User Guide

STEP - JT

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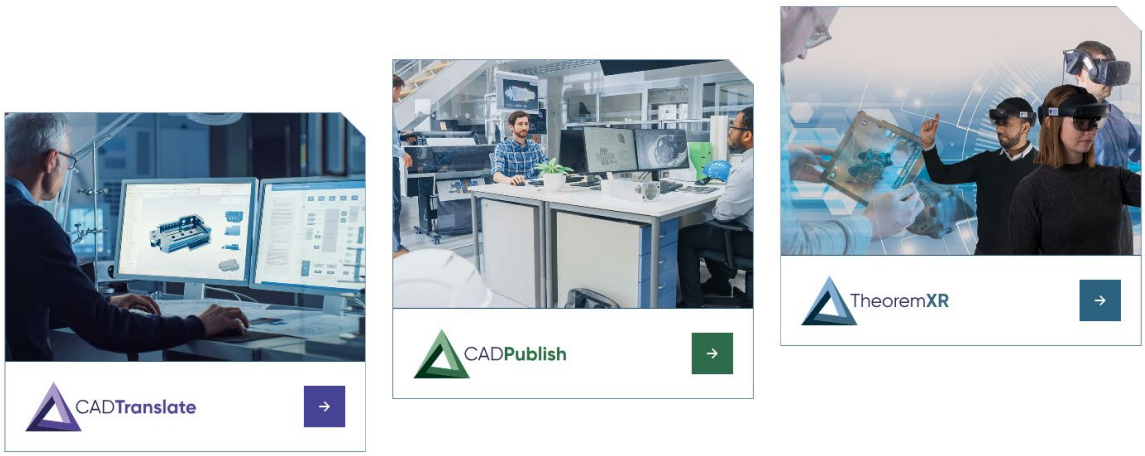


Theorem Solutions is a world leader in the field of Engineering Data Services and Solutions. This leadership position stems from the quality of our technology and the people in the company. Quality comes not only from the skills and commitment of our staff, but also from the vigorous industrial use of our technology & services by world leading customers.

We are proud that the vast majority of the world's leading Automotive, Aerospace, Defense, Power Generation and Transportation companies and their Supply chains use our products and services daily. Working closely with our customers, to both fully understand their requirements and feed their input into our development processes has significantly contributed to our technology and industry knowledge.

Theorem Solutions is an independent UK headquartered company incorporated in 1990, with sales and support offices in the UK and USA. Theorem has strong relationships with the major CAD and PLM vendors, including; Autodesk, Dassault Systemes, ICEM Technologies (a Dassault company), PTC, STEP, Spatial Technology and Siemens PLM Software. These relationships enable us to deliver best in class services and solutions to engineering companies worldwide.

Theorem's Product Suite

Theorem have 3 main Product brands. These are:

CAD**Translate**

Direct translation of 3D data to or from an alternate CAD, Visualization or Standards Based format.

See our website for more detail.

CAD**Publish**

The creation of documents enriched with 3D content

See our website for more detail.

Theorem**XR**

Visualization for Augmented (AR), Mixed (MR) and Virtual (VR) Reality applications

See our website for more detail.

The STEP – JT Translator

The translator may be installed on a number of machines each accessing a central network-floating license.

Theorem's STEP to JT product is a direct converter between STEP files and Siemens JT parts. It enables the user to convert all forms of 3D Mechanical Design Geometry and Assembly data, together with system defined attribute information, colour information, between these two systems. This product is designed for companies using STEP who have selected JT to be their main method of collaboration and communication between OEMs and their customers or suppliers.

It is also a major method of visualization and therefore companies using JT based solutions need to translate their STEP data into the JT format.

The translator can be invoked in either an interactive or batch mode with the command line interface allowing the conversion process to be integrated into any process oriented operation. Alternatively the conversion process may be operated by using the Theorem Unified Interface.

Primary Product Features

- Converts all types of geometry, wire frame, surfaces, trimmed surfaces (faces) and solid models
- Converts assembly structure between the systems
- Converts attribute data including colour and layer information
- The conversion process can be run Interactively or in Batch mode
- Data can be filtered by layer and entity type
- Geometry can be filtered and selectively processed

Primary Product benefits?

- Direct conversion between STEP and JT reduces processing time, simplifies integration and retains accuracy of the model
- The integrated viewing capability enables visual verification, pre and post translation
- The integrated data filtering options allows selected data ONLY to be processed, enabling optimisation of translations and time savings
- By converting all forms of geometry no data is lost, eliminating the time required to recreate missing data
- With over 20 years industrial use, Theorem's product robustness and quality is well proven, reducing your business risk

This document will focus specifically on guidance for the use of the STEP-JT product. For information regarding any of Theorem's product ranges please contact sales@theorem.com

Getting Started

Documentation & Installation Media

The latest copy of the User Guide documentation can be found on our web site at:

http://www.theorem.com/Documentation

Each product has a specific link that provides user documentation in the form of PDF and Tutorials.

The latest copy of Theorem software can be found via the link above and by searching for the specific product. Each product has a specific link to the Product Release Document, which contains a link to the download location of the installation CD.

Alternatively, you can request a copy of the software to be shipped on a physical CD.

Installation

The installation is run from the .msi file download provided. For full details of the installation process, visit www.theorem.com/documentation and select UI from the product selection list.

License Configuration

To run any product a valid license file is required. The Flex License Manager is run from the .msi file download provided. For full details of the installation process, visit www.theorem.com/documentation

Using the Product

To use the product, follow the documented steps found in this document or follow the online video tutorials which can be found from www.theorem.com/documentation

