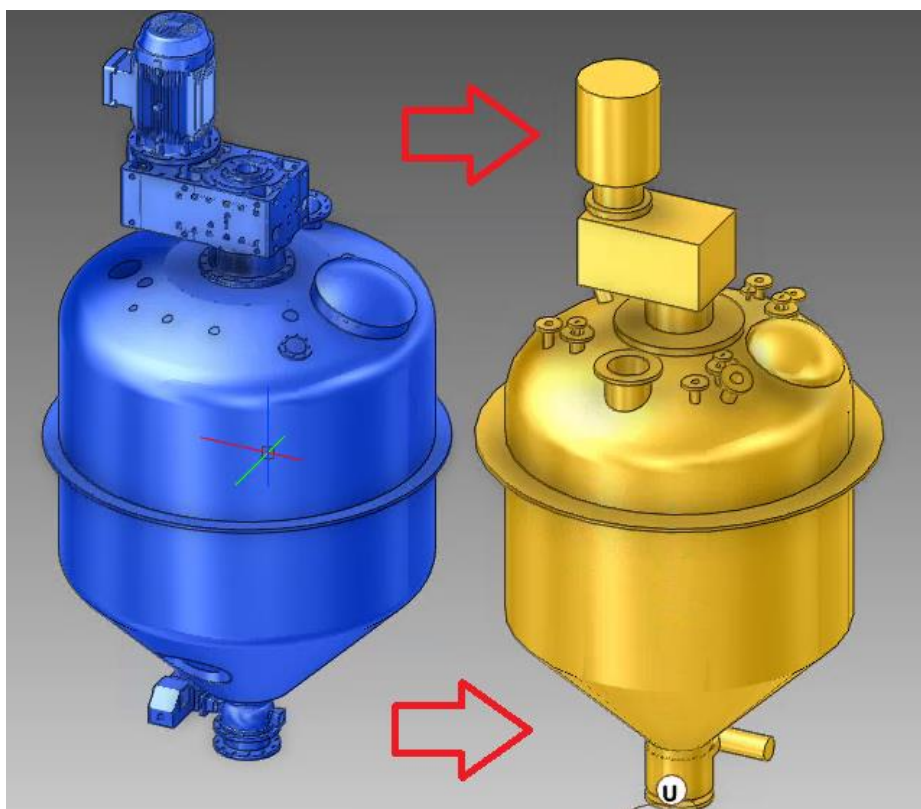


Figure 9. Refer imported primitives (GENPRI and GENCUR) and create primitives (NOZZ, BOX, CYLY, PYRA, etc.)

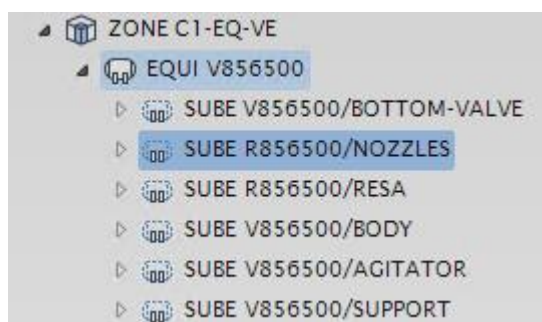


Figure 10. EQUI structure

3.2.3 Model simplification Import Utility

When a more detailed import is required, never use the MEI import Simplification and save. Contact the Model Coordinator or Administrator to get a simplicial file ([Figure 11](#)).

Write an email whit the name of the files, that have to be in the exchange folder (see Title 3.1), and as subject '**Project-Number: MEI SIMPLIFICATION**'. In a few days, a file with a _simplified will be stored in the folder.

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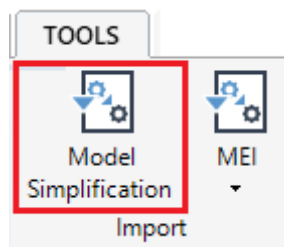


Figure 11. Model Simplification Utility

The most accurate configuration is to set the Simplification Level as Aggressive and increase removing tolerances.

