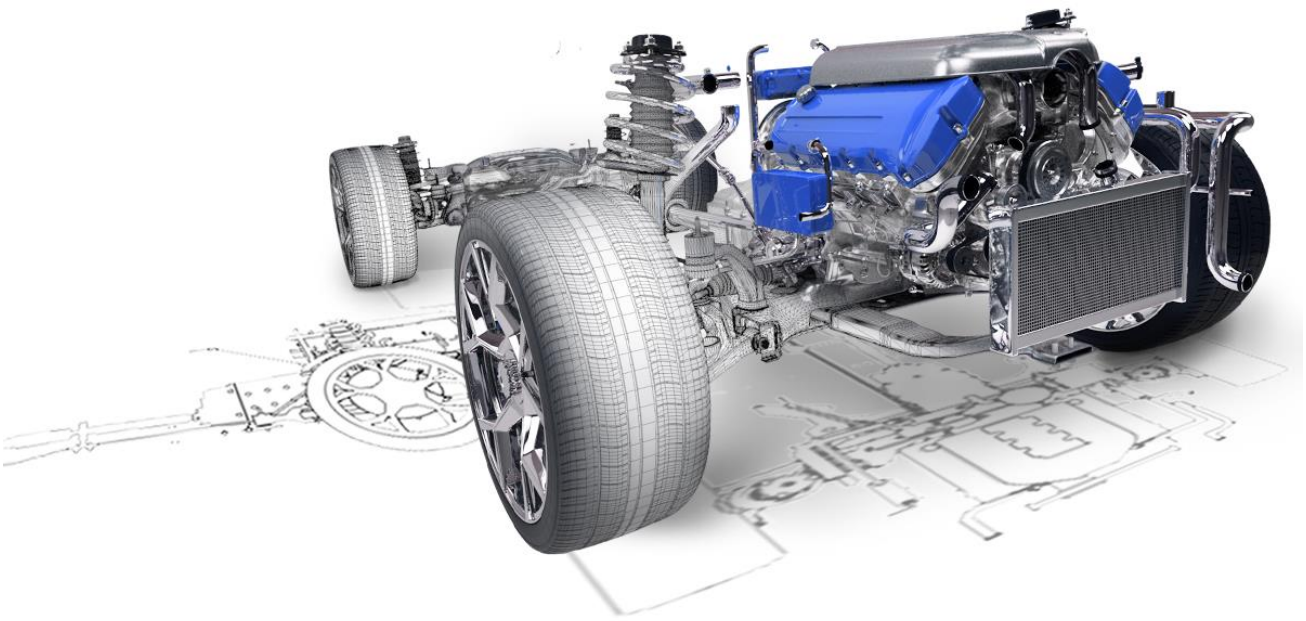


ZW3D From Entry to Master

# Configuration & Library Design

# Contents

# Configuration & Library

**Key Points:**

- ✧ Define Part Configurations
- ✧ Define Assembly Configurations
- ✧ Create Library Based on Configurations
- ✧ Create Library by Excel Data
- ✧ Reuse the Library

Library design consists of part seriation and library definition, which can speed up the design process, save development time, increase productivity and reduce mistakes.

Configurations allow designers to create multiple variations of a part with different part attributes, variables, features and dimensions, or different version of an assembly with different part configuration, component status and constraint parameters.

The library can be easily created based on configuration data or defined by the excel file. During the design process, you could select the suitable part or assembly to reuse the library to raise efficiency.

## 1.1 Build the Parametrical Model

Generally, the parametrical model should be created before defining part configurations for a 3D model. Take a nut as an example

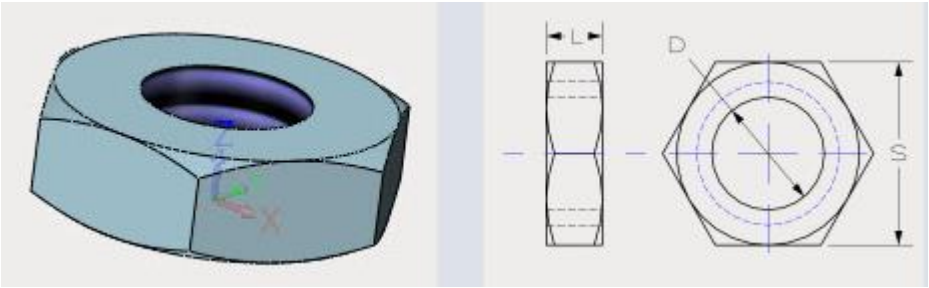



Figure1 Nut Model and Key Parameters

Refer to the following main steps to build the nut parametrical model.

STEP 01 Define the needed variables in equation manager, as shown in Figure2.

Equation Manager

Expression List

Filter User Defined

| Name | Expression | Value | Unit | Type |
|---|---|---|---|---|
| Nut_Hex_ISO_4035 | | | | |
| S | 4 | 4 | mm | Number |
| Length | 1.2 | 1.2 | mm | Number |
| Angle | 30 | 30 | deg | Number |
| Pitch | 0.4 | 0.4 | mm | Number |
| D | 2 | 2 | mm | Number |

Figure2 Defined Variables

STEP 02 Build the model base with the sketch and extrude commands.

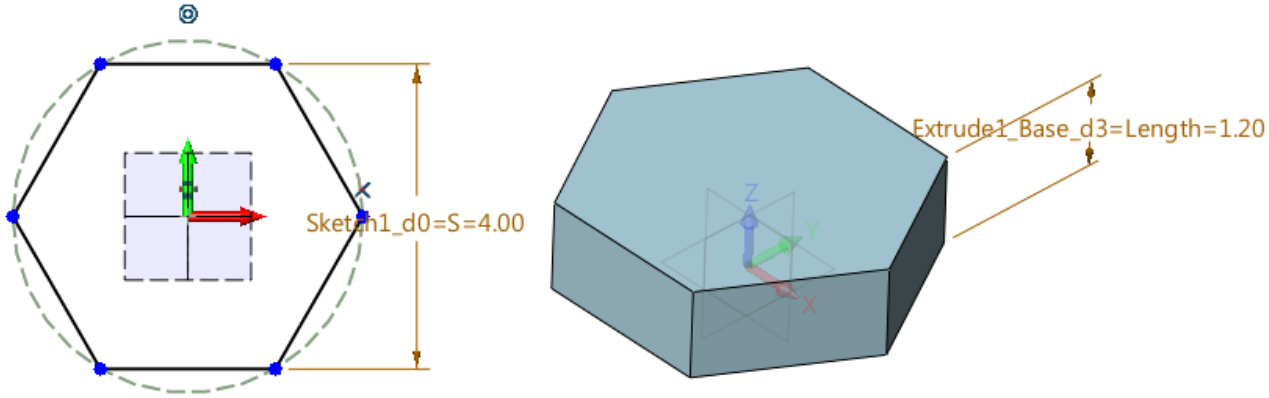



Figure3 Model Base

STEP 03 Create the thread-hole feature. Set the hole parameters with the variables, as shown in Figure4.

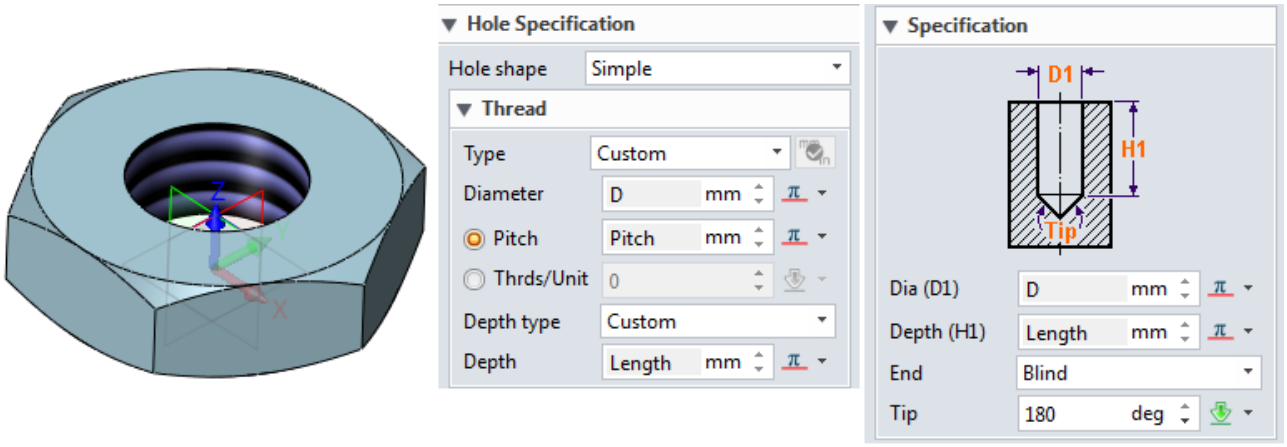



Figure4 Parametrical Nut Model

# 1.2 Introduction of Config Table

## 1.2.1 Configurable Items for the Part

In part tab of config table, all part configurable items are listed on the left side of the dialog, including standard attributes, user attributes, expressions and history.

- Configure attributes and expressions

  Check the standard attribute or user attribute, and the expression, then data can be resetted in the default configuration.

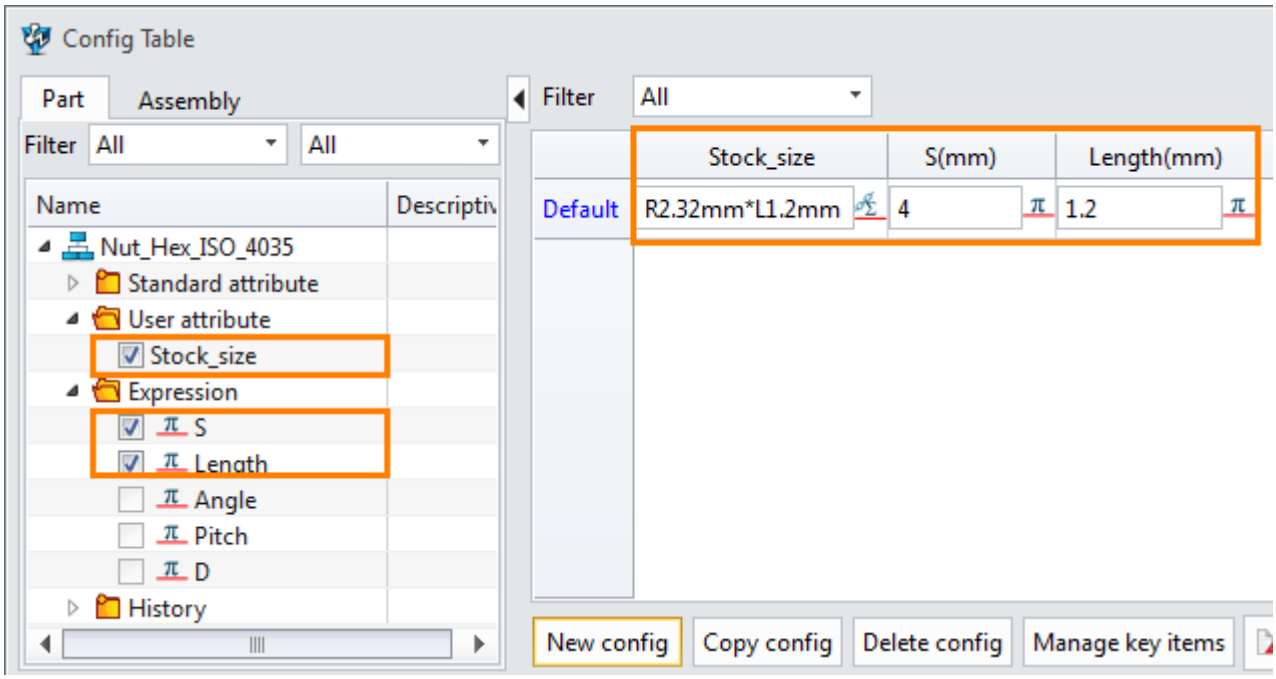



Figure5 Configure Attributes and Expressions

- Configure the features and feature dimensions

  Check the feature or feature dimension to add them into the configuration. In the configuration table, checking the feature means that this feature is suppressed in this configuration. The feature dimension could be directly modified.

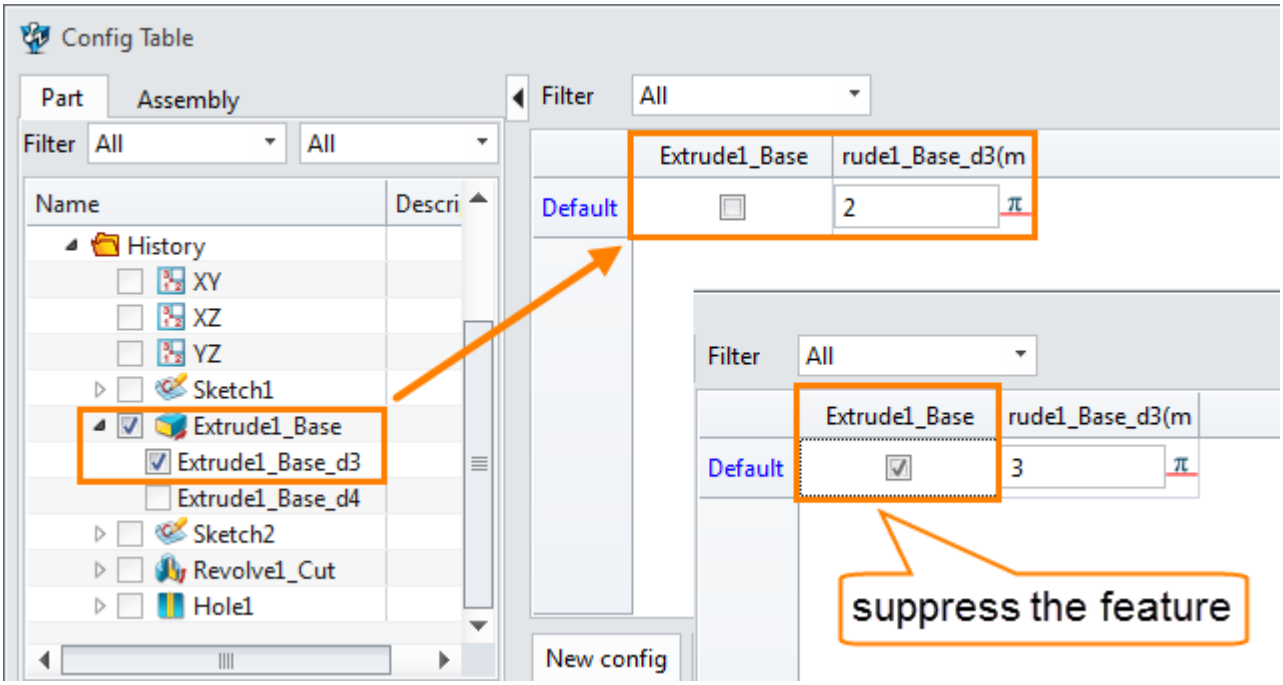



Figure6 Configure Features and Feature Dimensions

### 1.2.2 Configurable Items for the Assembly

For an assembly, the component status and constraints are configurable, including suppressed /un-suppressed component, part configuration, component color, position, enabled/disabled constraint and constraint value.