Using the Product

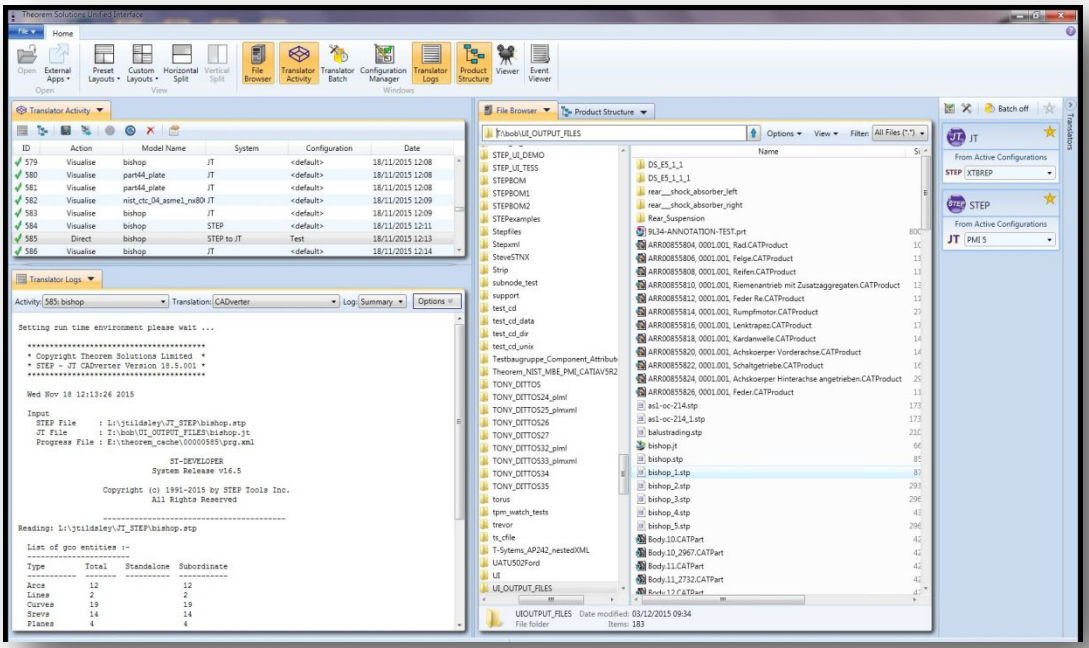
Default Translations

Default Translation – via the Unified Interface

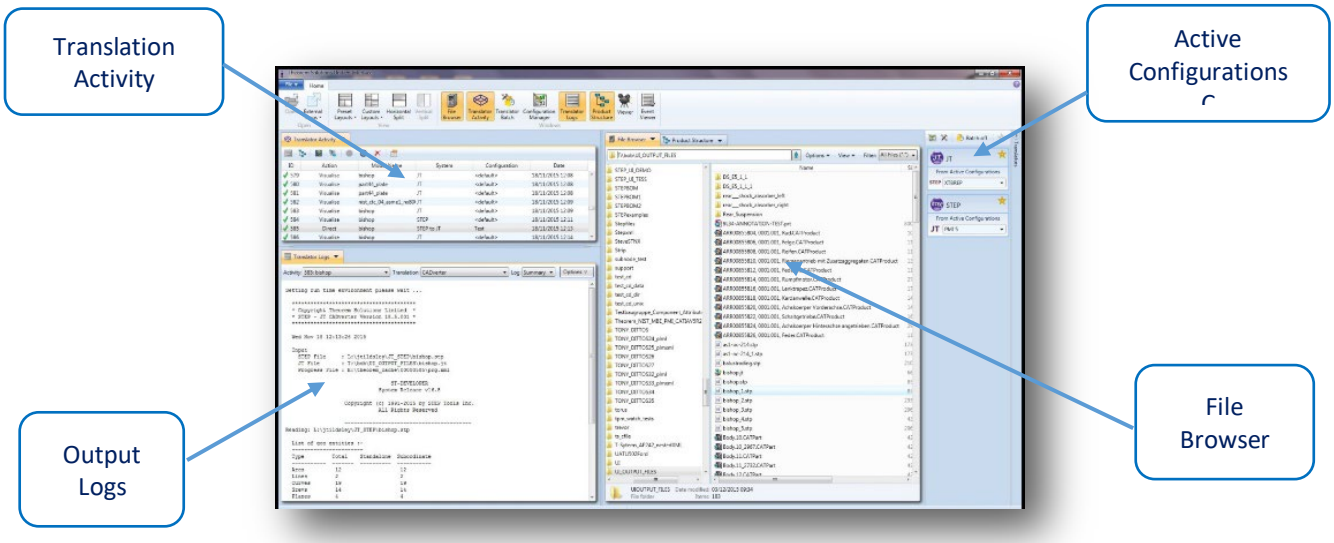
The Unified Interface can be started via the Start Menu – if a shortcut was added during installation. Alternatively, the Unified Interface can be run via a Windows Explorer selection in:

<UI_installation_directory>\bin\Unified_Interface.cmd

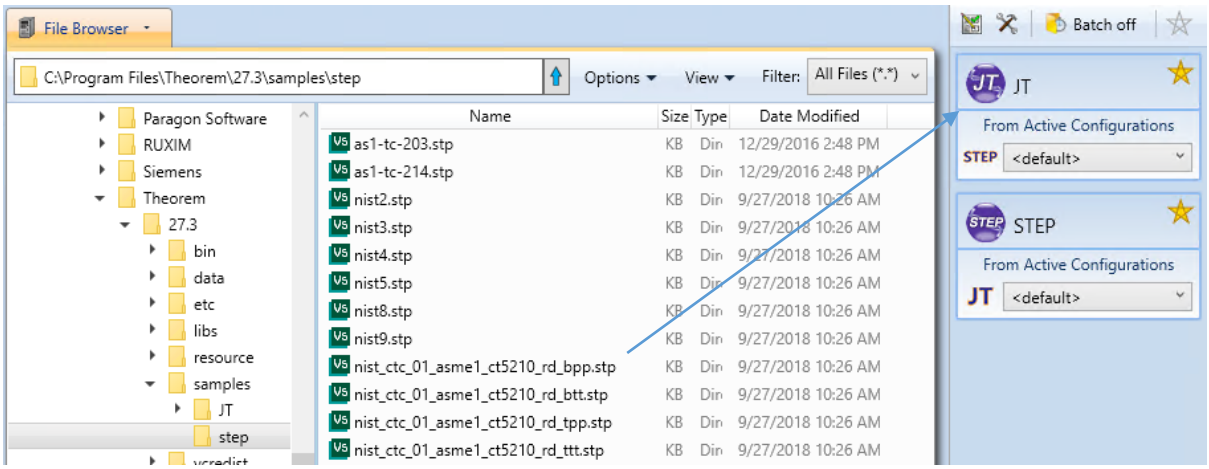
The following interface will be launched:



The default layout is split into 4 primary areas that can be altered to the user's preference:

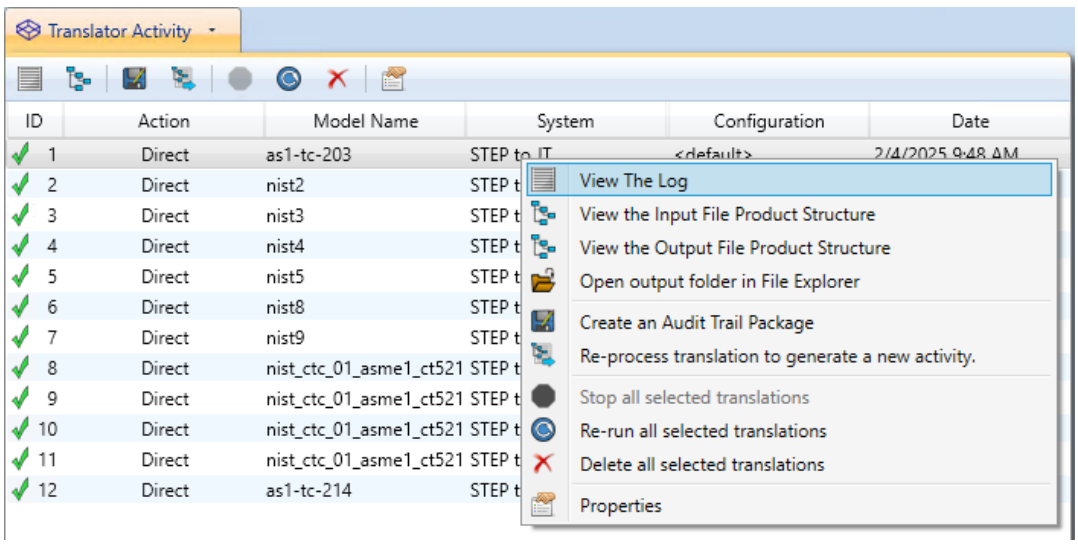


The simplest way to translate from STEP or JT is to drag a file from the file Browser Pane on to the Active Configurations for the translation you require.



On completion, the Unified Interface will display the activity information and details from the log file created during the translation, if requested, in the Translation Activity and Output Log panes, respectively.

The generated output data can be located by selecting the translation from the Activity pane and opening the output folder:

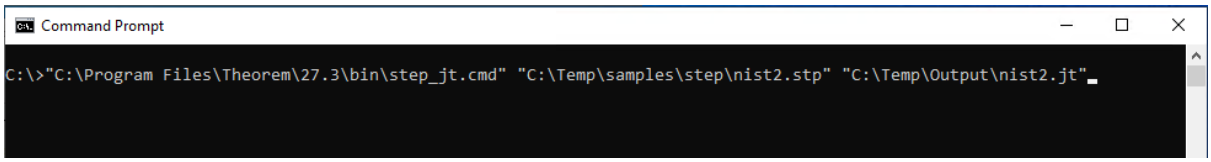


Default Translation – via the Command Line

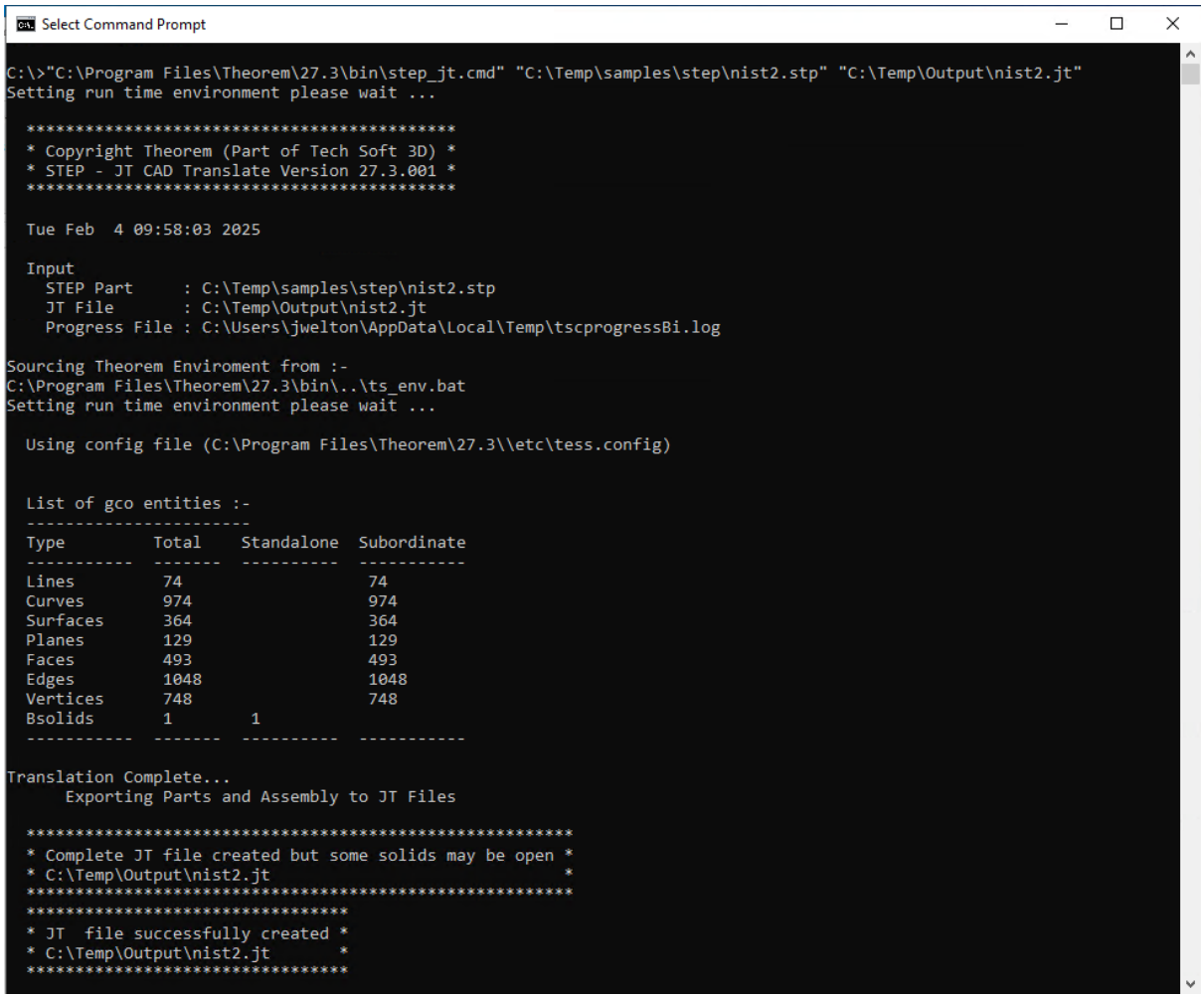
STEP-JT

The format of the command is as follows when translating from STEP to JT:

“<Translator_installation_directory>\bin\step_jt.cmd” “path\input_file” “path\output_file”



The example above will translate an STEP sample file provided within the installation and produce the following screen output:



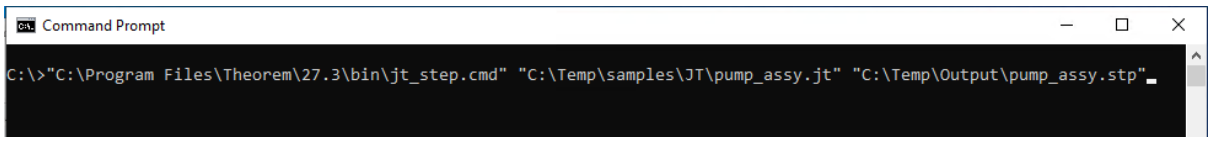
The file will be output to the target location. In this case:

C:\Temp\output\nist2.jt

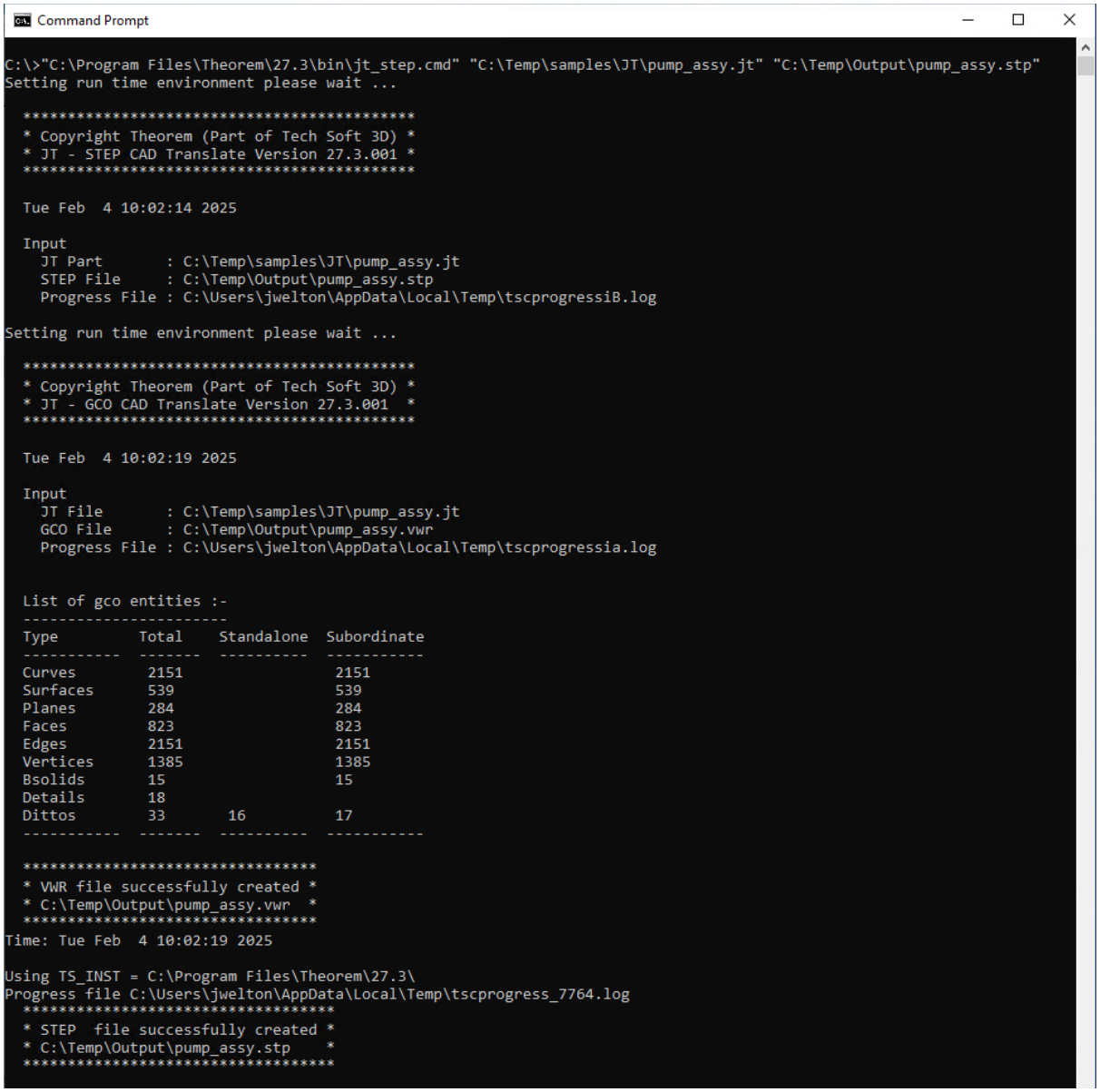
JT-STEP

The format of the command is as follows when translating from JT to STEP :

"<Translator_installation_directory>\bin\jt_STEP.cmd" "path\input_file" "path\output_file"



The example above will translate a JT sample file provided within the installation and produce the following screen output:



The file will be output to the target location. In this case:

C:\Temp\Output\pump_assy.stp

Translate Customization

Translate allows the information that is read from the source system and written to the target system to be tailored via a set of user specified arguments. Commonly used arguments are supported via the Unified Interface, with Advanced Arguments being described within this document for use in the Unified Interface or via the Command Line invocation.