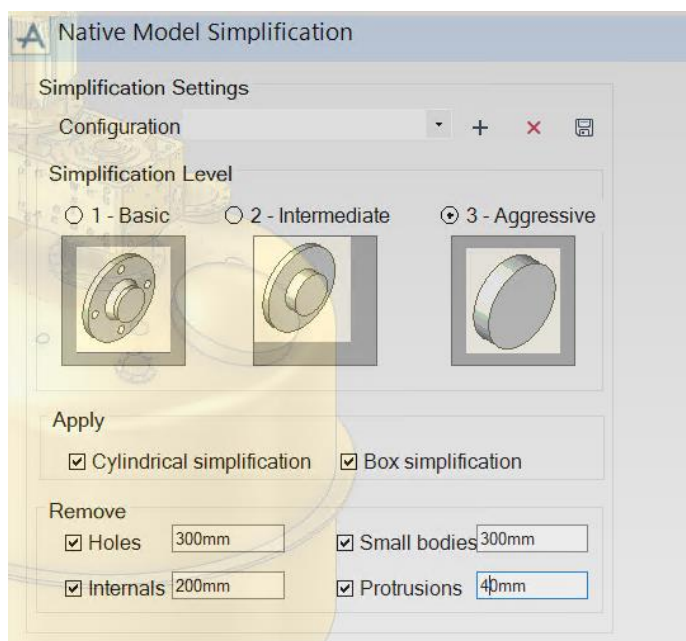


Figure 12. Agressive Simplification

3.3 DISPLAY MECHANICAL EQUIPMENT INTERFACE IN NAVISWORK.

Mechanical Equipment could be displayed showing the complexity of the native files but only in Naviswork.

File Storage System helps to find files and also to structure the NavisWork selection Tree (Figure 13).

Mechanical_Equipment_Interface.nwd a must be displayed in Naviswork simulate, hidden by default to improve the visibility of the 3ED equipment, properties and colours (Figure 14).

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Es001vs0154 > BIO > EXCHANGE > External_References > Mechanical_Equipment_Interface

Name	Date modified
C1-EQ	26/04/2021 18:01
D1-EQ	26/04/2021 17:46
Mechanical_Equipment_Interface.nwd	26/04/2021 17:48
Mechanical_Equipment_Interface.nwf	26/04/2021 17:48

Es001vs0154 > BIO > EXCHANGE > External_References > Mechanical_Equipment_Interface > C1-EQ

Name
0_BACK_UP_C1-EQ
2021_02_25_...V856500_Rev01_Mechanical.STEP
2021_02_25_...V856500_Rev01_Mechanical.IMPLANTATION.txt
2021_02_25_...V856500_Rev01_Mechanical.SIMPLIFICATION.txt
2021_02_25_...V857100_Rev01_Mechanical.STEP
2021_02_25_...V857100_Rev01_Mechanical.IMPLANTATION.txt
2021_02_25_...V857600_Rev01_Mechanical.STEP
2021_02_25_...V8576_...Rev01_Mechanical.IMPLANTATION.txt
C1-EQ.nwd
C1-EQ.nwf