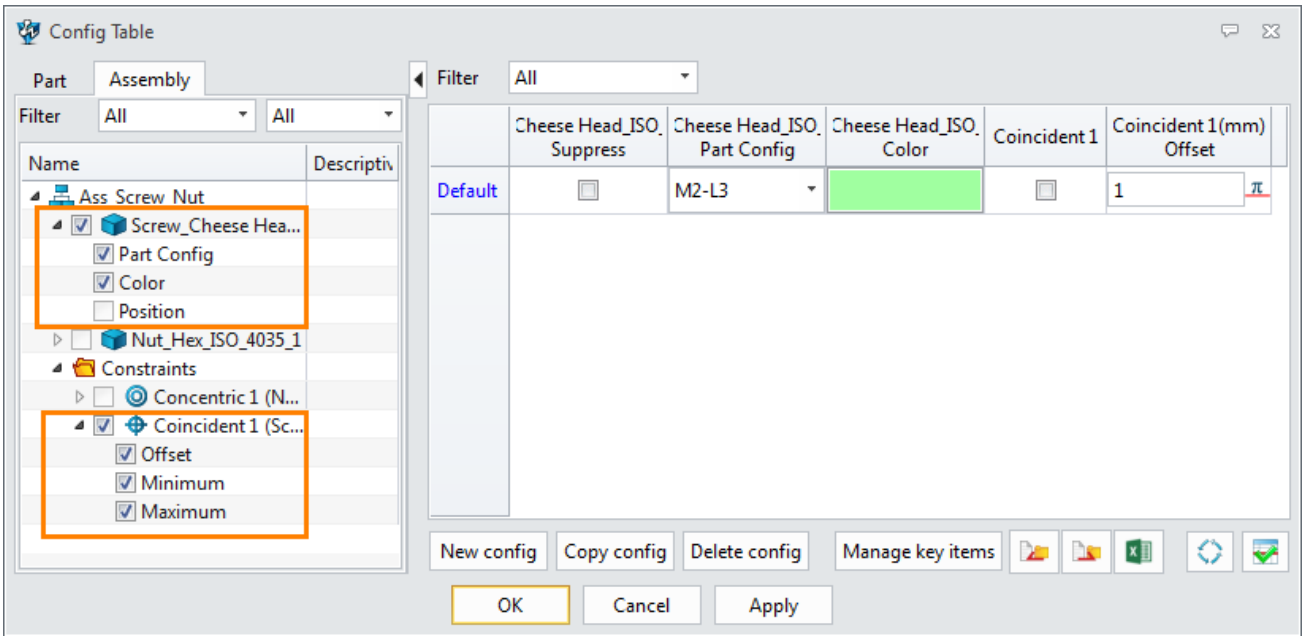
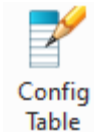



Figure7 Configure Components and Constraints

# 1.3 Define Part Configuration

Take the nut as example, we will create a part seriation with different size. There are two methods to call config table dialog.

**1) Tool Ribbon Toolbar->Insert->** 


**2) Right click the blank area of history manager ->** 

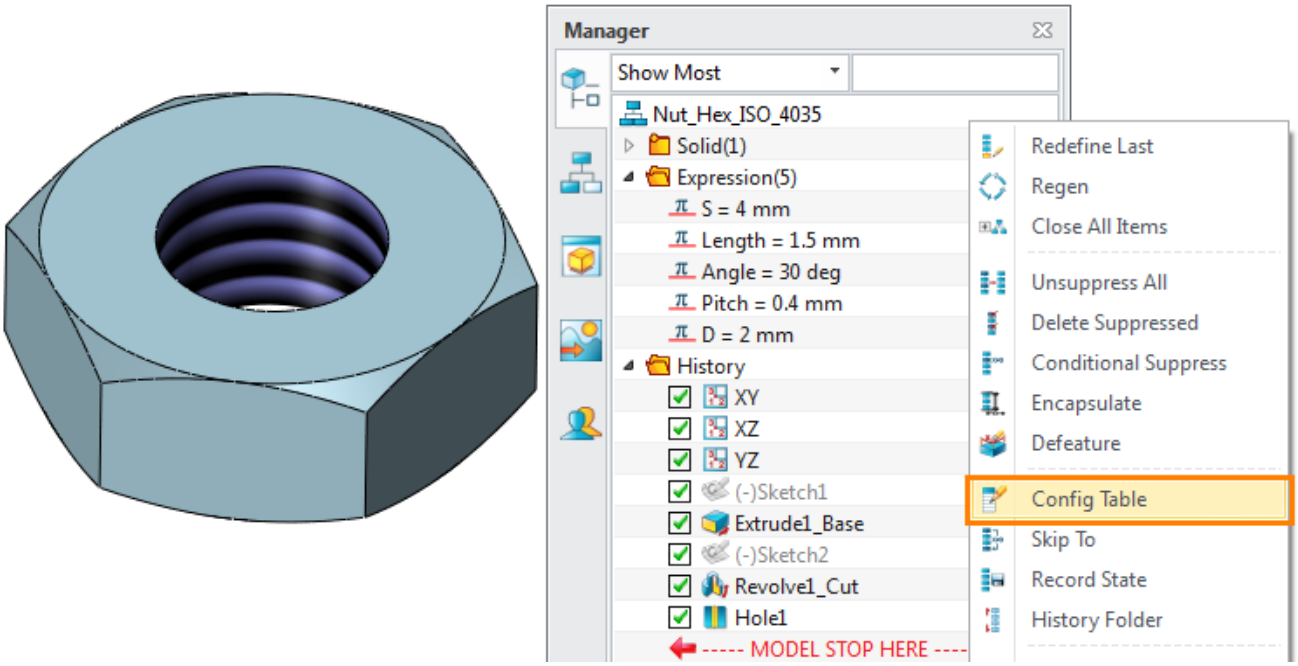




Figure8 Config Table

## 1.3.1 Define Default Part Configuration

STEP 01 In config table, expand the expression and then check the needed variable.

STEP 02 Set the value as the default configuration.

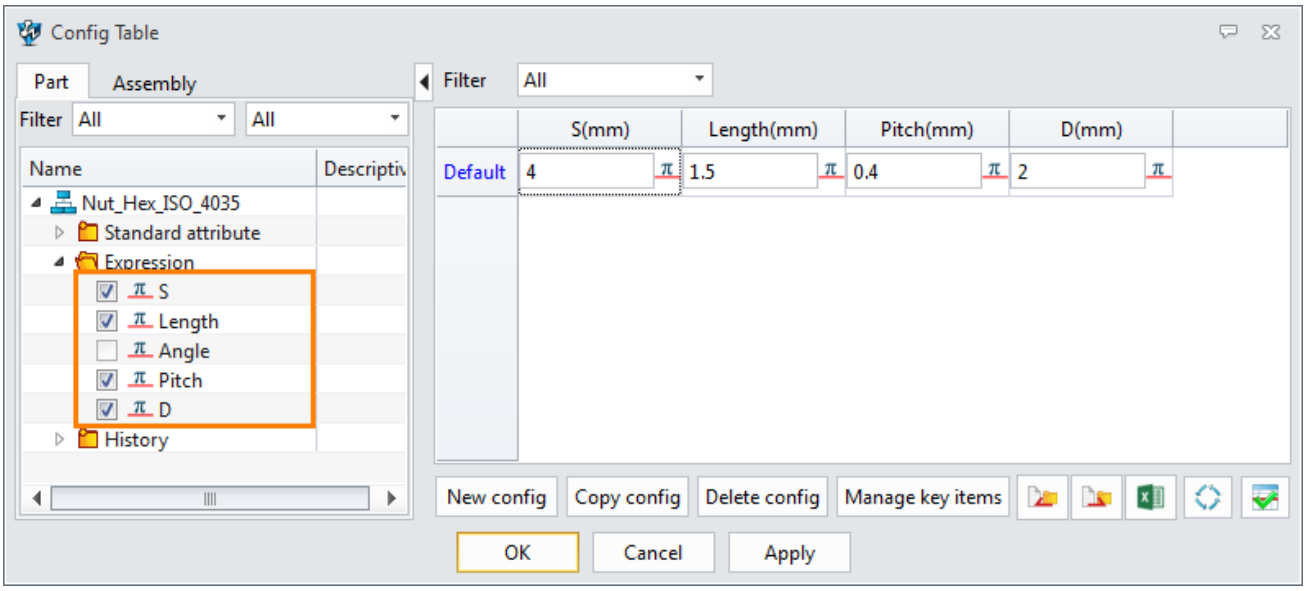



Figure9 Define the Default Configuration

### 1.3.2 Create All Part Configurations

Many different methods are provided to create the configurations. All will be introduced by this case.

**Method1: New config**

STEP 01 Click "New config" button to create a new config, give a name "D2" or add the needed description.Then a config D2 with the default parameters is added.

STEP 02 Set the parameters value if necessary.

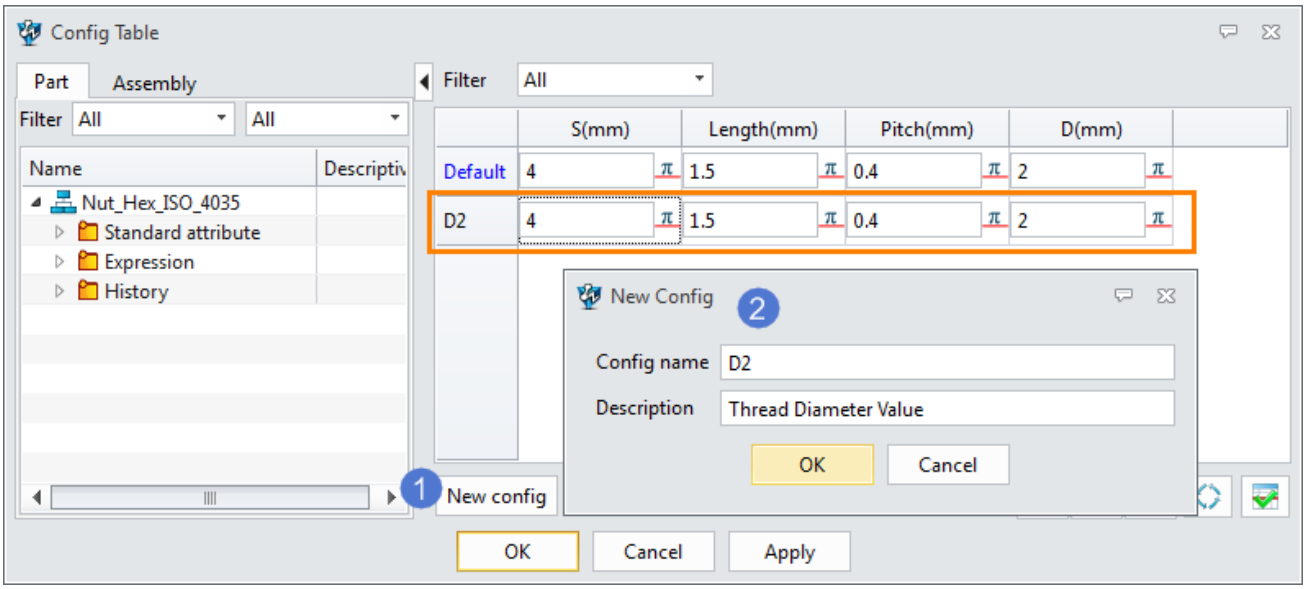



Figure10 Create a New Configuration

**Method2: Copy config**

STEP 01 Select a config, then click “Copy config” button to copy a config with the same data.

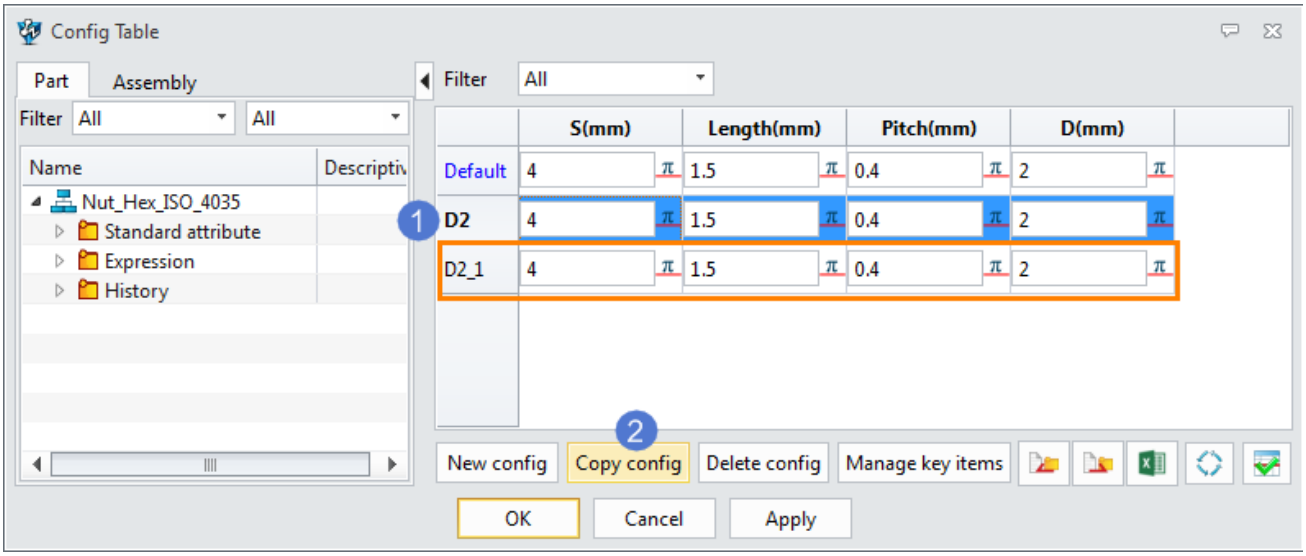



Figure11 Copy a New Configuration

STEP 02 Double-click the config name to rename it as “D2.5”.

STEP 03 Set the new parameter value for the config D2.5, as shown in the image below.

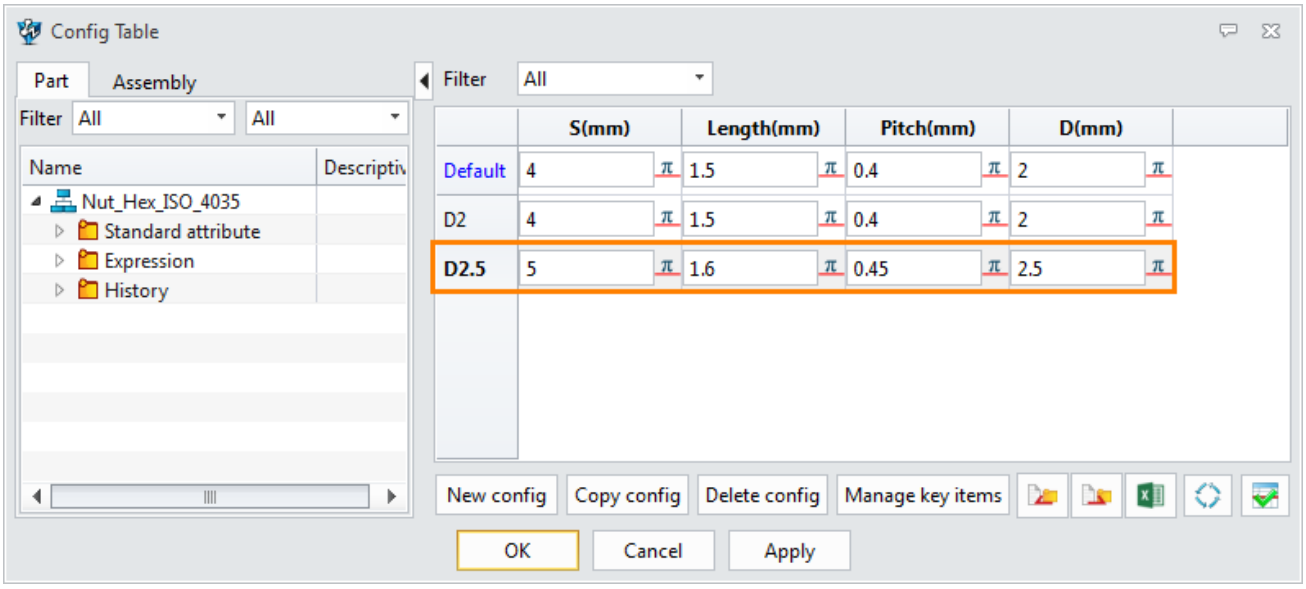



Figure12 Set the Config Parameters

**Method3: Add new configurations by exporting/importing excel file**

STEP 01 Click export icon to export current data to excel file(Part name_Part Config.xls).

STEP 02 Add other configurations data in this part config excel file and save it.

STEP 03 Import the excel data into config table.