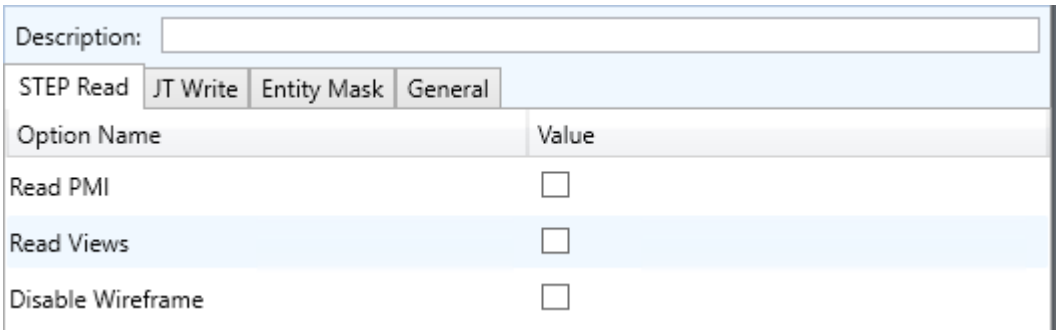
Common Options for STEP to JT

Within the Configuration Manager panel of the Unified Interface, arguments that can be specified when publishing STEP data into JT are grouped into 3 areas:

1. STEP Read: Those arguments that affect how data is read from STEP
2. JT Write: Those arguments that affect how the data is written to JT
3. General: Those arguments that are common to ALL Publishing activities regardless of source dat

STEP Read Arguments

The image below shows the STEP Read arguments that are available, with their default settings:

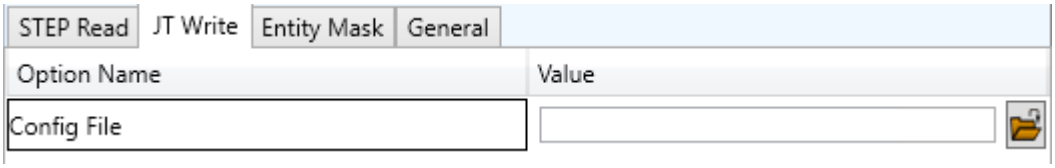


Each of these options is described below:

Option	Description
Read PMI	Enables PMI data read from the STEP file. (Default is OFF). ○ Command Line Syntax: • read_pmi – to enable
Read Views	Disables reading of views . (Default is ON). ○ Command Line Syntax: • read_views – to enable
Disable Wireframe	Disables reading of wireframe entities. . (Default is ON). ○ Command Line Syntax: • read_wire_frame_off – to enable

JT Write Arguments

The image below shows the JT Write arguments that are available, with their default settings:

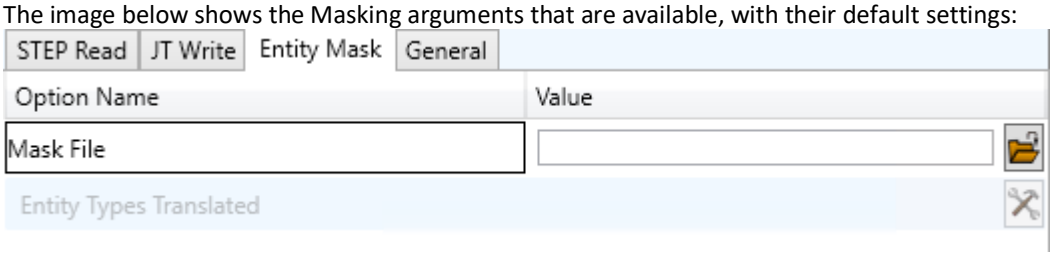


Each of these options is described below:

Option	Description
Config File	Allows a JT configuration file to be specified. Please see Appendix B for a full description of the JT config file format. ○ Command Line Syntax • -z “path\file_name”

STEP to JT Entity Mask

The image below shows the Masking arguments that are available, with their default settings:

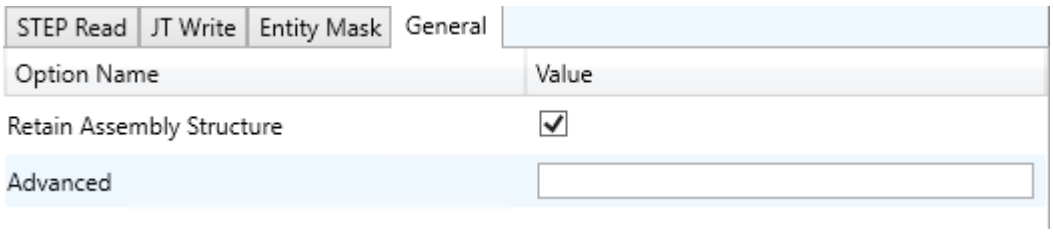


Each of these options is described below:

Option	Description
Mask File	Specifies the Mask File to be written to, that can be referenced by future translations. A Mask file MUST be specified if masking is required. The first line in this file is OFF ALL ENT: ○ Command Line Syntax: • Mask “path\file_name”
Entity Types Translated	Specifies a list from which to select which entity types are to be processed. These will be added to the Mask file. The following types are available: "POI","LIN","ARC","CON","CUR","SUR","FAC","SOL" ○ Command Line Syntax: • Add any of the above to the specified mask file, one entry per line prefixed by the word ON, e.g.: • ON POI • ON LIN

STEP to JT General

The image below shows the Masking arguments that are available, with their default settings:



Each of these options is described below:

Option	Description
Retain Assembly Structure	Collapse assembly to a part ○ Command Line Syntax: • offditto
Advanced	Provides a text field to enter any command line arguments.

STEP to JT Advanced Arguments

Theorem's STEP to JT translator has been configured with default settings that optimise the translation process. However, there are times when a satisfactory result cannot be obtained, so it may be required to deploy one or more Advanced Arguments to improve the translated result.
The following table describes useful Advanced Arguments that can be entered into the General Tab -> Advanced field:

Option	Description
Parasolid Tolerant Modelling	A secondary option to be used when *Brep Type = XT Brep (Theorem)* output is specified. Enables Parasolid tolerant modelling. Default is ON ○ Command Line Syntax • nopstolmodel – to disable
Factor	Specify the factor level of Parasolid Tolerant Modelling when turned on. Default is 3. ○ Command Line Syntax • pstolmodel 3
Sew Parasolid Bodies	A secondary option to be used when *Brep Type = XT Brep (Theorem)* output is specified. Enables the sewing of Parasolid bodies. Default is ON ○ Command Line Syntax • nosew – to disable
Tolerance	Specify the tolerance for the sew command above. Default is 0.01. ○ Command Line Syntax