Figure 13. File Store System

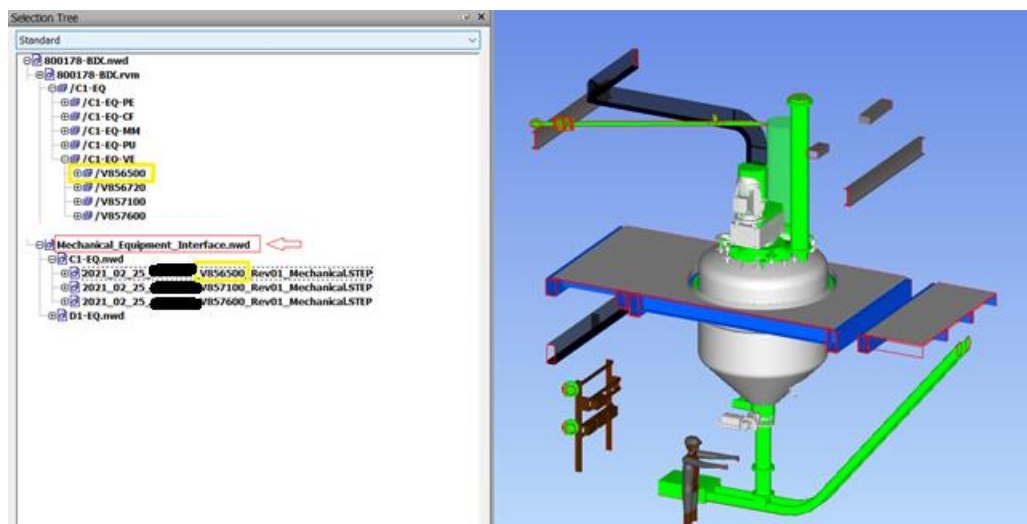


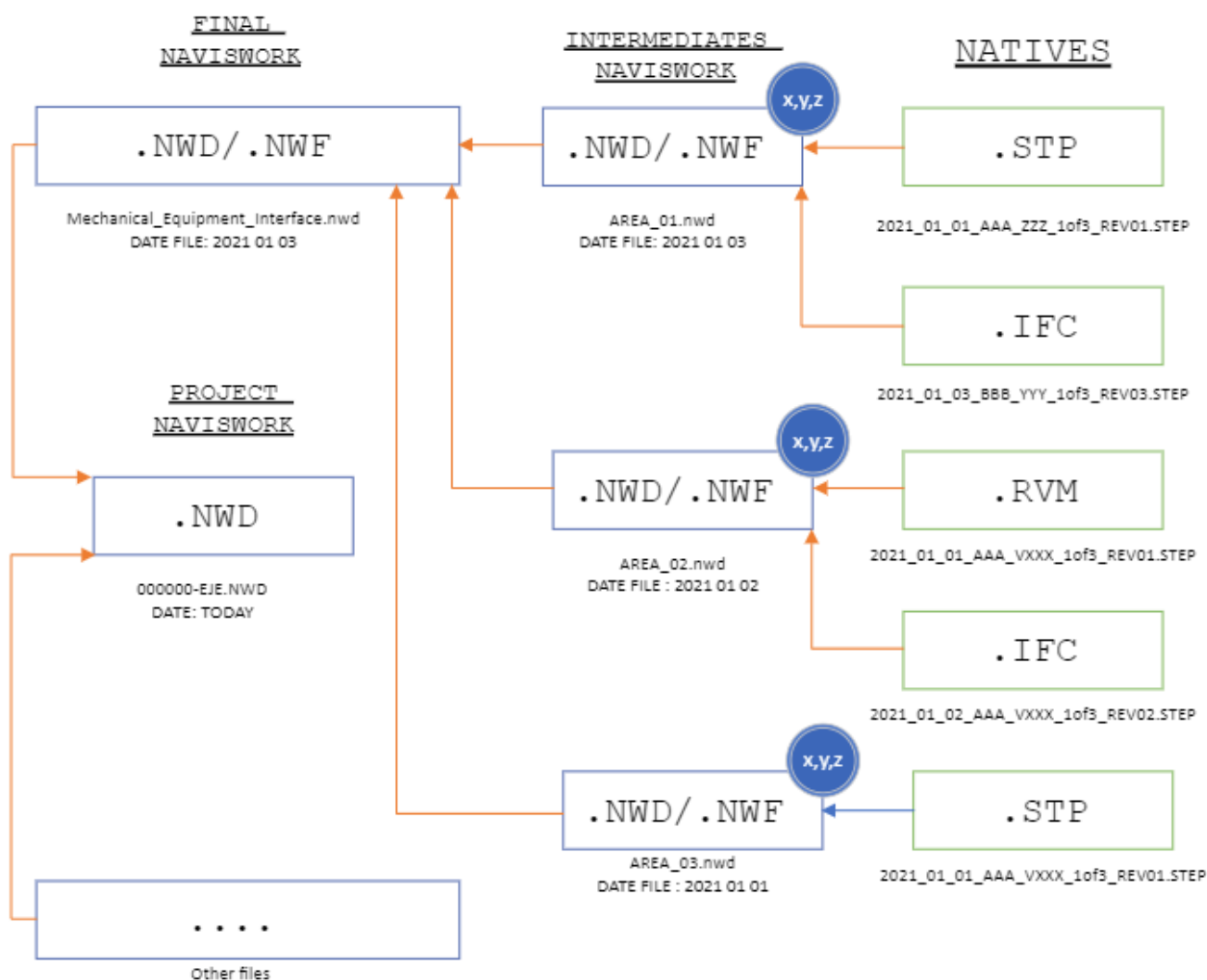
Figure 14. Mechanical Equipment Interface in Naviswork

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3.3.1 Why we should have Intermedies Navisworks.