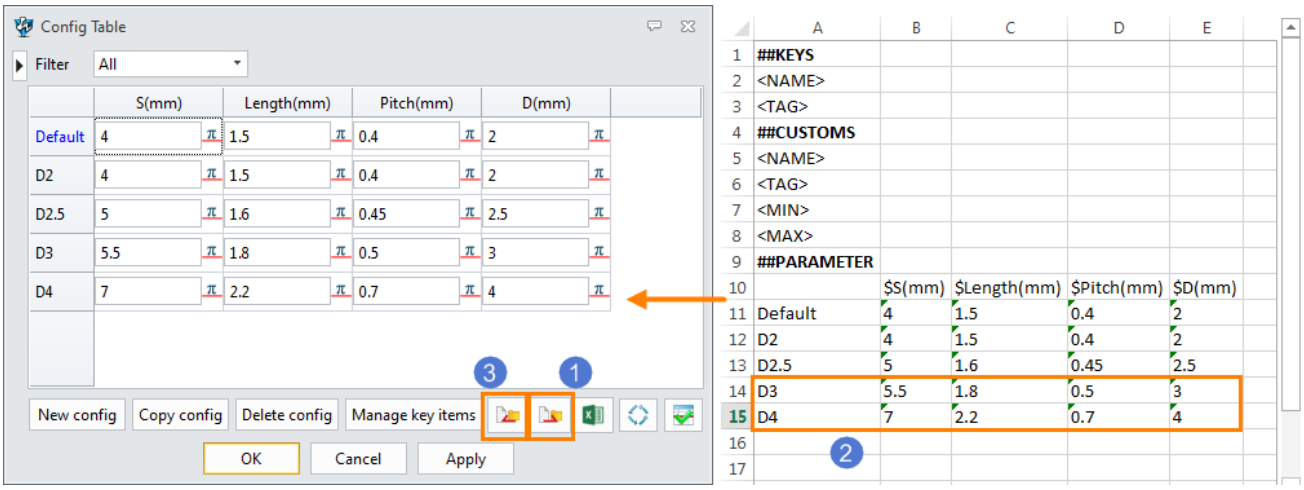



Figure13 Export and Import Excel Data

More importantly, it's easy to share the defined configuration data by exporting and importing tools.

**Method4: Edit configurations data in temporary excel file**

STEP 01 Click excel icon to directly edit configuration data in a temporary excel file.

STEP 02 Add other configurations data in the excel, such as Config D3 and D4.

STEP 03 Save the excel, then config table is automatically updated.

*Notes: This temporary excel file is different with the exported config excel file. Only config table data is recorded, as shown in the image below.*

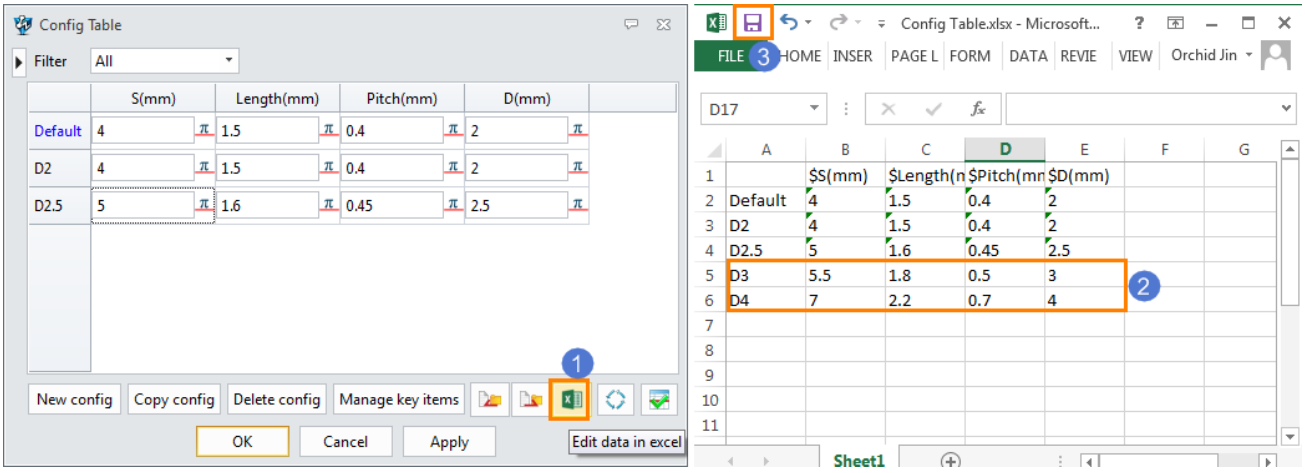



Figure14 Edit Configuration Data in Excel

**How to quickly add a group of similar configuration data?**

In method4, during adding configuration data in the temporary excel file, you could add a

group of data in a cell separated by a comma. After saving, multi- configurations are automatically created, as shown in the image below.

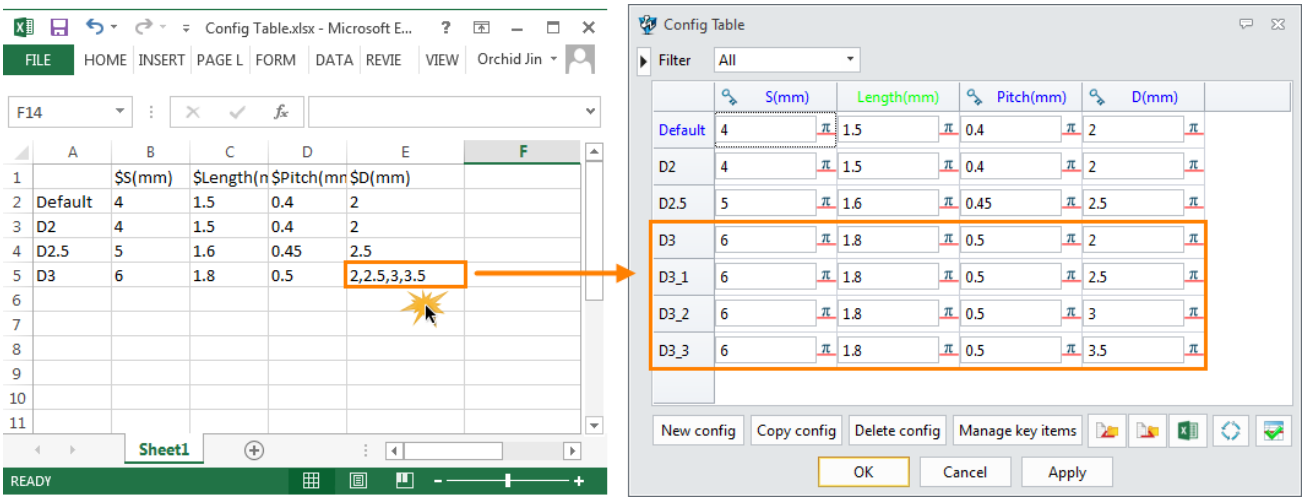



Figure15 Add a Group of Data in a Cell

### 1.3.3 Verify and Activate the Configuration

Click the verify icon  in the right corner to verify the configuration data.

Select one configration or all configurations, then click “Verify” button to verify data. If the data is incorrect, the verification will be failed.

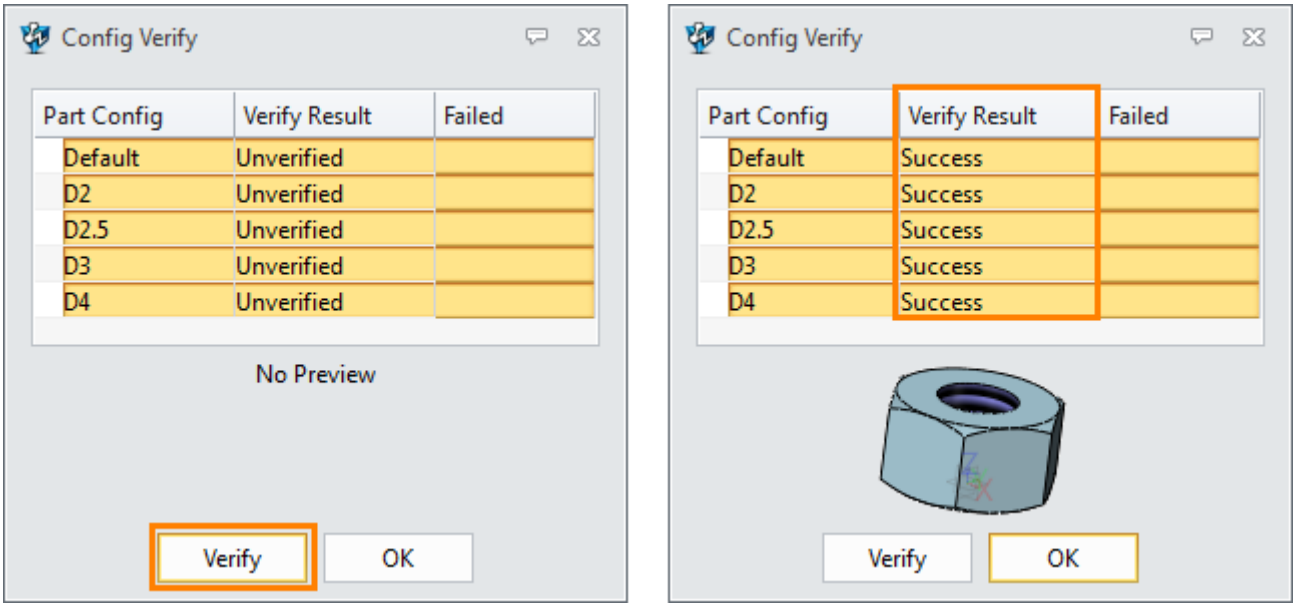



Figure16 Verify the Configurations

So far, four different configurations are created. In history manager, any part configuration can be activated by double click.

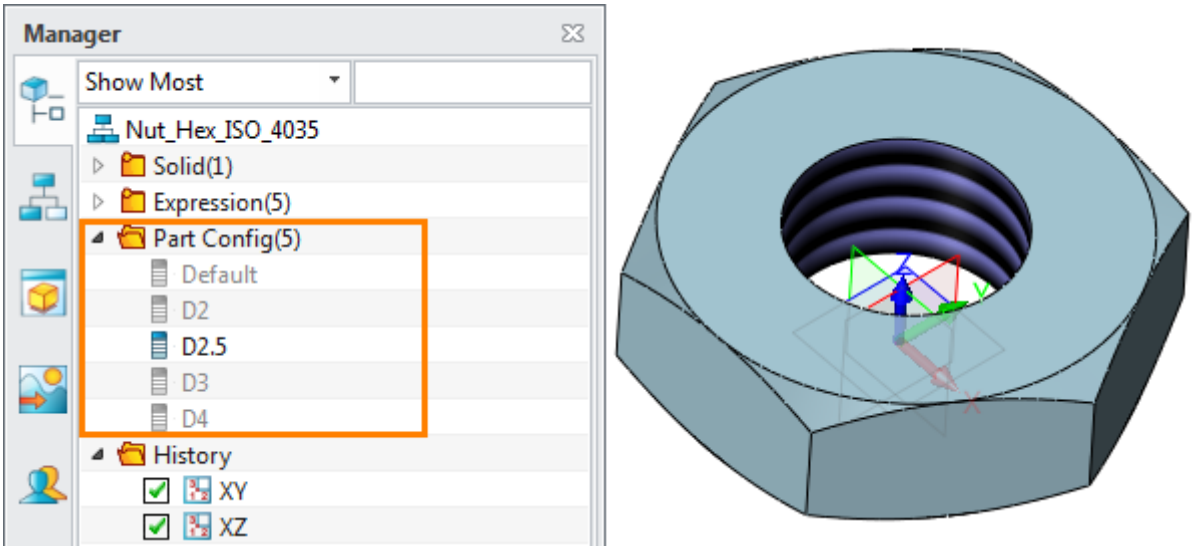



Figure17 Activate the Part Configuration

***Note:*** *After modifying the data in the config table and before clicking "Apply" button, the old data can be recovered by clicking "Reload part config from the file" button.*

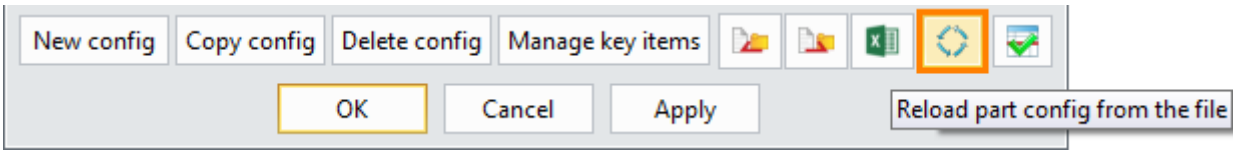



Figure18 Data Recovery

**Is it possible to directly configure the dimension or feature to the configuration?**

In the modeling level, all sketch dimensions and feature dimensions both can be directly configured. Right click the dimension or feature to configure it, as shown in image below.

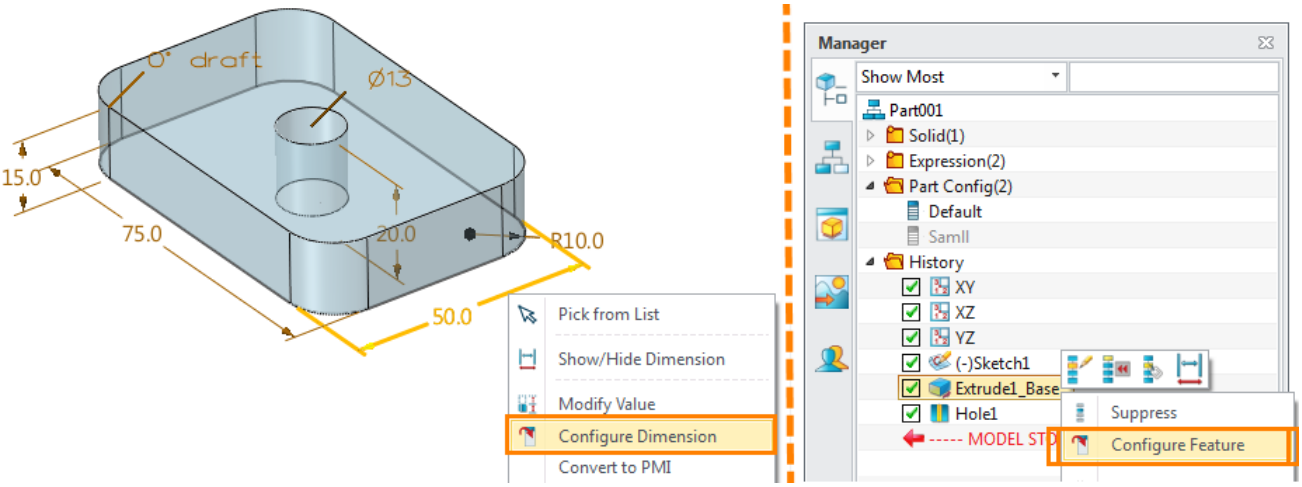



Figure19 Directly Configure Dimension or Feature

# 1.4 Create Part Library Based on Configurations

Firstly, let's see the display effect of the library reuse. Then we could get a general idea of the library design. When adding library part, the designer chooses the needed part by choosing the key parameters (and defining the custom parameters).

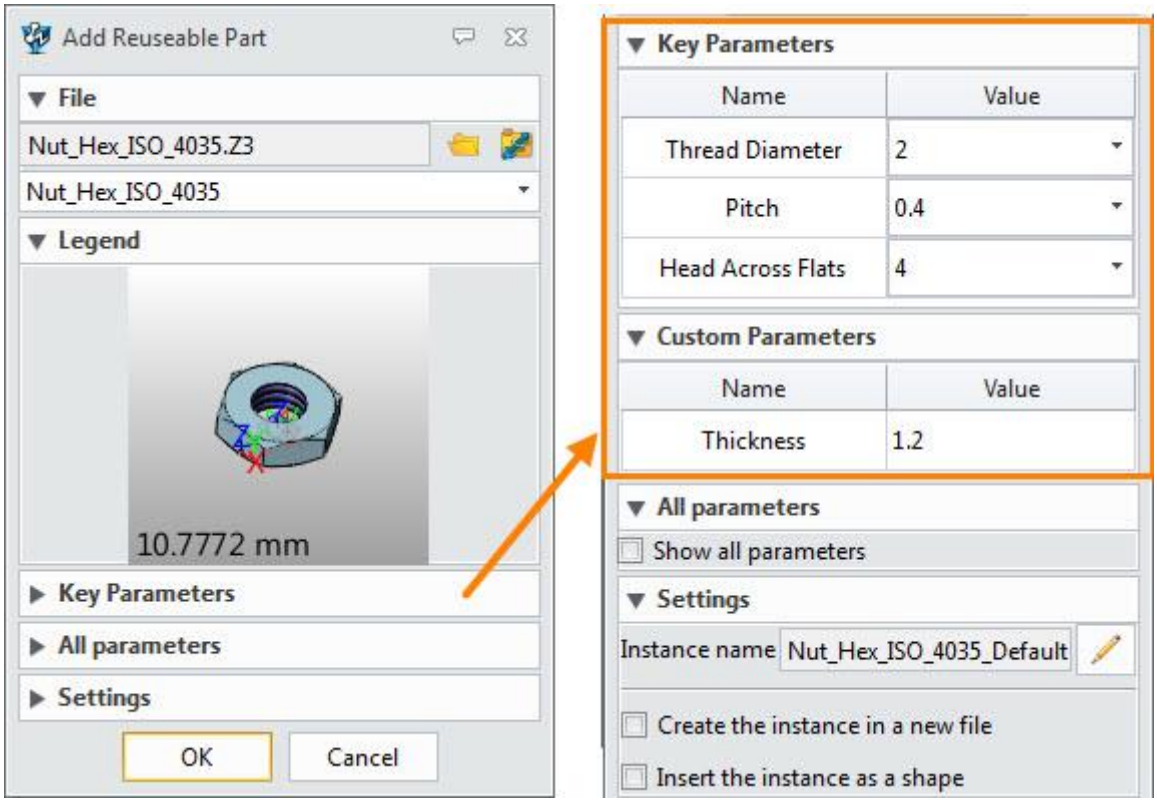



Figure20 Library Application

So for the library definition, key parameters and legend must be defined. Custom parameters is optional.