	• pssew 0.01
Incremental Sewing	Enables incremental sewing when used with Sew Parasolid Bodies. Default is ON. ○ Command Line Syntax • no_sew_increm – to disable
Split Discontinuous Surfaces	A secondary option to be used when *Brep Type = XT Brep (Theorem)* output specified. Splits discontinuous surfaces. Default is OFF. ○ Command Line Syntax • brep_prep – to enable • no_brep_prep – to disable
Force body creation (No check of Parasolid entities)	A secondary option enabled when XT Brep (Theorem) output specified. Removes the checking of Parasolid entities. Default is ON. ○ Command Line Syntax • nocheck – (Default - force body creation without Parasolid checking) • check – (Enable Parasolid checking)
Fix Degenerate Edges	A secondary option to be used when *Brep Type = XT Brep (Theorem)* output specified. On face create failure, check and fix any degenerate edges. Default is ON. ○ Command Line Syntax • fix_degen • no_fix_degen – to disable
Specify a Face Edge Tolerance	A secondary option to be used when *Brep Type = XT Brep (Theorem)* output specified. Specify an edge tolerance to be used when creating faces. Default is ON. ○ Please see Edge Tolerance below
Edge Tolerance	A secondary option used with Specify a Face Edge Tolerance where the tolerance value is assigned. Default is 0.000006. ○ Command Line Syntax • face_edge_tol 0.000006
Fix small features in solids	A secondary option to be used when *Brep Type = XT Brep (Theorem)* output specified. Remove small edges, sliver and spike faces from solid bodies. Default is OFF. ○ Command Line Syntax • ps_fix_small – to enable • no_ps_fix_small - default

Fix small features in open solids	A secondary option to be used when *Brep Type = XT Brep (Theorem)* output specified. Remove small edges, sliver and spike faces from open solids. Default is OFF. ○ Command Line Syntax • no_ps_fix_osol - Default • ps_fix_osol – to enable
Parasolid Trans Delete	This option causes the CADverter to check for any hidden bodies in the .sldprt file and delete these before exporting the .sldprt file to a parasolid .x_t file. This is because hidden bodies became visible in the export. This option will reduce the processing time for large assemblies. ○ Command Line Syntax • parasolid_trans_delete
Simplify Geometry	A secondary option to be used when *Brep Type = XT Brep (Theorem)* output specified. Simplify Geometry. Default is OFF. ○ Command Line Syntax • simplify_solids – to enable

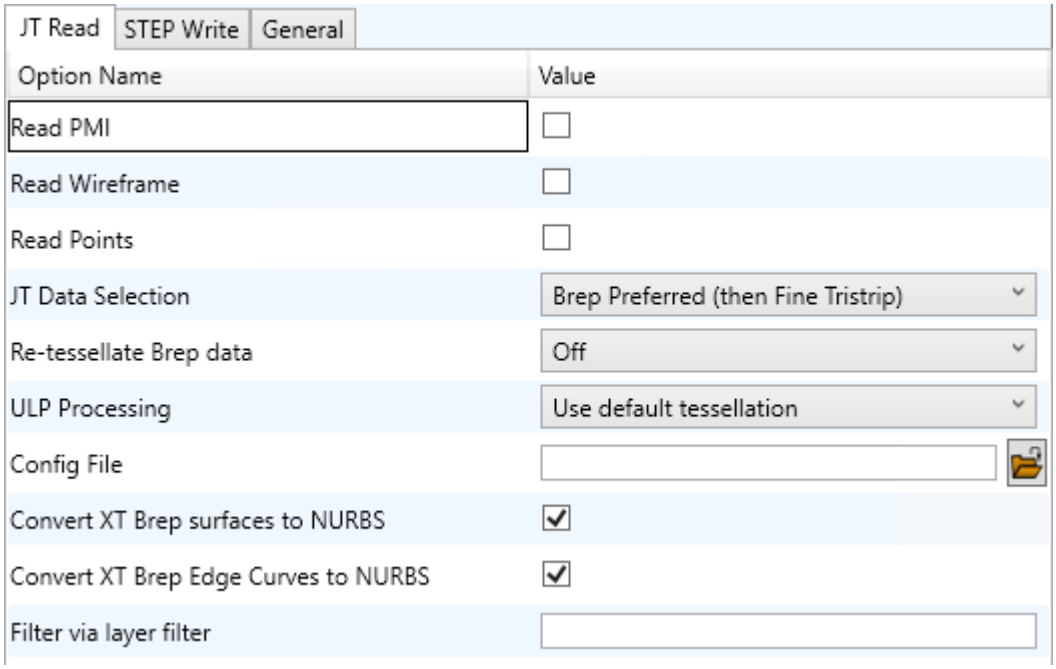
Common Options for JT to STEP

Within the Configuration Manager pane of the Unified Interface, arguments that can be specified when publishing JT data into STEP are grouped into 3 areas:

- JT Read – Those arguments that affect how data is read from JT
- STEP Read – Those arguments that affect how data is written Into STEP
- General – Those arguments that are common to ALL Publishing activities regardless of source data

JT Read Arguments

The image below shows the STEP Read arguments that are available, with their default settings:



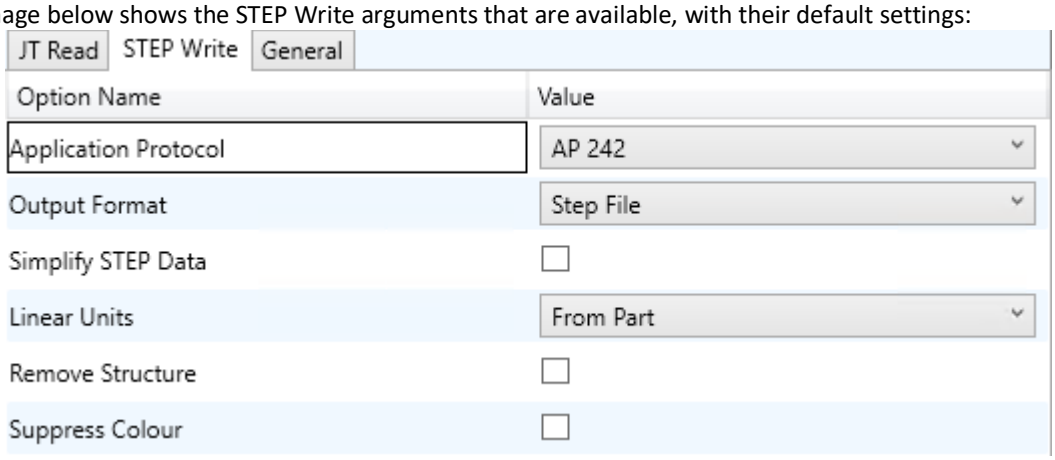
Each of these options is described below:

Option	Description
Read PMI	Read JT wireframe data. Default is OFF. ○ Command Line Syntax • no_ps_fix_osol - Default
Read Wireframe	Read JT point data. Default is OFF. ○ Command Line Syntax • no_ps_fix_osol - Default
Read Poimts	Enables reading of Points
JT Data Selection	Select Brep or tessellated data read. Default is 'Brep Preferred (then fine facet)'. ○ Command Line Syntax • Brep Preferred (then Fine Facet): brep_pref • Brep preferred (then Fine Tristrip): brep_pref_tri • Brep Only: brep_only • Fine Tristrip: fine_tristrips • Coarse Tristrip: coarse_tristrips • Fine Facet: fine_facets
Re-tessellate Brep data	
ULP Processing	How to process ULP data in the JT part. Default is 'Use Default Tessellation'. ○ Command Line Syntax

	• Tess_ulp - to enable
Config File	Config File for Brep or ULP tessellation. ○ Command Line Syntax • -z "path\file_name"
Retain Assembly Structure	Enables Assembly Structure to be removed. Selecting this option will remove all assembly structure and collapse ALL geometry into a single selectable object
Convert XT Brep surfaces to NURBS	Read XT Brep surfaces as NURBS surfaces (else read in native form). Default is ON. ○ Command Line Syntax • Noprep - to disable
Convert XT Brep Edge Curves to NURBS	Read XT Brep edge curves as NURBS curves (else read in native form. Default is ON. ○ Command Line Syntax • rd_native_edge – to disable
Filter via layer filter	Supply layer filter(s) separated by commas and double quoted. Default is OFF. ○ Command Line Syntax • layer_filter "path\file_name"

STEP Write Arguments

The image below shows the STEP Write arguments that are available, with their default settings:



Each of these options is described below:

Option	Description
Application Protocol	Define which STEP protocol to use, Default is AP 242

	○ Command Line Syntax • Ap 203e2 • Ap 214
Output Format	Read JT point data. Default is OFF. ○ Command Line Syntax • Part 21 – Is Default – writes a STEP file • Part 28 – Writes a XML file
Simplify STEP Data	Enables writing of analytic geometry where possible. ○ Command Line Syntax • simplify
Linear Units	Set the Linear Units to be used in the STEP file, Default is to use the units from the input file: ○ Command Line Syntax • length_measure mm • length_measure inch
Remove Structure	Collapse assembly to a part ○ Command Line Syntax: • nostructure
Suppress Colour	Disable colour processing ○ Command Line Syntax: • nostyle

Appendix A – JT Configuration File

Introduction

A configuration file contains the settings for your translations. The configuration file can be specified using the command line option ***–config*** or ***-z***.

If this is not supplied the following config file will be used:-

tessSTEP.config in ***%TS_INST%\etc*** directory (where TS_INST = Installed directory)

The JT configuration file contains various sections, each containing different settings based on the section.

The Setup Section

The setup options in the configuration file define how your files are translated. The setup section is the first part of the configuration file and contains a series of standard translator options.

To edit setup options

1. Open an existing configuration file with a text editor.
2. Edit the configuration file options listed in the table below.
3. Save the configuration with a .config extension

Option name	Keywords	Example
EAITranslator	EAITranslator {	EAITranslator {
OutputDirectory	"*path to directory*"	OutputDirectory = "/home/<user>/"
CommonPartsPath	"*path to directory*"	CommonPartsPath= "/myaccount/jtparts/"
chordalOption	"RELATIVE" "ABSOLUTE"	chordalOption = "RELATIVE"
structureOption	"PER_PART" "MONOLITHIC" "FULL_SHATTER"	structureOption = "MONOLITHIC"
WriteWhichFiles	"ALL" "ASSEMBLY_ONLY" "PARTS_ONLY"	WriteWhichFiles = "ALL"
compression	true TRUE false FALSE	compression = true
triStripOpt	true TRUE false FALSE	triStripOpt = false
seamSewing	true TRUE false FALSE	seamSewing = true
seamSewingTol	*any integer*	seamSewingTol = 0.001
includeBrep	true TRUE	includeBrep = false

	false FALSE	
brepPrecision	"SINGLE" "DOUBLE"	brepPrecision = "SINGLE"
autoNameSanitize	true TRUE false FALSE	autoNameSanitize = true
updateChangedPartsOnly	true TRUE false FALSE	updateChangedPartsOnly = false
verboseReporting	true TRUE false FALSE	verboseReporting = false
writeAsciiAssembly	true TRUE false FALSE	writeAsciiAssembly = false
singlePartsNoAssem	true TRUE false FALSE	singlePartsNoAssem = false
smartLODgeneration	true TRUE false FALSE	smartLODgeneration = true
autoLowLODgeneration	true TRUE false FALSE	autoLowLODgeneration = true
numLODs	*any integer*	numLODs = 3
JtFileFormat	95, 100, 105, 106, 110, 111	JtFileFormat = “95”
includeULP	PASSTHROUGH TRUE FALSE	includeULP = “PASSTHROUGH”
ulpPrecision	Real Value	ulpPrecision = 0.001
close brace	}	}

The Level of Detail Section

The level of detail section of the configuration file contains the tessellation and simplification information for each level of detail in the file.

This section consists of several sets of level of detail (LOD) information, and the number of these sets depends on the number you specified on the numLODs line in the configuration file.

To edit level of detail options

1. Open an existing configuration file in a text editor.
2. Edit the configuration file options listed below.
3. Save the configuration with a .config extension

Option name	Keywords	Example
LOD	LOD "*lod number*" {	LOD "1" {
Level	*any integer*	Level = 1
Chordal	*any number*	Chordal = 0.001
Angular	*any number*	Angular = 25
Length	*any number*	Length = 1
Label	*any string*	“ud_FINE”
FeatureSuppression	*any integer*	FeatureSuppression = 0
Simplify	*any number*	Simplify = 0.60
AdvCompressionLevel	*any number*	AdvCompressionLevel = 0.0
ULP	true false	
close brace	}	}

The Filter Section

The filter section of the configuration file contains the filename and metadata filtering information. Edit this section if you want to change how the translator sanitizes filenames and filters metadata keys.

To edit filter options

1. Open an existing configuration file with a text editor.
2. Edit the configuration file options from the table below.
3. Save the configuration with a .config extension

Option name	Keywords	Example
Filter	Filter {	Filter {
FilenameSanitizeSet	*"string of characters"*	FilenameSanitizeSet = "abc123."
FilenameSanitizeSetAdd	*"string of characters"*	FilenameSanitizeSetAdd = "4l"
FilenameSanitizeSetDelete	*"string of characters"*	FilenameSanitizeSetDelete = "c"
MetadataKey	*"string of characters"*	MetadataKey = "*metadata key to exclude*"
close brace	}	}

The Metadata section

The metadata section sets which metadata to attach to all parts, assemblies and nodes of the model.