- El principal motivo es repartir el peso de los archivos (tiempo en abrir). Tambien repartir la posibilidad de 'romper el archivo'.
- Es mas eficiente que un .nwf cargue, guarde, etc.. archivos tippo .nwd que la mayoría de las otras extensiones de archivo.



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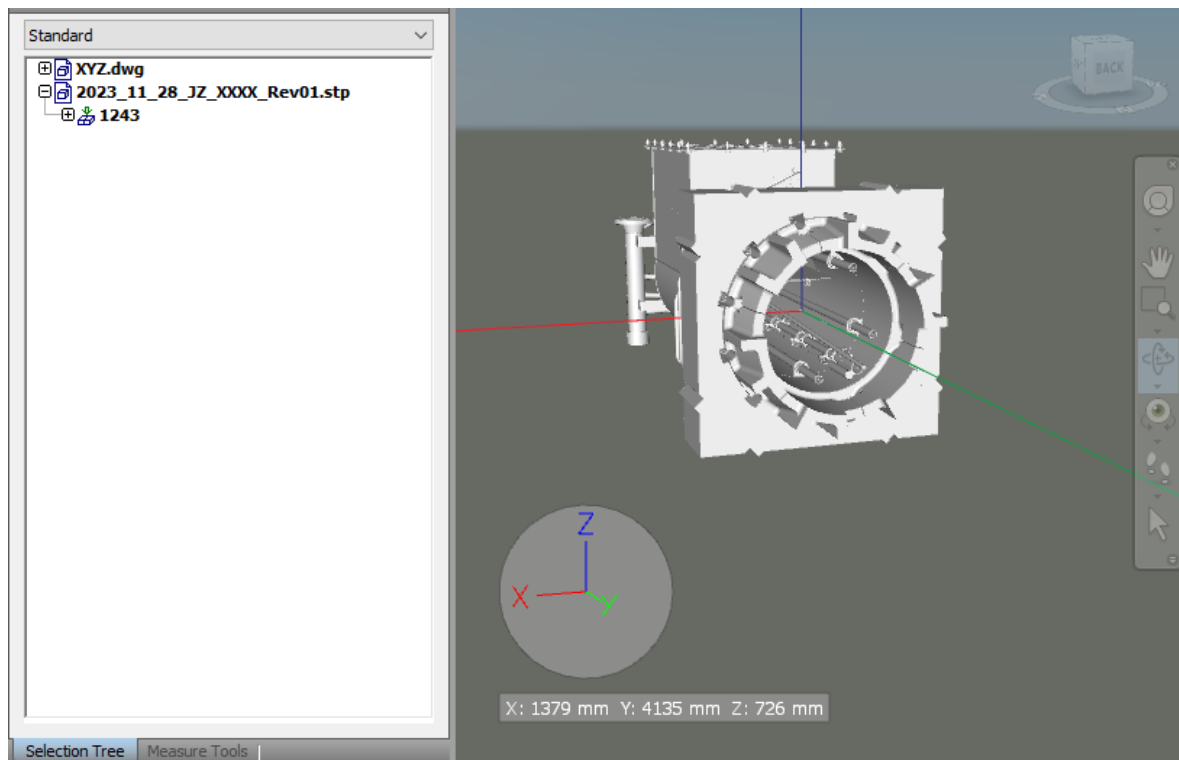
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3.3.2 Leasons Learned