### 1.4.1 Set Key Parameters

Based on the defined configurations, the first step of library design is setting key parameters.

STEP 01 Open the config table.

STEP 02 Right click the configured item, then check "Key" option. Set "S", "Pitch" and "D" as key parameters.

The default order of key items depends on the definition order. In here, the required order is D-Pitch-S.

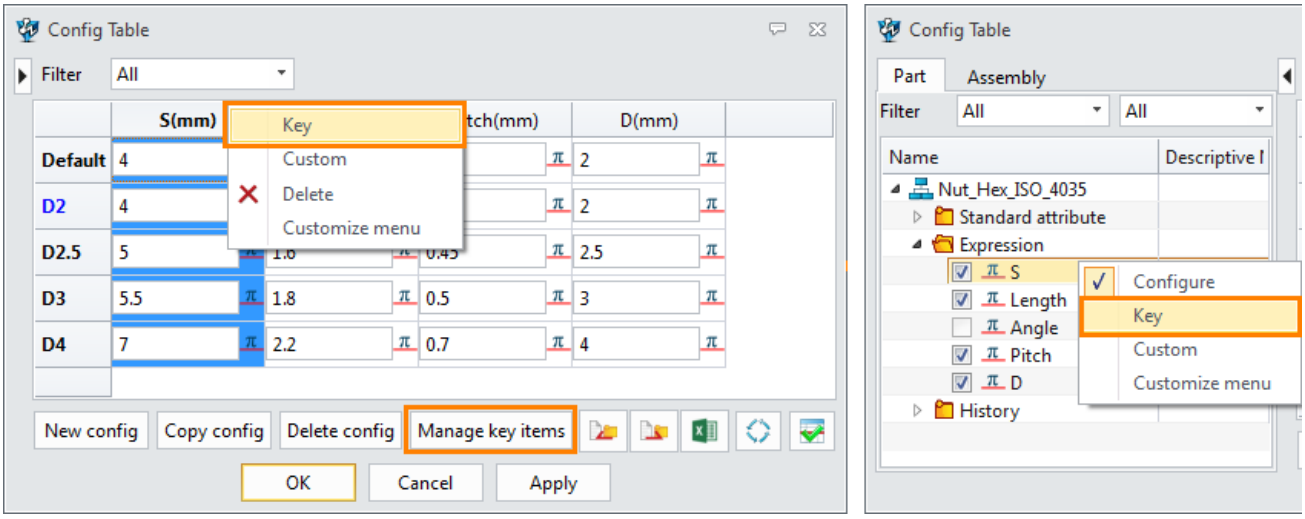



Figure21 Define the Key Parameters

STEP 03 Click "Manage key items" button to adjust the order if required.

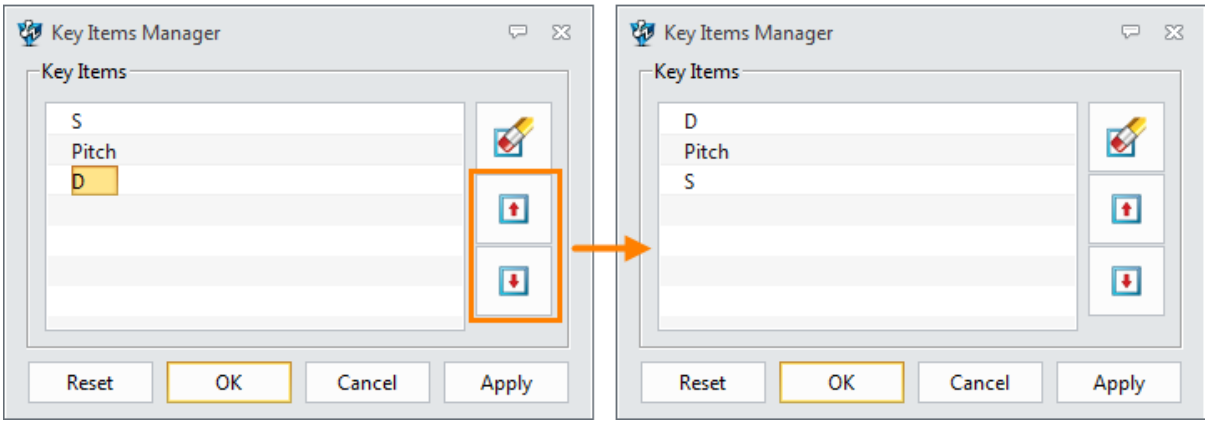



Figure22 Adjust the Order of Key Items

STEP 04 Set the descriptive name for the key items. This step is not necessary.

STEP 05 Click "Apply" button of config table to save these settings.

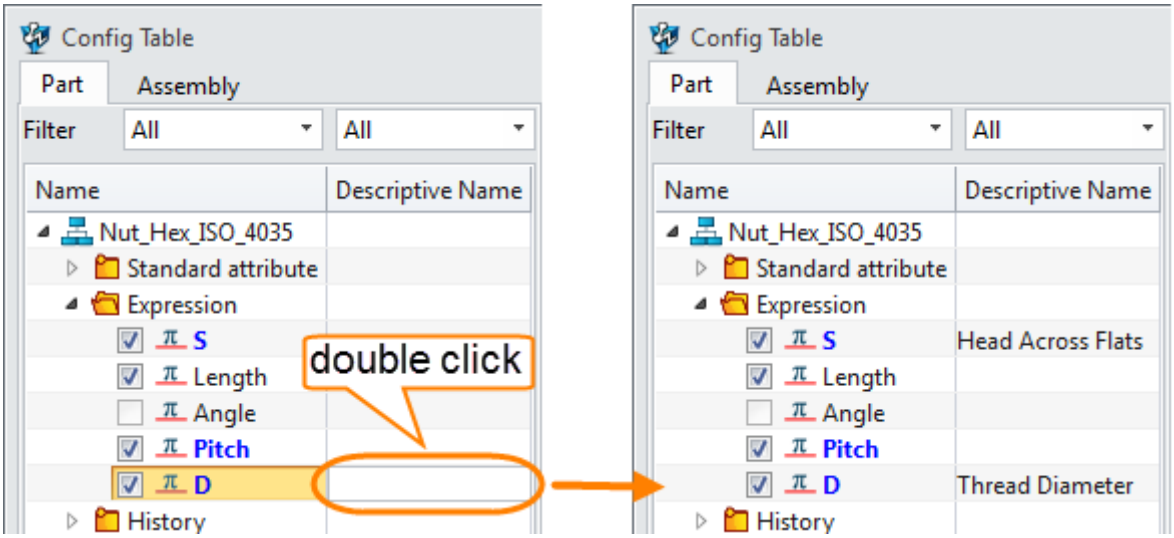



Figure23 Add Descriptive Name

### 1.4.2 Set Custom Parameters

If some parameters value could be customized by the user, this attribute also should be defined in the config table.

STEP 01 Define the “Length” parameter as the custom parameter, as shown in the image below.

STEP 02 Click “Apply” button of config table to save the setting.

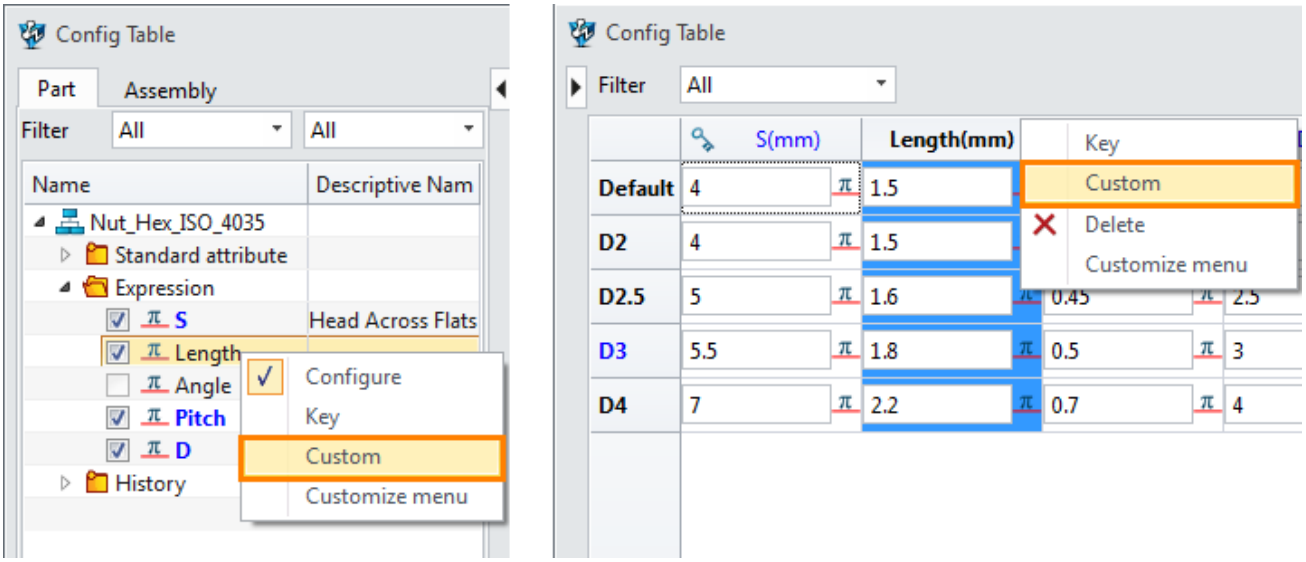



Figure24 Define the Custom Parameters

So far, key / custom parameters and descriptive name both have been defined.

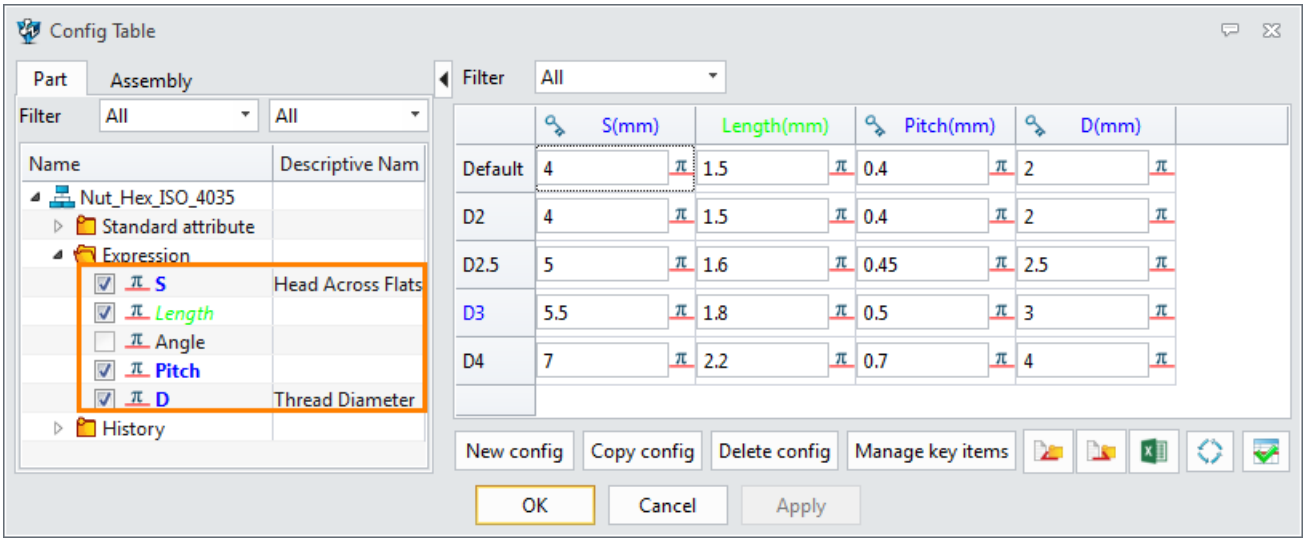
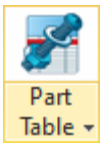



Figure25 Define Parameters Attributes

### 1.4.3 Define Part Table

**Tool Ribbon Toolbar->Part Table->** 


STEP 01 Open part table, all part onfigurations data is automatically loaded.

STEP 02 Select one image as the legend of this library part. if it is not defined, the default legend of Z3 file will be used.

STEP 03 Click “Apply” button to save the setting.

In this table, the order of key parameters match the previous definition.

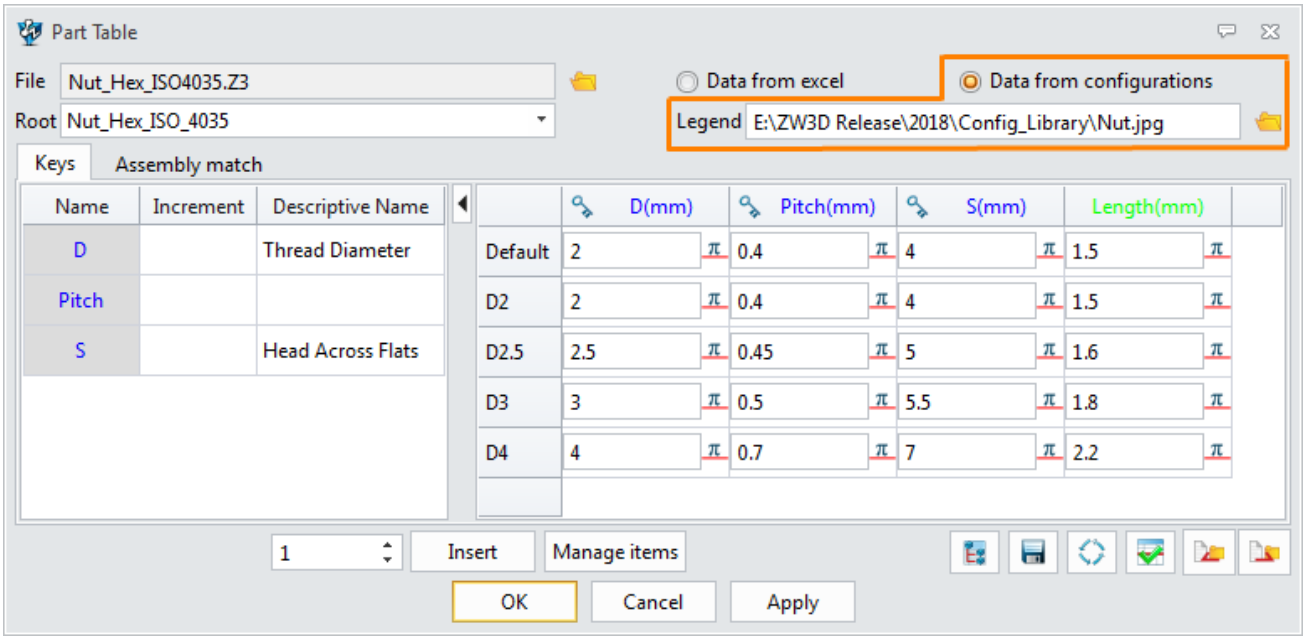
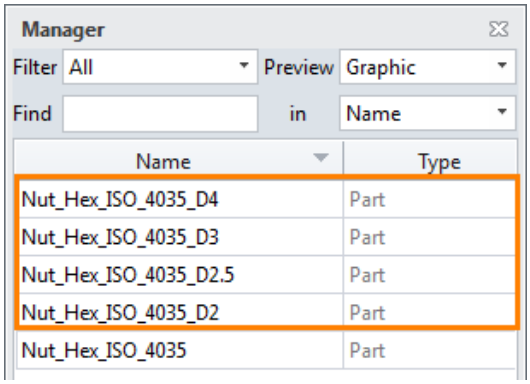



Figure26 Part Table

**Generate instrance with the selected row**

In part table, each different instrance can be created by this command. Select the rows and then click this tool to generate coresponding instances.