Note: Be sure to add these options to the configuration file in pairs: one line to define the metadata key and one line to define the metadata value.

To edit metadata options

1. Open an existing configuration file (.CONFIG) in a text editor.
2. Edit the configuration file options shown in the table below.
3. Save the configuration with a .config extension

Option name	Keywords	Example
Metadata	Metadata {	Metadata {
AddToParts	*"string of characters"*	AddToParts = "<metadata key>" AddToParts = "<metadata value>"
AddToAssemblies	*"string of characters"*	AddToAssemblies = "<metadata key>" AddToAssemblies = "<metadata value>"
AddToAllNodes	*"string of characters"*	AddToAllNodes = "<metadata key>" AddToAllNodes = "<metadata value>"
close brace	}	}

The Special Section

The special section of the configuration file contains lines that are unique to this translator.

To edit special options

1. Open an existing configuration file with a text editor.
2. Edit the configuration file options shown in the table below.
3. Save the configuration with a .config file extension.

Option	Keyword	Example	Default Value
STEPOptions	STEPOptions {	STEPOptions {	
ProjectFile	Full system file path	Windows example ProjectFile = "P:\apps\STEP2009\Samples.ipj"	“”
IgnoreMigration	true/TRUE false/FALSE	IgnoreMigration = true	false
ReportFilename	Full system file path	Windows example ReportFilename = P:\caddata\translation\result\part55	Windows system C:%TEMP%\tscprogressyi
OutputUnits	mm millimetres cm centimetres m metre	OutputUnits = mm	inputUnits

	metres inches feet yards inputUnits		
StructureOutputType	JT PLMXML PLMXMLJT	StructureOutputType = JT	JT
PLMXMLPropertyMappingFile	*File Name*	PLMXMLPropertyMappingFile = “mapping_file.txt”	“”
brepType	XT JT XTJT	brepType = XT	JT
ParasolidTolerantModelling	true/TRUE false/FALSE	ParasolidTolerantModelling = true	true
ParasolidTolerantModellingFactor	*Any positive integer*	ParasolidTolerantModellingFactor = 3	3
SewParasolidBodies	true/TRUE false/FALSE	SewParasolidBodies = true	true
SewParasolidBodiesTol	*Any number*	SewParasolidBodiesTol = 0.01	0.01
IncrementalSewing	true/TRUE false/FALSE	IncrementalSewing = true	true
IncrementalSewingNoOfIterations	true/TRUE false/FALSE	IncrementalSewingNoOfIterations = 5	5
ExplodeSolidstoFaces	true/TRUE false/FALSE	ExplodeSolidstoFaces = false	false
SplitDiscontinuousSurfaces	true/TRUE false/FALSE	SplitDiscontinuousSurfaces = true	false
ForceBodyCreation	true/TRUE false/FALSE	ForceBodyCreation = true	true
FixDegenerateEdges	true/TRUE false/FALSE	FixDegenerateEdges = true	true
FaceEdgeTol	*Any number*	FaceEdgeTol = 0.000006	0.000006
FixSmallFeaturesSolids	true/TRUE false/FALSE	FixSmallFeaturesSolids = false	false
FixSmallFeaturesOpenSolids	true/TRUE false/FALSE	FixSmallFeaturesOpenSolids = false	false
SimplifyGeometry	true/TRUE false/FALSE	SimplifyGeometry = false	false
BrepWireframe	true/TRUE false/FALSE	BrepWireframe = true	true
ProduceTessellatedOutput	true/TRUE false/FALSE	ProduceTessellatedOutput = false	false
ExpandPart	true/TRUE false/FALSE	ExpandPart = false	false

ReuseSolids	true/TRUE false/FALSE	ReuseSolids = false	false
CADPropertyMappingFile	*File Name*	CADPropertyMappingFile = “mapping_file.txt”	“”
SavedViewsViewSetName	*"string of characters"*	SavedViewsViewSetName	"SavedViews"
AnnotationPlanesViewSetName	*"string of characters"*	AnnotationPlanesViewSetName	"AnnotationPlanes"
Close brace	}	}	

Appendix B – Property Mapping Files

Property mapping files are required for CAD property Mapping and PLMXML Property Mapping

A Property Mapping File is a comma separated text file containing information of how CAD properties from the source system will be mapped into the target file.

The format is as follows:

- Lines beginning with a "#" are treated as comment lines and are ignored.
- Any space characters will be treated as part of the item
- Lines containing a mapping must contain 6 items separated by 5 commas

Item	Description
Source name	The attribute name in the Source System
Target name	The attribute name in the Target File
Data derived from	0 - Do not convert 1 - Use the source value as given 6 - Use the source value as given and hide the property ***Note!*** *Value 6 For CAD Mapping Files ONLY (Not PLMXML)*
Default Value	Not currently used
Value Type	Not currently used
Default Units	Not currently used

The six items are :-

An Example of a mapping file is shown below:-

```
# Mapping from input attribute name to Target property name
#
# Line Format:-
# Source name,Target name,Data derived from,Default Value,Value Type,Default Units
#    Data derived from:-
#    0 - Do not convert
#    1 - Use the source values as given
#    6 - Use the source value as given and hide the property
#
_ActivateBOM,NULL,0,0,,
_LastModifier,NULL,0,0,,
_Maturity,NULL,0,0,,
_PrdVersion,NULL,0,0,,
_ReferenceTimeStamp,NULL,0,0,,
_Responsible,NULL,0,0,,
COG M,ud_CAD_CENTER_OF_GRAVITY,1,0,,
COMPONENTS PRINCIPAL AXES ,NULL,0,0,,
DENSITY Kg/M^3,NULL,0,0,,
INERTIA MATRIX KgM2,ud_CAD_MOMENT_OF_INERTIA,1,0,,
INERTIA VOLUME M^3,ud_CAD_VOLUME,1,0,,
INERTIA WET AREA M^2,ud_CAD_SURFACE_AREA,1,0,,
MASS Kg,ud_CAD_MASS,1,0,,
```

PRINCIPAL MOMENTS KgM^2,NULL,0,0,,
FILESAVETIME,File Last Modified,1,0,,
LOCALE,LOCALE,1,0,,
Masterdata Version,Masterdata Version,1,0,,
Material Details,Material Details,1,0,,
PART_NUMBER,PART_NUMBER,1,0,,
MPARTNAME,Source Model Name,1,0,,
Source,SourceName,1,0,,

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