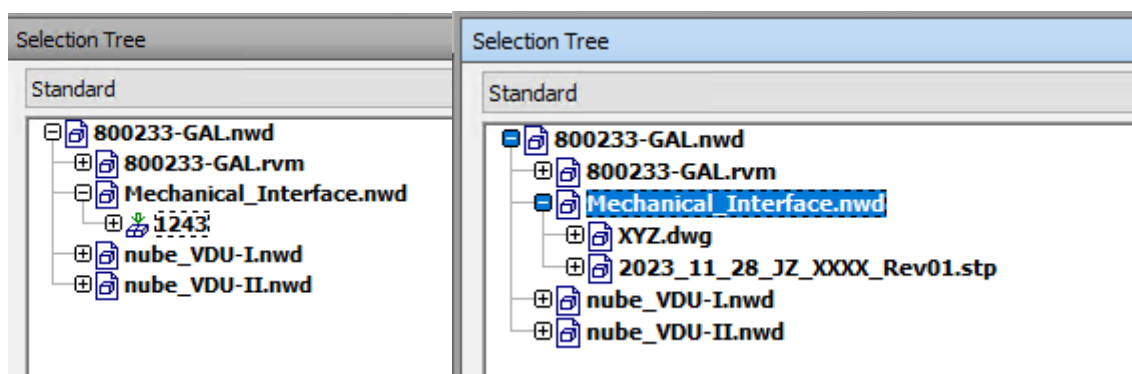
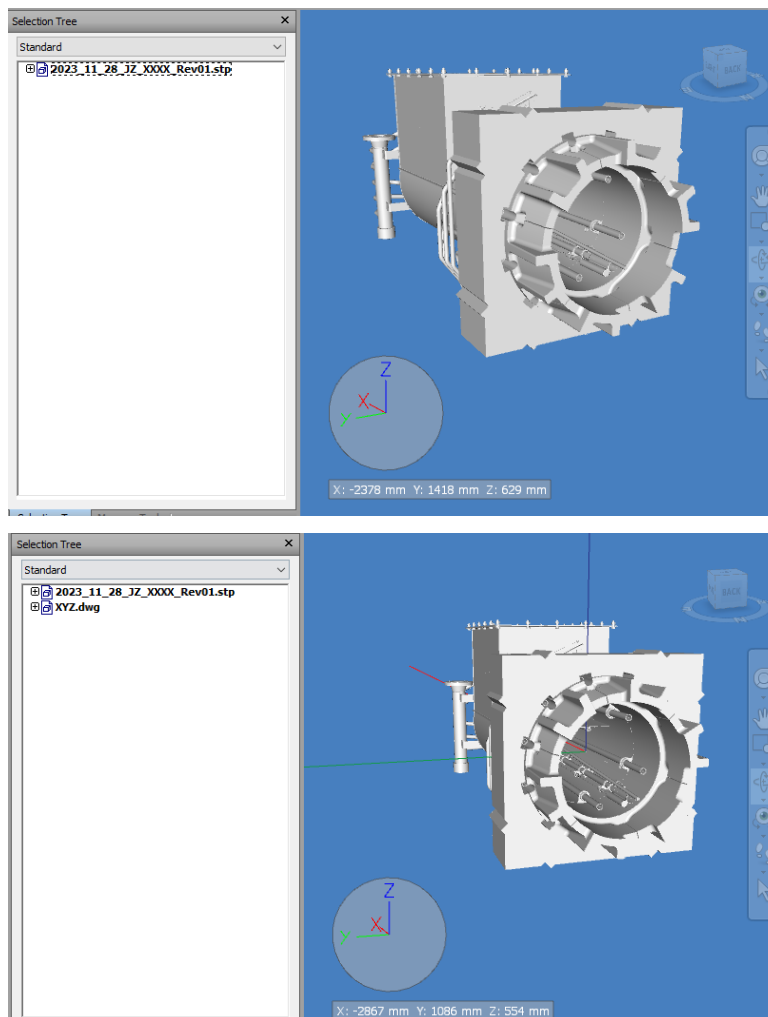
Ocorre que existe

Incluir el fichero XYZ.dwg el primero. ¿Por qué? Si vemos las siguientes imágenes, si introducimos un objeto y le **giramos (x ej 90°)**, navis adecua los ejes a ese movimiento y si incluimos el XYZ.dwg vemos que se orienta conforme a este ultimo giro. Por experiencia este hecho ocurrido en varios archivos que luego son referenciados es 'un lio'. Por eso es mejor empezar dejando claro el sentido de los ejes.