# 1.5 Create Part Library from Excel Data

If the designer doesn't want to create part library based on configuaration data, he/she could define library data by excel file.

**Method 1：Tool Ribbon Toolbar->Part Table->** 


STEP 01 Open part table, select "Data from excel" the option.

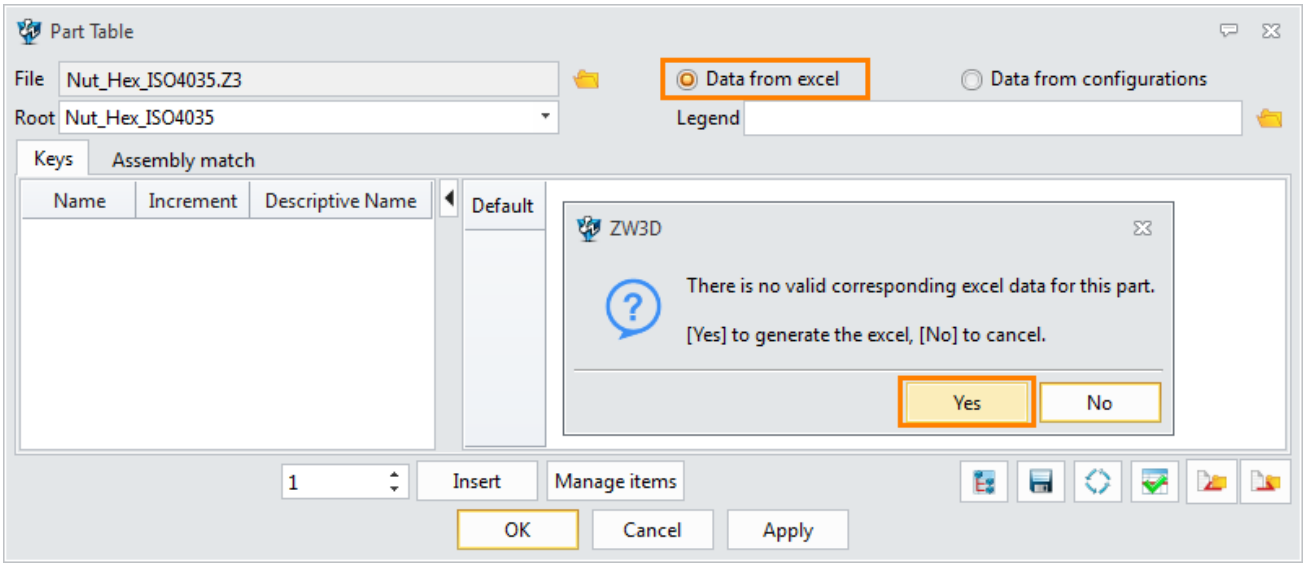



Figure27 Create the Excel file

STEP 02 Click "Yes" button to general a new expty excel file in the same file folder.

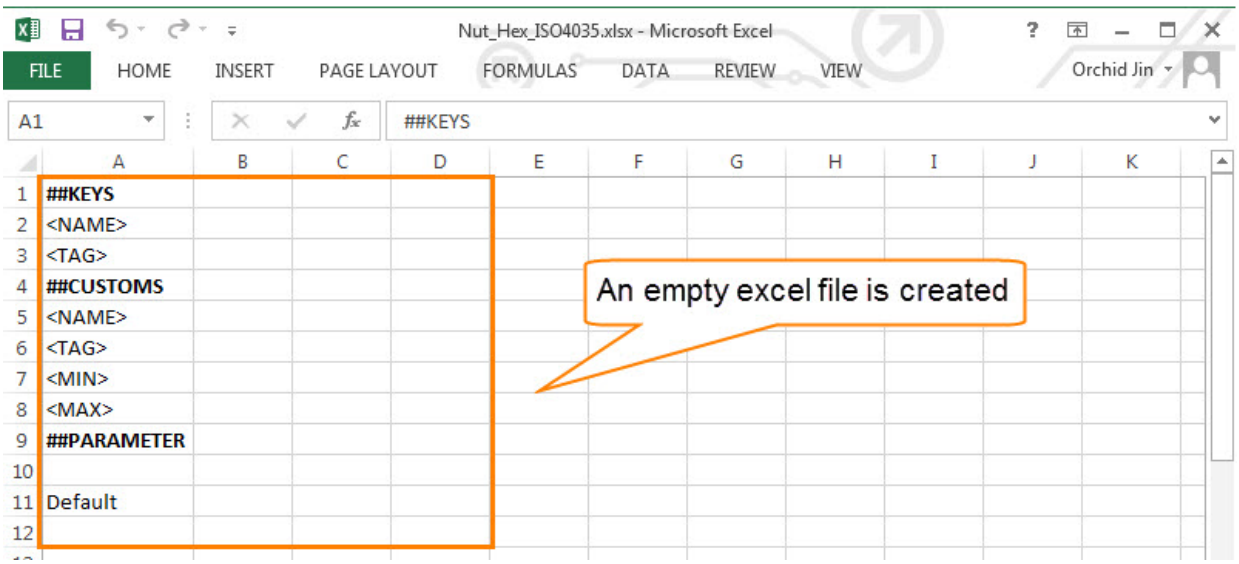
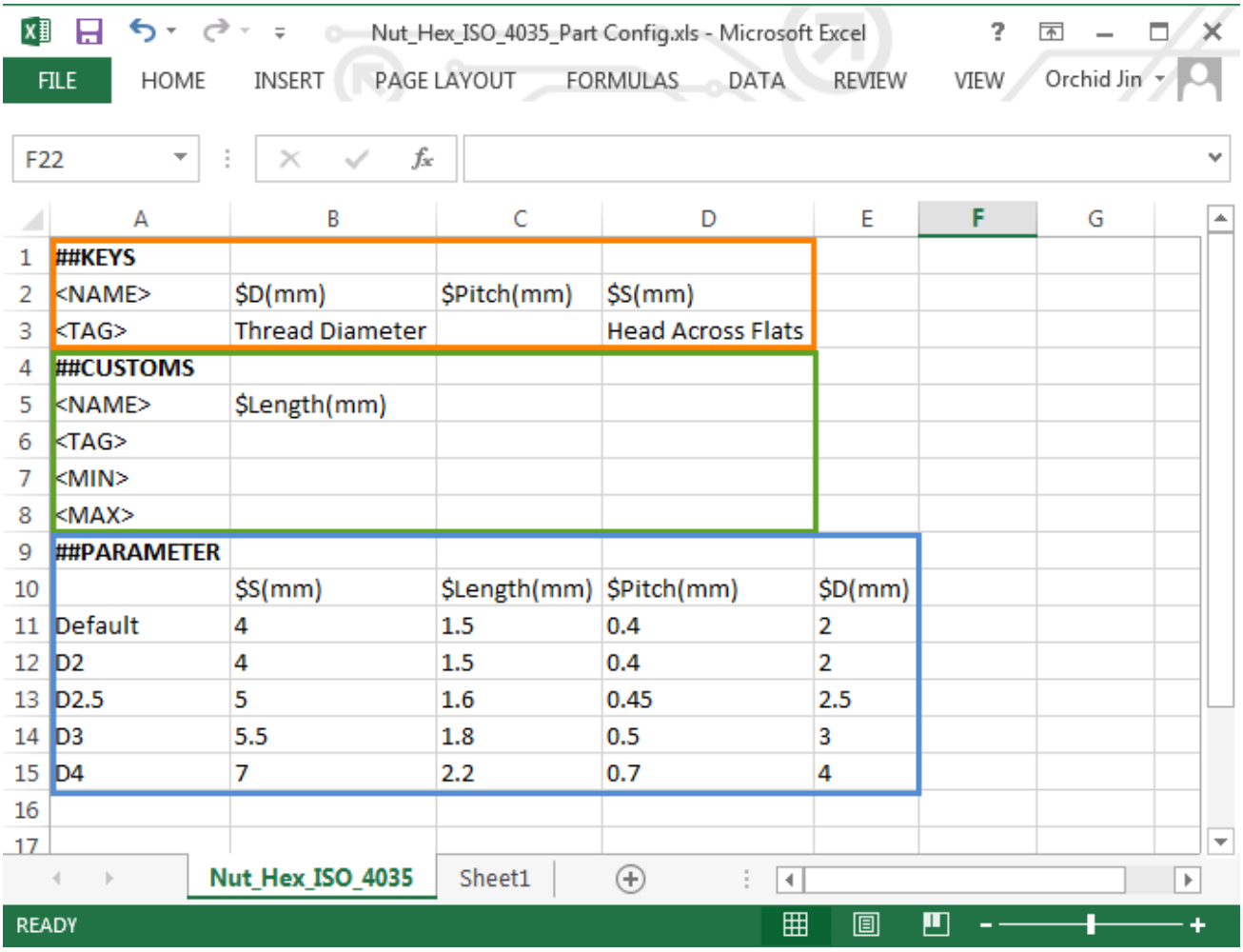



Figure28 Empty Excel File

STEP 03 Add all data manually in the excel file. All parameters name and formats must be correct.

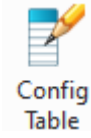



| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | ##KEYS | | | | |
| 2 | <NAME> | $D(mm) | $Pitch(mm) | $S(mm) | |
| 3 | <TAG> | Thread Diameter | | Head Across Flats | |
| 4 | ##CUSTOMS | | | | |
| 5 | <NAME> | $Length(mm) | | | |
| 6 | <TAG> | | | | |
| 7 | <MIN> | | | | |
| 8 | <MAX> | | | | |
| 9 | ##PARAMETER | | | | |
| 10 | | $S(mm) | $Length(mm) | $Pitch(mm) | $D(mm) |
| 11 | Default | 4 | 1.5 | 0.4 | 2 |
| 12 | D2 | 4 | 1.5 | 0.4 | 2 |
| 13 | D2.5 | 5 | 1.6 | 0.45 | 2.5 |
| 14 | D3 | 5.5 | 1.8 | 0.5 | 3 |
| 15 | D4 | 7 | 2.2 | 0.7 | 4 |
| 16 | | | | | |
| 17 | | | | | |

Figure29 Add the Library Data in Excel

*Notes: This way begins with the empty excel file. It's easy to make mistake since of spelling or format mistakes to cause the failure of library definition.*

So the recommendation is to start with the default configuration. Next, the better way is introduced.

**Method 2: Tool Ribbon Toolbar->Insert->** 


STEP 01 Open config table, define the default part configuration (chapter 1.3.1).

STEP 02 Set the key/custom parameters (chapter 1.41/1.4.2). The result as shown in the image below.

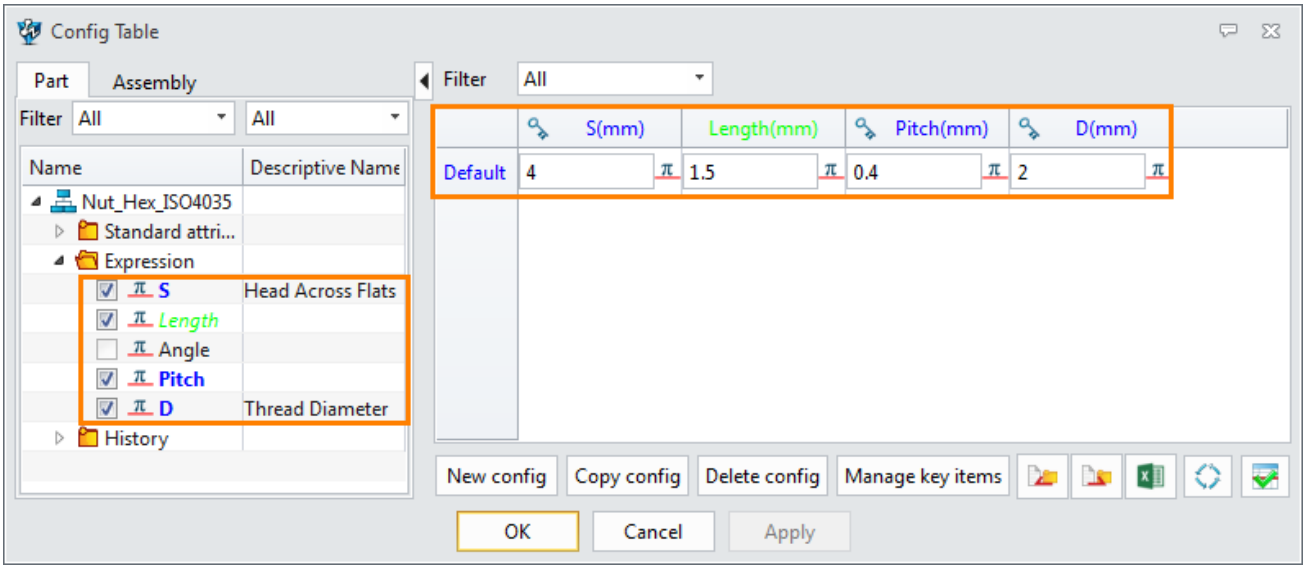
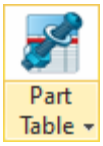



Figure30 Default Part Config with Key/Custome Parameters

**Tool Ribbon Toolbar->Part Table->** 


STEP 01 Open part table, select the option “Data from excel”.

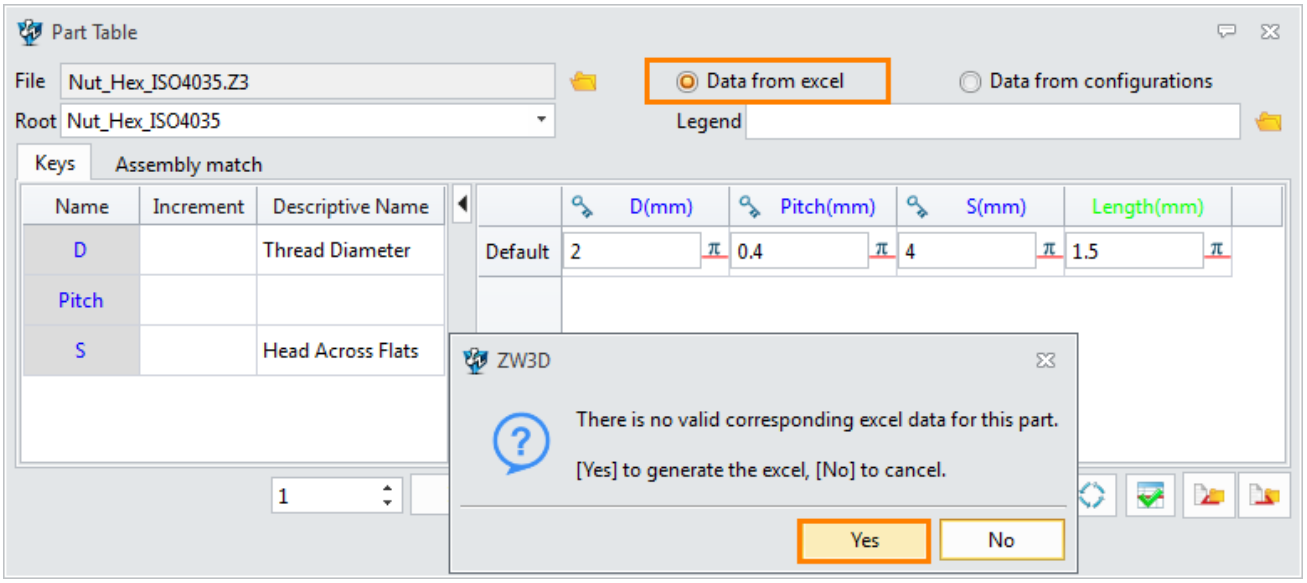
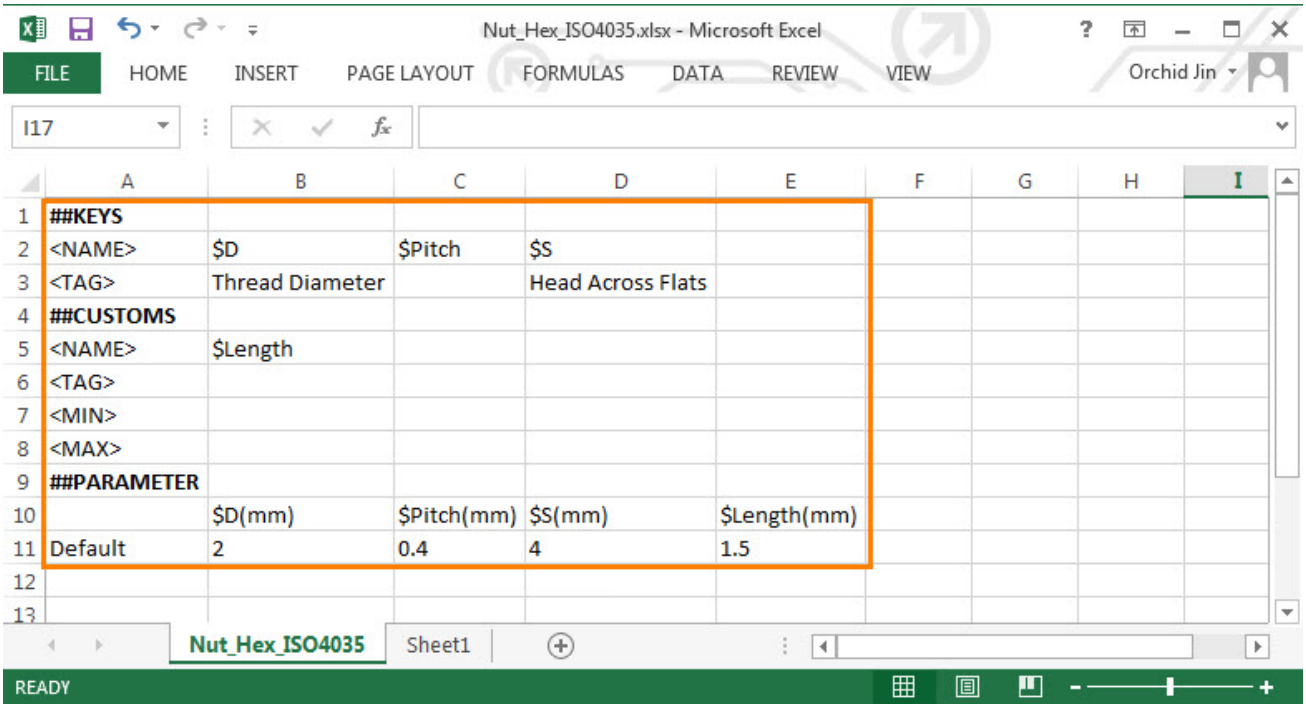



Figure31 Create the Excel File

STEP 02 Click “Yes” button to general an excel file in the same file folder.

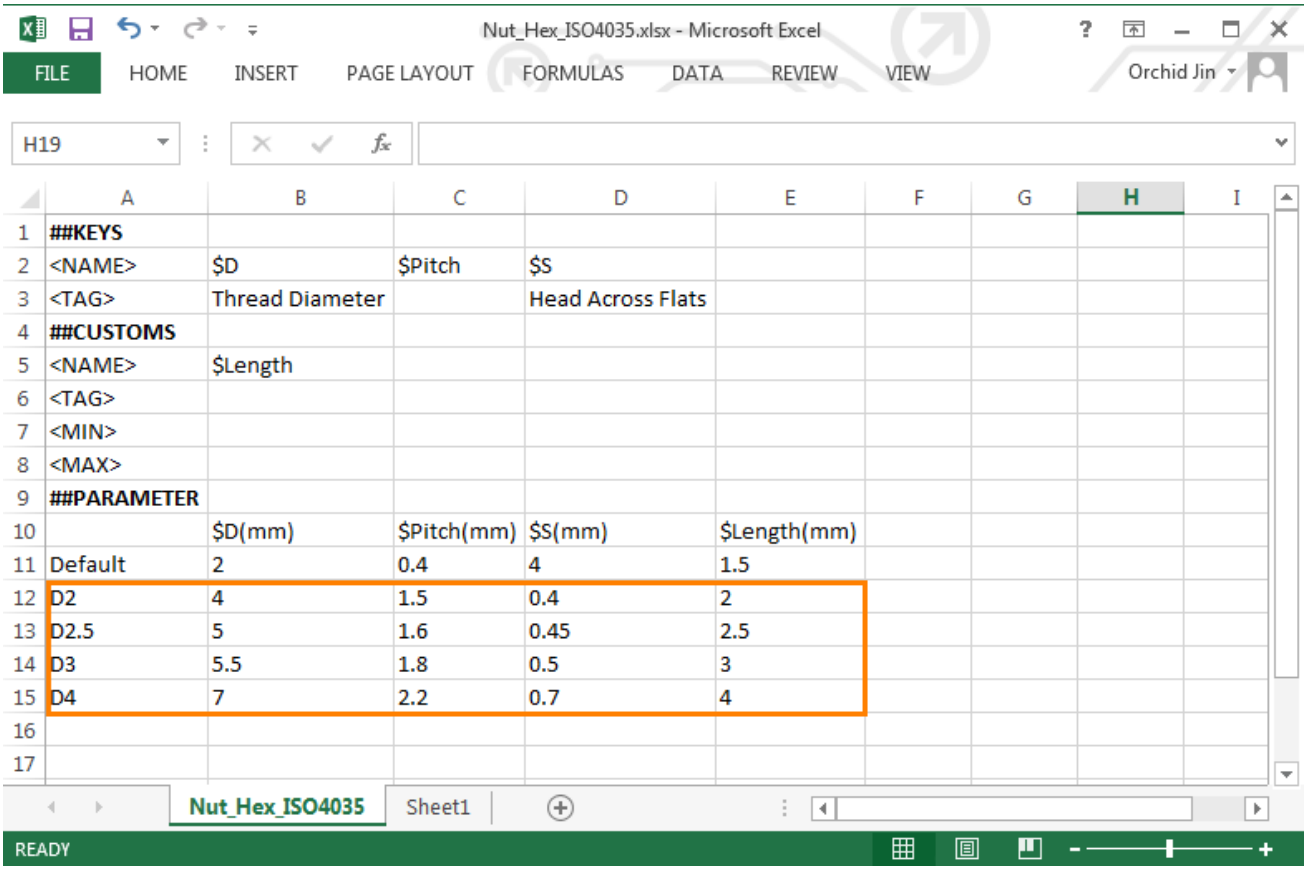
STEP 03 Open the excel file, as shown in the image below.




| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | ##KEYS | | | | |
| 2 | <NAME> | $D | $Pitch | $S | |
| 3 | <TAG> | Thread Diameter | | Head Across Flats | |
| 4 | ##CUSTOMS | | | | |
| 5 | <NAME> | $Length | | | |
| 6 | <TAG> | | | | |
| 7 | <MIN> | | | | |
| 8 | <MAX> | | | | |
| 9 | ##PARAMETER | | | | |
| 10 | | $D(mm) | $Pitch(mm) | $S(mm) | $Length(mm) |
| 11 | Default | 2 | 0.4 | 4 | 1.5 |
| 12 | | | | | |
| 13 | | | | | |

Figure32 The Default Excel file with All Formats

STEP 04 Add part library data in the excel file.




| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | ##KEYS | | | | |
| 2 | <NAME> | $D | $Pitch | $S | |
| 3 | <TAG> | Thread Diameter | | Head Across Flats | |
| 4 | ##CUSTOMS | | | | |
| 5 | <NAME> | $Length | | | |
| 6 | <TAG> | | | | |
| 7 | <MIN> | | | | |
| 8 | <MAX> | | | | |
| 9 | ##PARAMETER | | | | |
| 10 | | $D(mm) | $Pitch(mm) | $S(mm) | $Length(mm) |
| 11 | Default | 2 | 0.4 | 4 | 1.5 |
| 12 | D2 | 4 | 1.5 | 0.4 | 2 |
| 13 | D2.5 | 5 | 1.6 | 0.45 | 2.5 |
| 14 | D3 | 5.5 | 1.8 | 0.5 | 3 |
| 15 | D4 | 7 | 2.2 | 0.7 | 4 |
| 16 | | | | | |
| 17 | | | | | |

Figure33 Add Library Data in Excel

*Notes: Compared with the method1, the method2 is easier and more accurate.*

# 1.6 Reuse Part Library

After defining the library, we could reuse the library part in any file.

**Tool Ribbon Toolbar->Part Table->** 


STEP 01 Add the file folder into the library manager.

In this manager, some standard parts are provided, such as ANSI, DME standard parts.

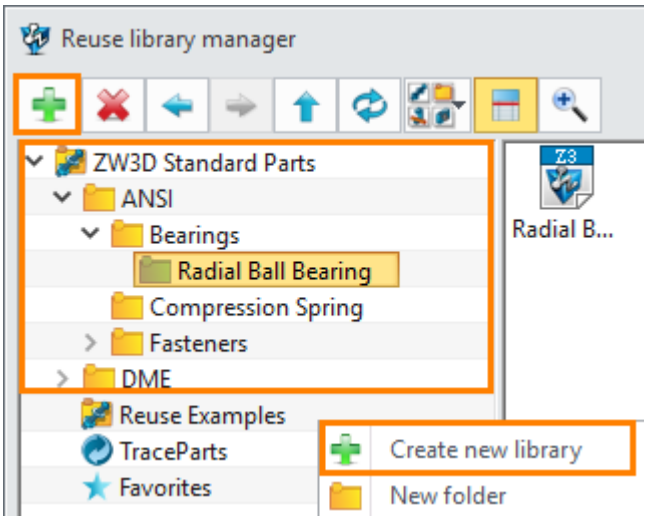



Figure34 Add the New Library Folder

STEP 02 Select the z3 file and part model. All parameters are displayed in this table for preview.

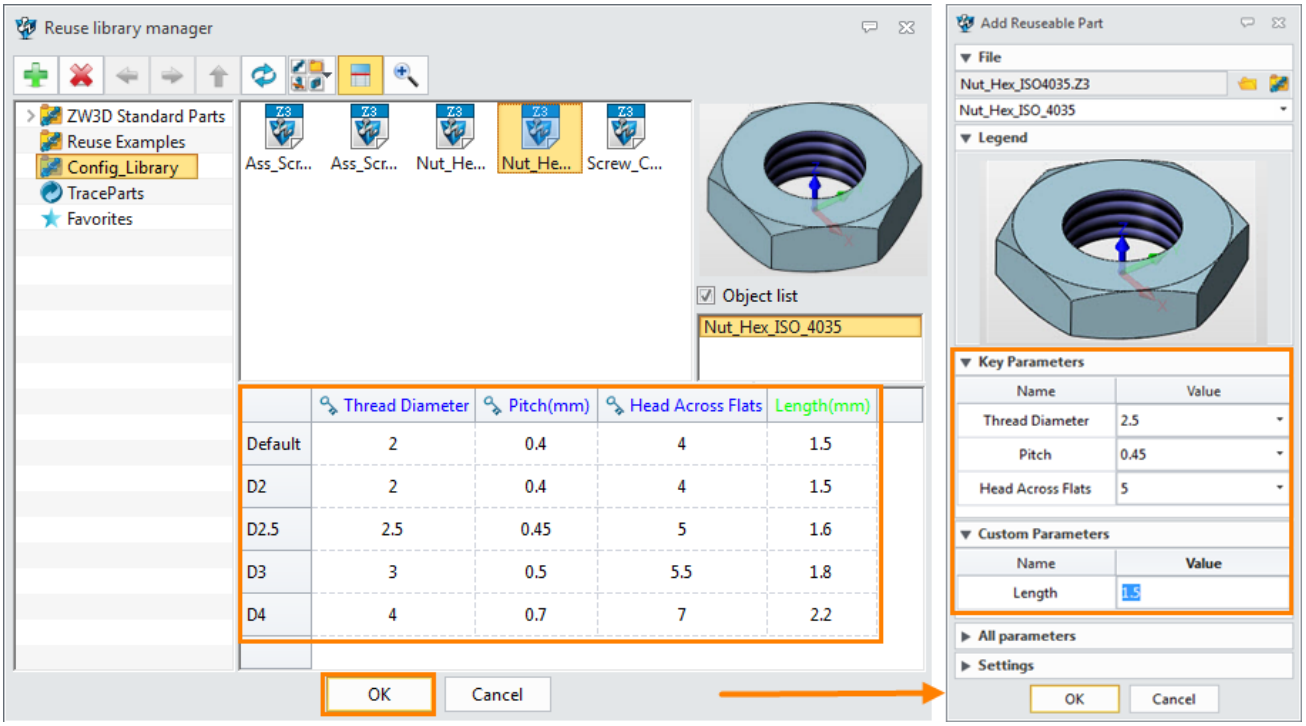



Figure35 Reuse the Library Part

STEP 03 Click "OK" button, then a new dialog pops up. According to the requirement, select the key parameters or set the custom parameter, then click "OK" to insert the library part.

STEP 04 By default, the instance is inserted as a component into the current file. And the instance part is created in the current file.

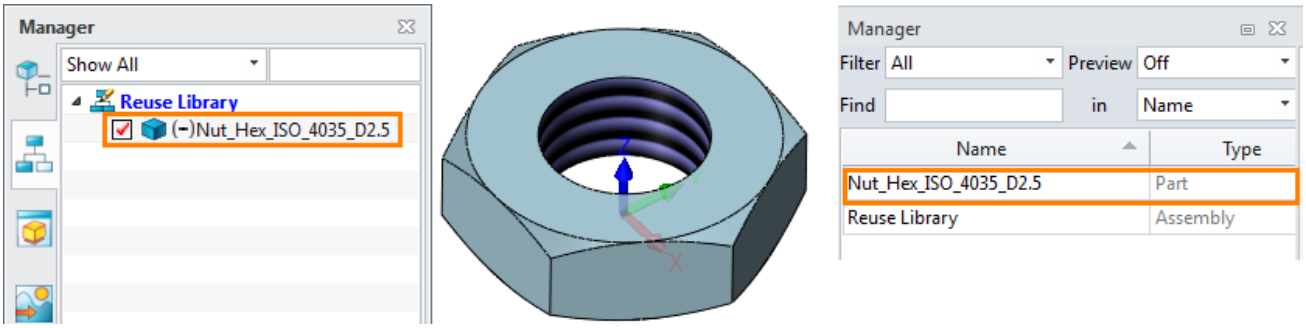
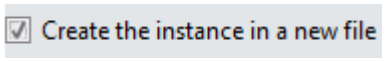



Figure36 Result

**Settings Parameters:**

 : click this icon to rename the instance name.




: When this option is checked, the instance part is created in a new file, as shown in the image below.

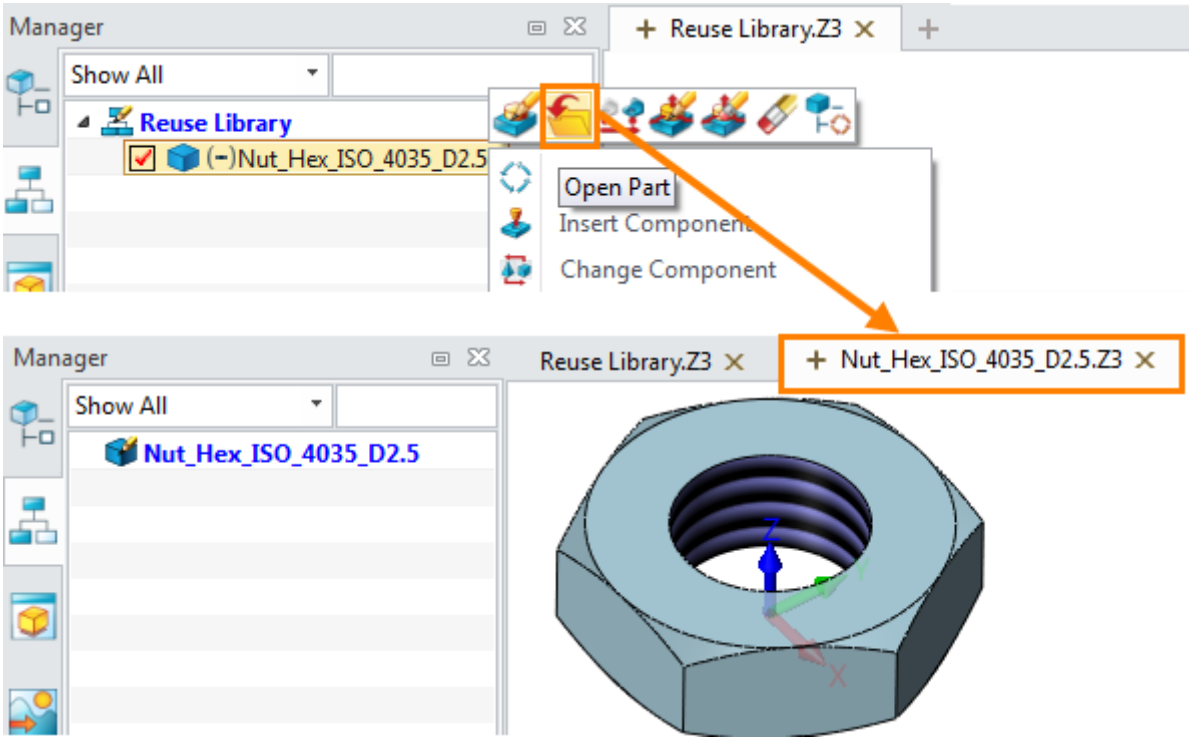



Figure37 Create the Instance in a New File

Insert the instance as a shape : When this option is checked, the instance is inserted as a shape into the current file.