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<p>PUMP, PUMPER & P.W. HOPE ROTARY EQUIPMENT & MOTOR</p> <p>PLAN ELEVATION</p> <p>DPI - CENTERLINE OF PUMP SHAFT AND INJECTION NOZZLE P - CENTERLINE OF PUMP SHAFT S - UP</p>	<p>VERTICAL PUMP</p> <p>PLAN ELEVATION</p> <p>DPI - CENTERLINE OF PUMP AND CENTERLINE OF DIST. NOZZE P - UP S - NORTH</p>	<p>WIND/SCREEN PUMP</p> <p>PLAN ELEVATION</p> <p>DPI - CENTERLINE OF EQUIPMENT AND INJECTION NOZZLE P - NORTH OR EAST SHAFT AXIS S - UP</p>	<p>TOP SUCT - TOP DISH PUMP</p> <p>PLAN ELEVATION</p> <p>DPI - CENTERLINE OF PUMP SHAFT AND DISCHARGE NOZZLE P - CENTERLINE OF PUMP SHAFT S - UP</p>	<p>SIDE SUCT - SIDE DISH PUMP</p> <p>PLAN ELEVATION</p> <p>DPI - CENTERLINE OF PUMP SHAFT AND DISCHARGE NOZZLE P - CENTERLINE OF PUMP SHAFT S - UP</p>	<p>GENERAL NOTES</p> <ol style="list-style-type: none"> THIS DOCUMENT IS ISSUED AS A CONVENIENCE FOR DESIGN PURPOSES. LOCATION OF THE PLACEMENT OF A DASH POINT (DPI). EQUIPMENT DIMENSIONS SHOWN ARE THE DIMENSIONS OF THE EQUIPMENT, EXCEPT FOR THE DIMENSIONS OF THE DASH POINT. NOZZLE DASH POINT IS TO BE DEFINED "NIP" IN ALL CASES. ALL NOZZLES TO BE PLACED IN "NOZZLE SUPPLY" AREA OF DASH POINT. USE OF THIS DRAWING FOR ANY OTHER PURPOSES IN THIS DOCUMENT SHALL HAVE THE SET OUT POINT NOTED ON THE EQUIPMENT LAYOUT PLAN. (D) & (S) DASH TO INDICATE AND SUBSEQUENTLY INDICATE THE DASH POINT IS TO BE USED. INDICATE THE DIMENSIONS AND APPLY TO ALL DIMENSIONS. FOR EQUIPMENT DIMENSIONS USE THE "TOP" DASH POINT UNLESS NOTED OTHERWISE. DPI PLACEMENT POINT & DASH ORIENTATION TO BE DETERMINED FROM NOZZLE DASH. <p>(SECONDARY) (DPI) (PRIMARY) ORIENTATION TO THE NOZZLE</p>	
<p>VERTICAL VESSEL WITH LEGS OR SHIRT</p> <p>PLAN ELEVATION</p> <p>DPI - CENTERLINE OF EQUIPMENT AND INJECTION TANK LINE P - UP S - NORTH</p>	<p>HORIZONTAL TANK & VESSEL</p> <p>PLAN ELEVATION</p> <p>DPI - CENTERLINE OF EQUIPMENT & SOUTH OR WEST TANK LINE P - CENTERLINE OF VESSEL S - UP</p>	<p>ROUND STORAGE TANK OF VESSEL</p> <p>PLAN ELEVATION</p> <p>TANK FLOOR CODE UP/DOWN U/S STEEL ROOF CORNER OF FLOORING TANK RN DPI - CENTERLINE AND UNDERLINE OF EQUIPMENT / TANK RN P - UP S - NORTH</p>	<p>SLEEPING VESSEL</p> <p>PLAN ELEVATION</p> <p>DPI - AT INTERSECTION OF TANGENT LINE & OF VESSEL & HORIZONTAL REF. LINE P - HORIZONTAL REF. LINE OF VESSEL S - UP</p>	<p>PLATE EXCHANGER</p> <p>PLAN ELEVATION</p> <p>DPI - CENTERLINE OF EQUIPMENT & TOP OF BASE P - CENTERLINE OF EQUIPMENT S - UP</p>	<p>SHELL & TUBE EXCHANGER</p> <p>PLAN ELEVATION</p> <p>DPI - CENTERLINE OF EQUIPMENT & CHANNEL INLET P - CENTERLINE OF EQUIPMENT S - UP</p>	
<p>MIXER</p> <p>PLAN ELEVATION</p> <p>DPI - CENTERLINE OF MIXER SHAFT & FULF OF NOZZLE P - SHAFT AXIS S - UP IF NOZZLE HORIZONTAL ORIENTATION OF NOZZLE IF VERTICAL</p>	<p>SILVER</p> <p>PLAN ELEVATION</p> <p>DPI - NORTH EAST OF SILVER SIDE REVERSERS PLUS UNDERLINE OF BASE PLATE P - UP</p>					

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Doc. Ref.

800178 - FMC RONLAND SIXLOZONE PROJECT

EQUIPMENT ARRANGEMENT

DATUM POINT LEGEND SHEET

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TechnipFMC Doc. Ref.

Revision: 0

Format: A3

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