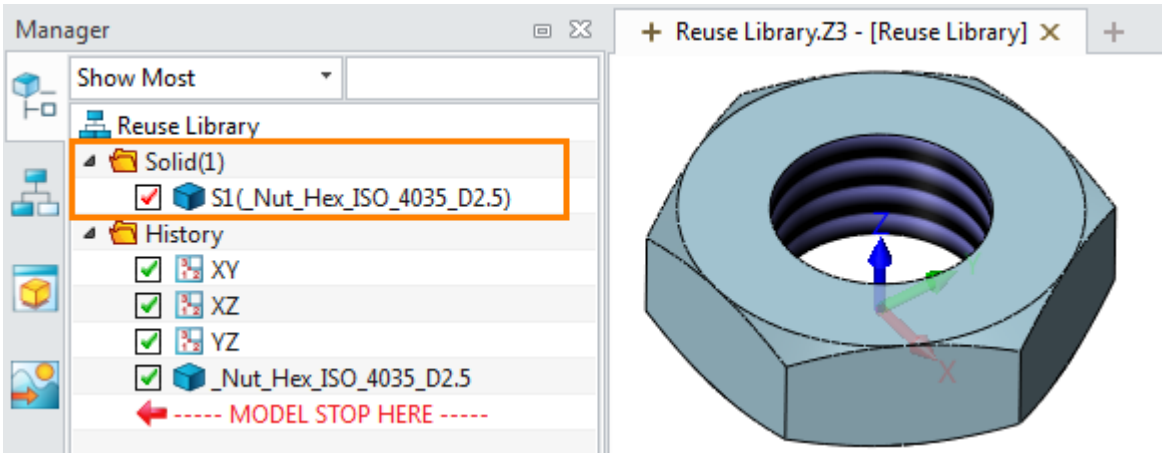



Figure38 Insert the Instance as a Shape

# 1.7 Define Assembly Configuration

## 1.7.1 Create Assembly Model with Constraints

Firstly, use the same method to define the part configurations for the screw model.

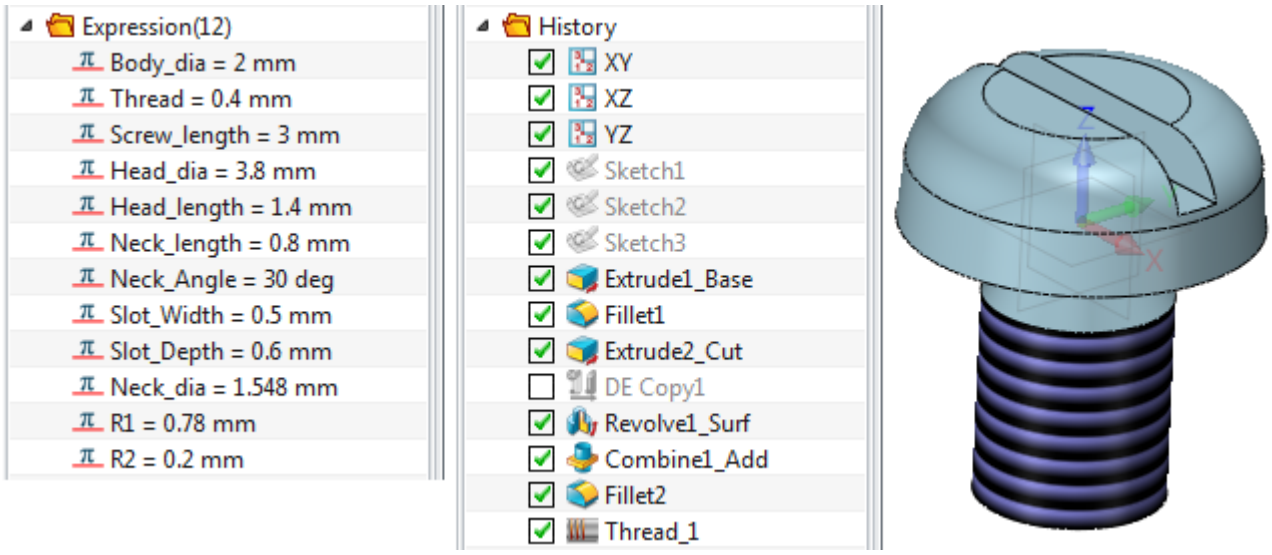



Figure39 Screw Model

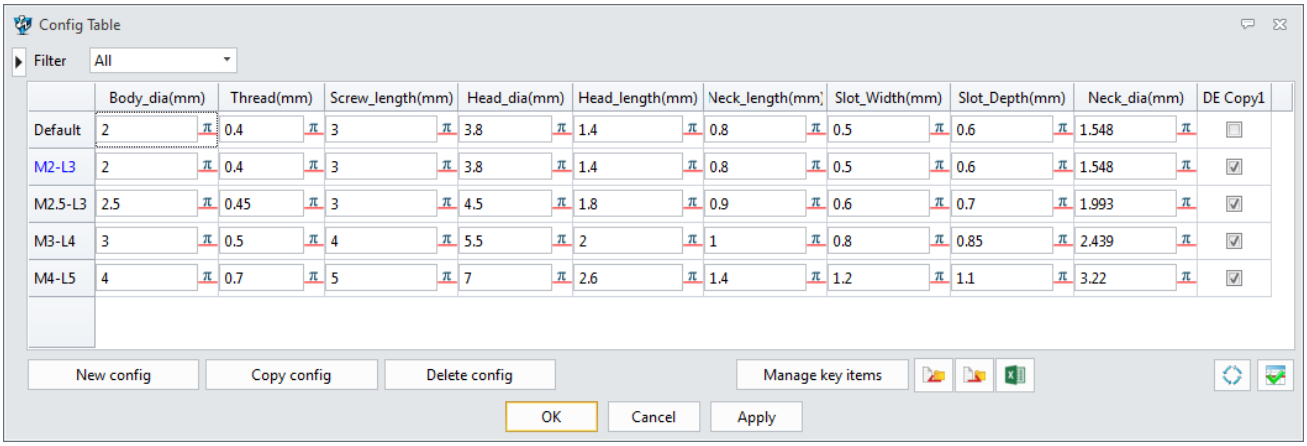



Figure40 Screw Part Configurations

Next, create a new file to assembly the screw and nut together.

STEP 01 Insert the screw and anchor it.

STEP 02 Insert the nut and add the concentric constraint.

STEP 03 Define the coincident constraint and set the offset value as 1mm.

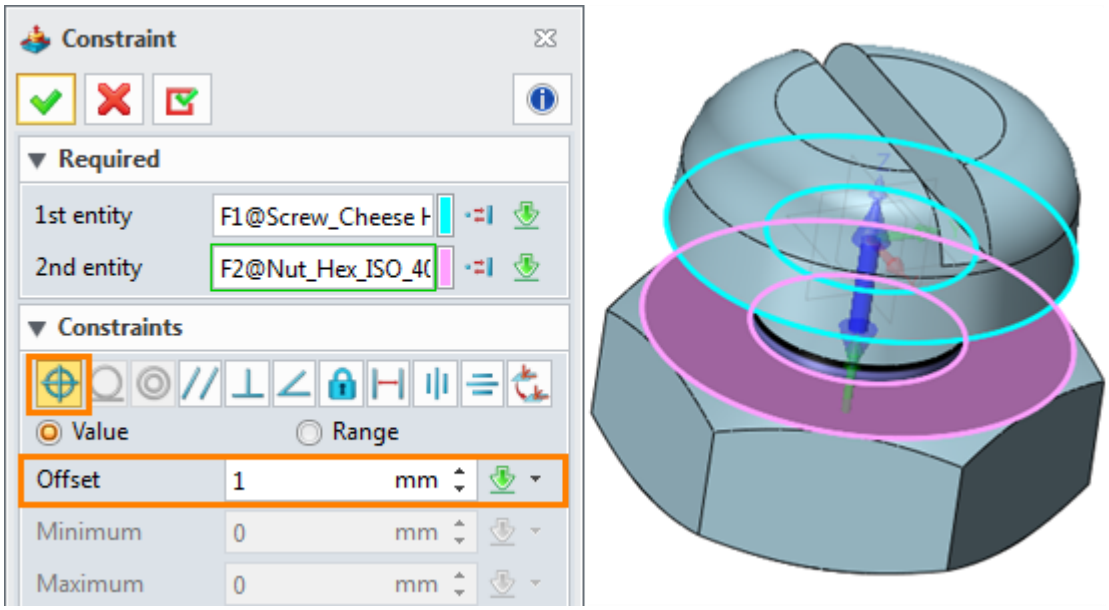



Figure41 Coincident Constraint

### 1.7.2 Define Assembly Configurations

STEP 01 Go to Tool ribbon toolbar -> Config table.

STEP 02 Check the part config and colour item of Screw and Nut components and check the offset item of coincident1 constraint.

STEP 03 Define the default value for default assembly configuration.

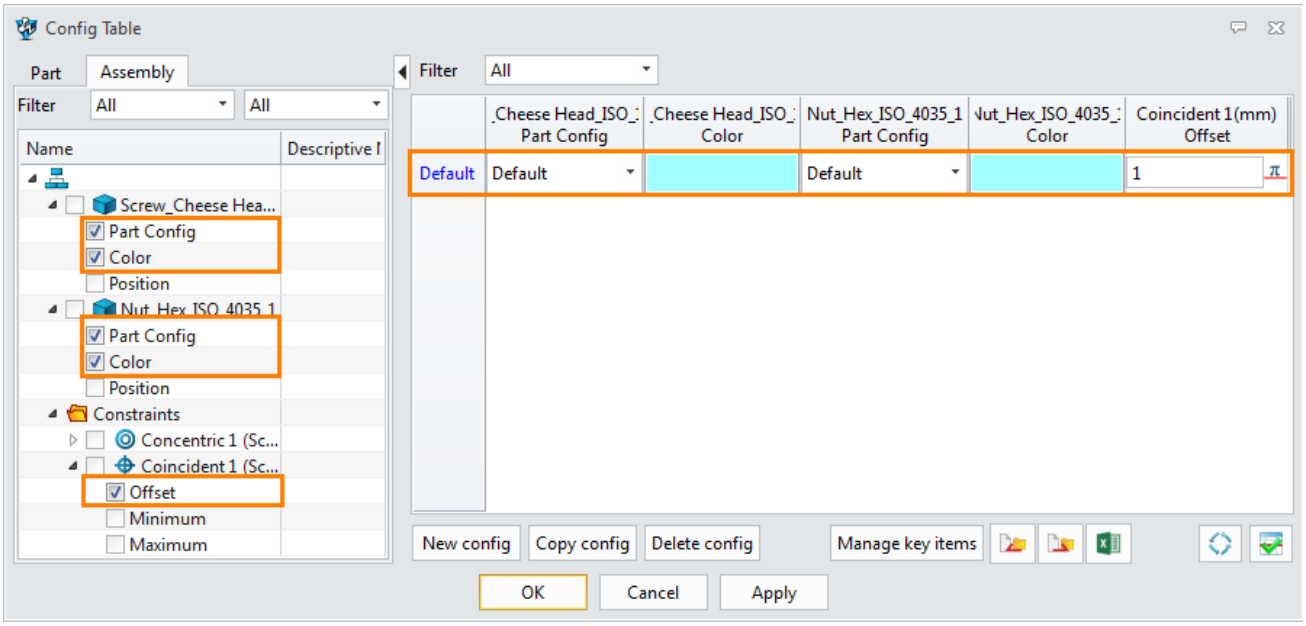



Figure42 Define the Assembly configuration Items

STEP 04 Define other assembly configurations, as shown in the following image. The operations are similar to the definition of part configurations.

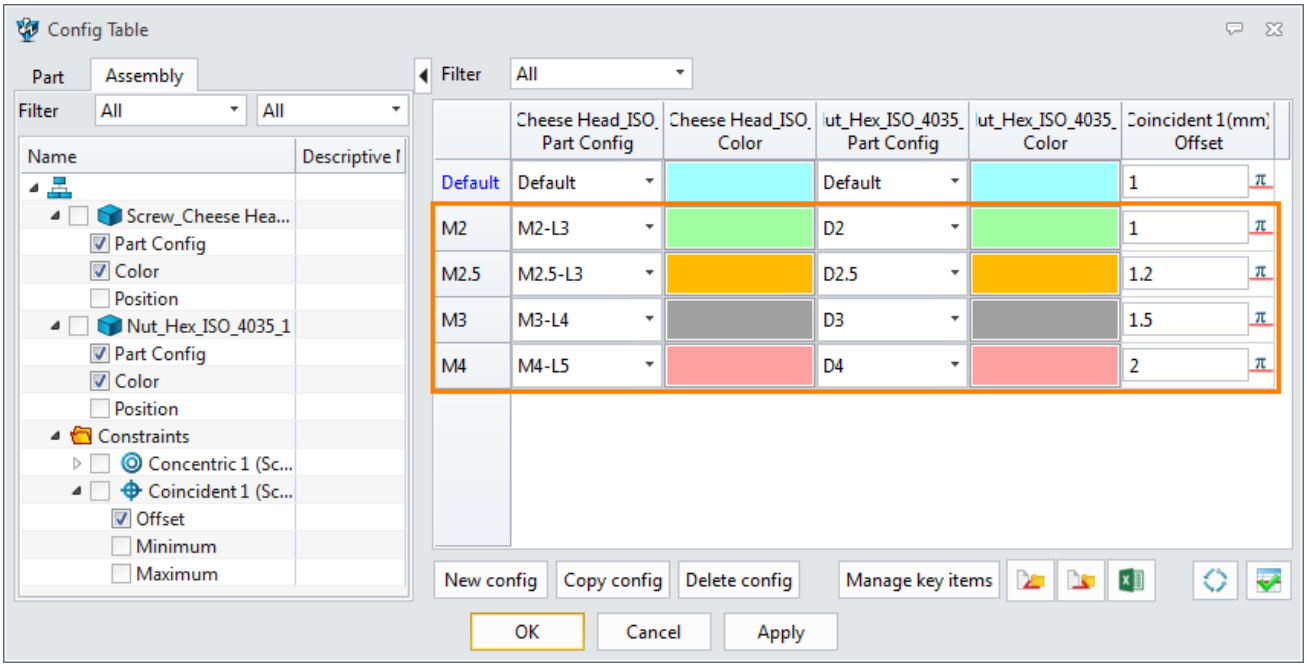



Figure43 All Assembly Configurations

STEP 05 Click the verify icon in the right corner to verify the configuration data.

STEP 06 In history manager, double click to activate any assembly configuration.

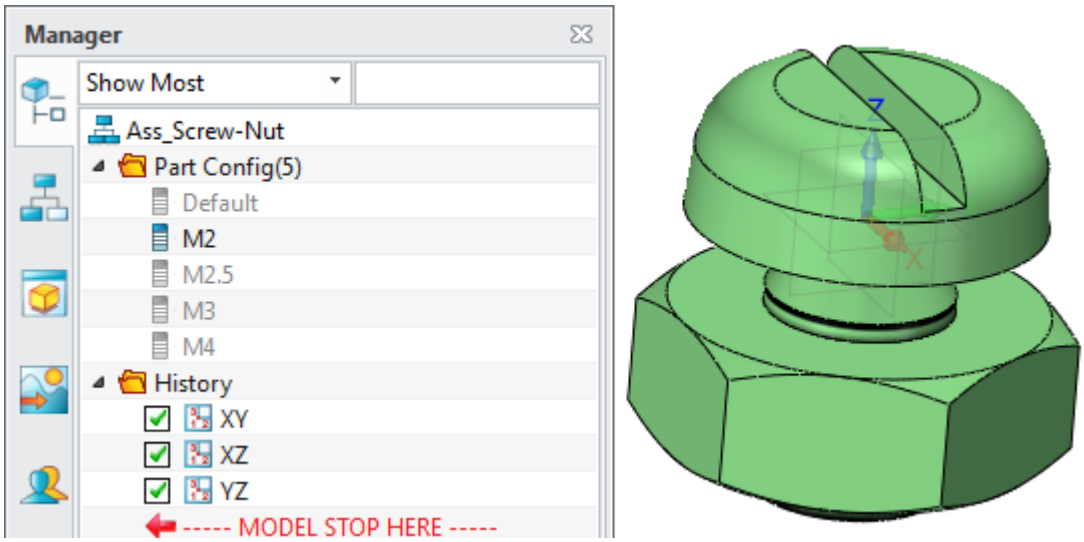



Figure44 Activate the Assembly Configuration

# 1.8 Create Assembly Library Based on Configs

The recommended method is defining assembly library based on configurations.

STEP 01 Define the key/custom parameters in config table. (Refer to chapter 1.4.1 and 1.4.2)

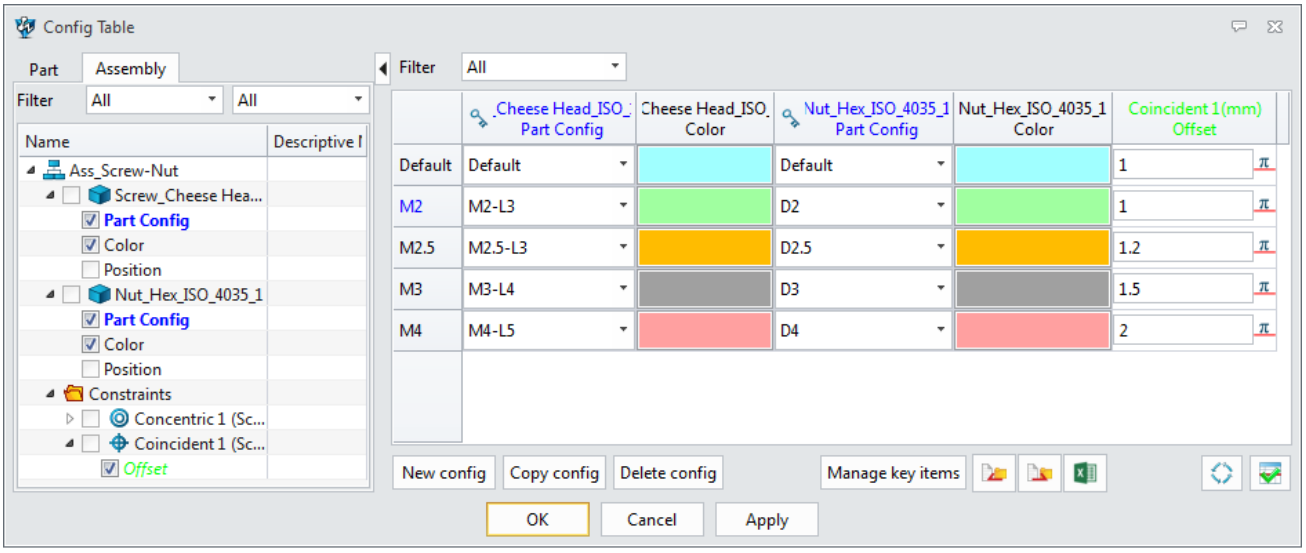



Figure45 Define the Key and Custom Parameters

STEP 02 Open part table, all part configurations data is automatically loaded.

STEP 03 Select one image as the legend of this library. The descriptive name of key parameters also can be defined in the part table.

STEP 04 Click “Apply” button to save the setting.

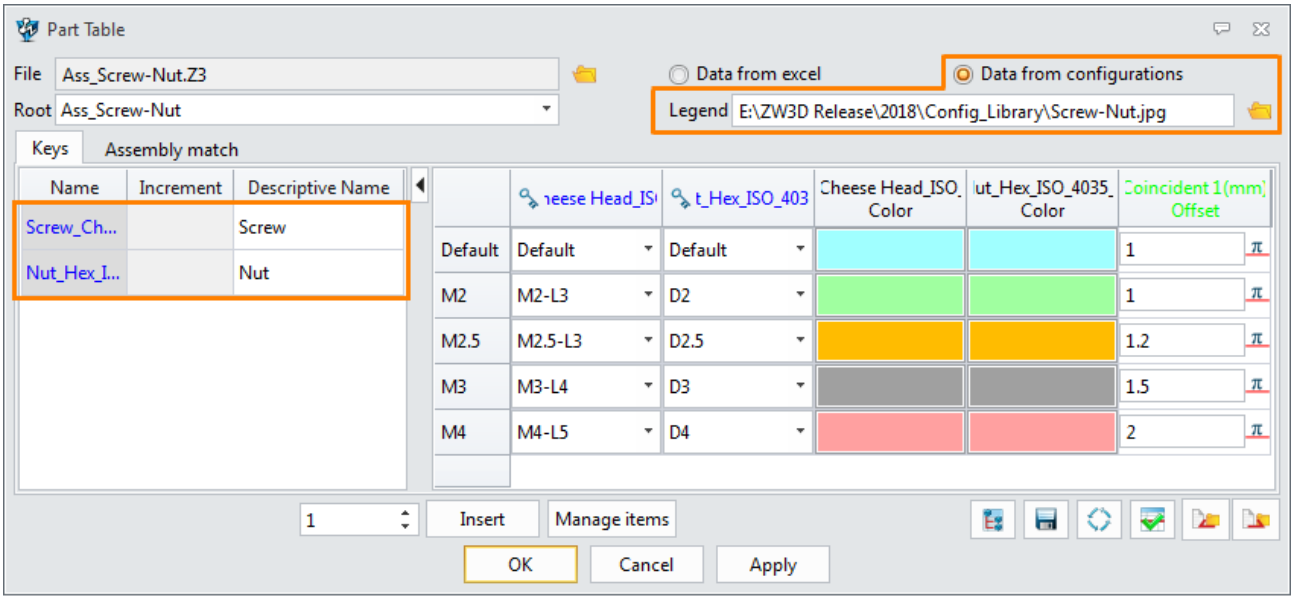



Figure46 Assembly -Part Table

# 1.9 Reuse Assembly Library

**Tool Ribbon Toolbar->Part Table->** 


STEP 01 Add the file folder into the library manager.

STEP 02 Select the z3 file and part model. All parameters are displayed for preview.

STEP 03 Select the key parameters or set the custom parameter, then click “OK” to insert.

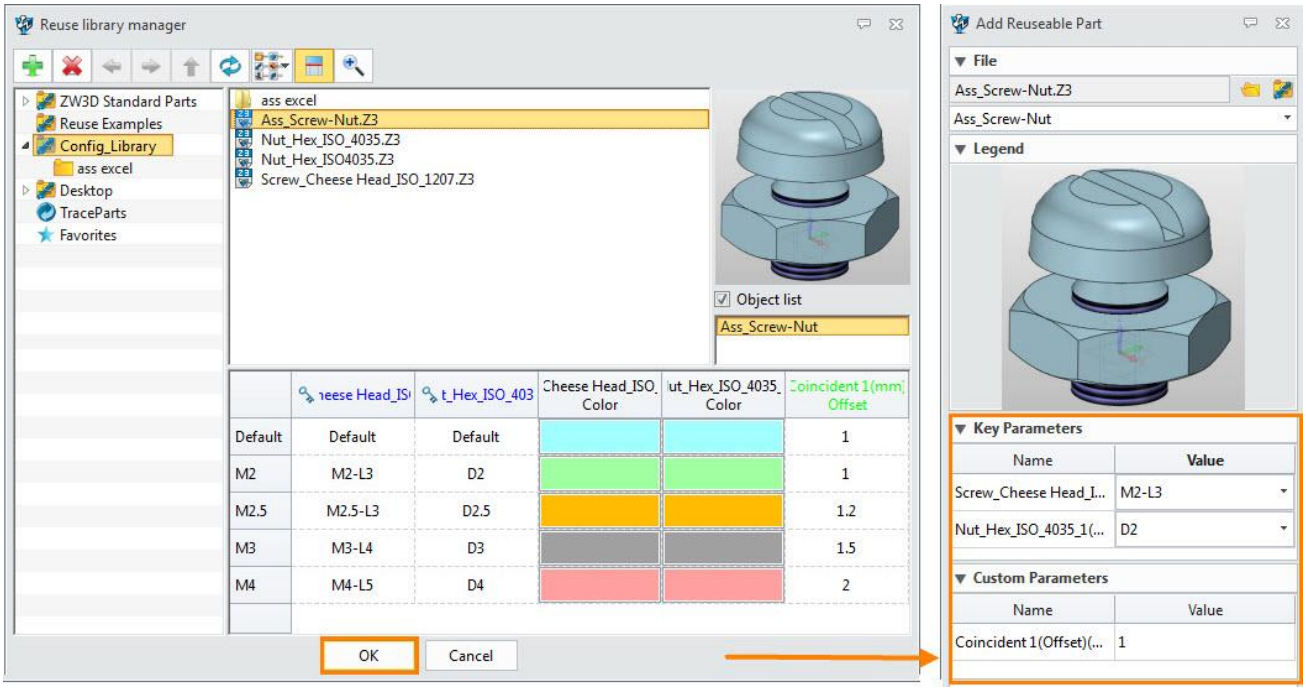



Figure47 Reuse the Assembly Library

STEP 04 By default, the library instance is inserted as a component into the current file.

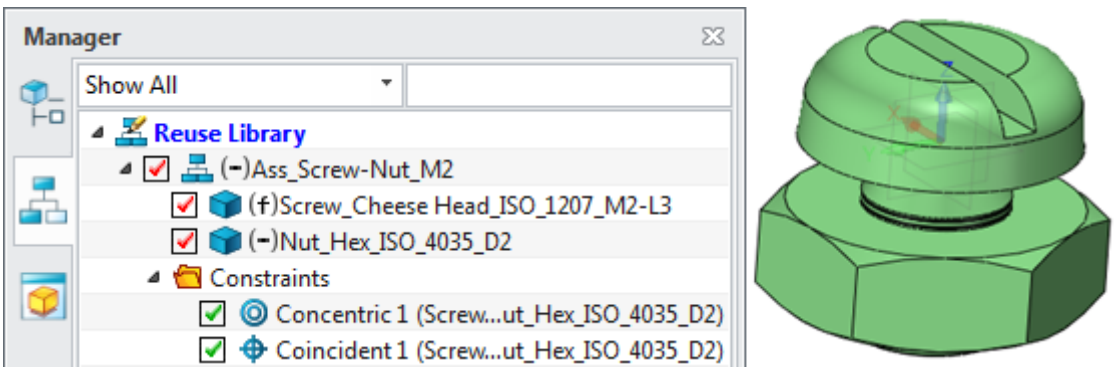



Figure48 Result

*Notes: If you want to learn the meaning of other setting parameters, please go to chapter 1.6.*

# 1.10 Application of Configurations

During the product design, if there is a part/assembly with some configurations, you could easily to change the configuration to get different product model or status.

This is a handle case. Three different configurations are defined for this model, involving dimension variables and feature suppression.

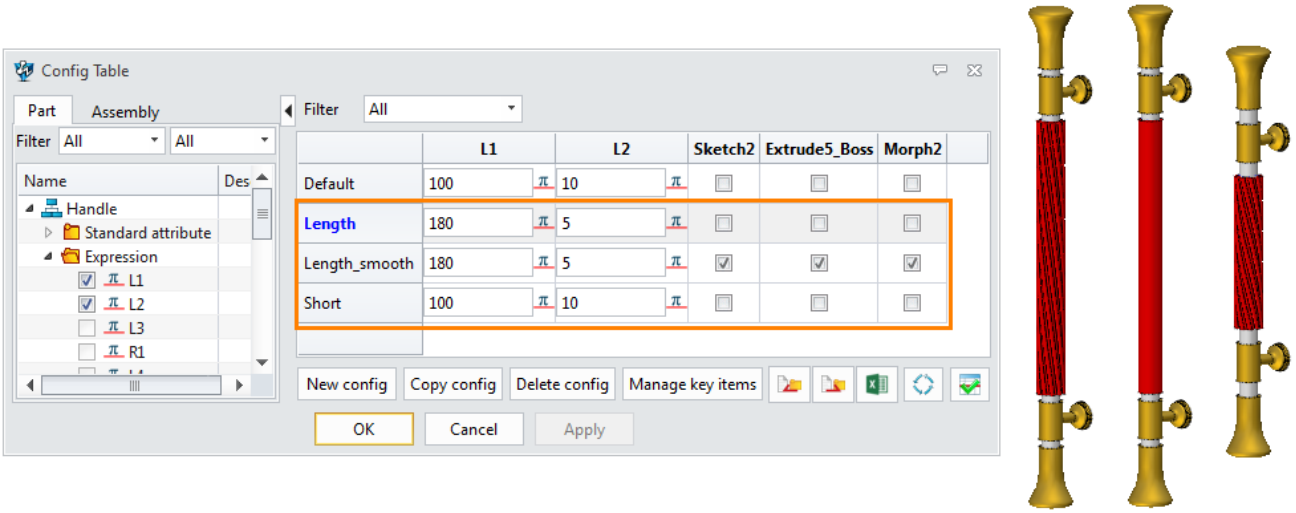



Figure49 Part Configurations

In following cabinet model, there are two handles as the component.

Right click the handle component, you could change the part configuration.

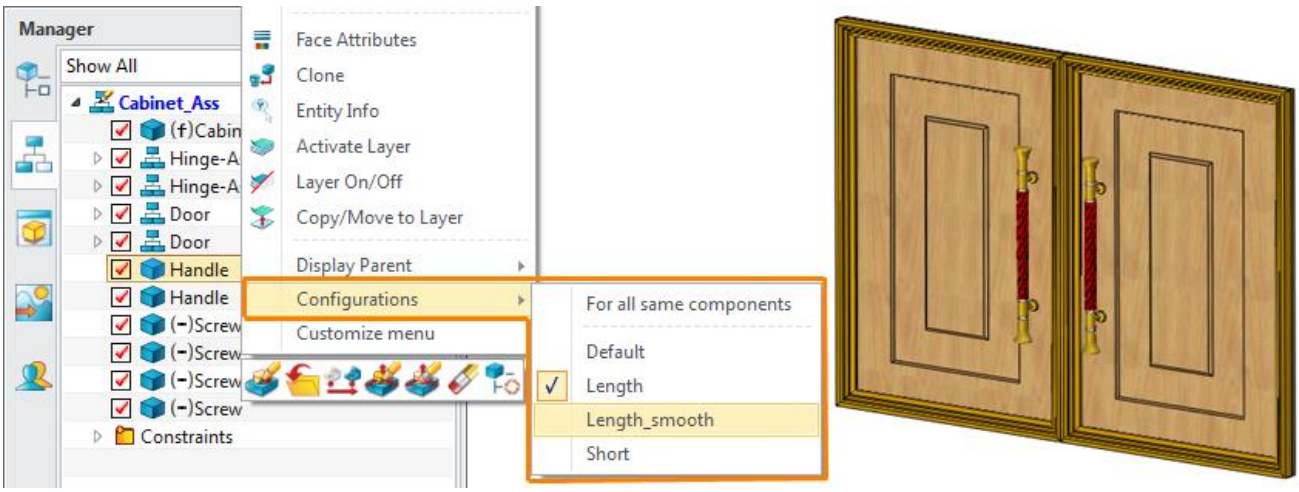



Figure50 Change Part Configuration at Assembly Level

When “For all same components” is checked, one handle is changed, another one is also changed. The same components keep the same status. If “For all same components” is unchecked, the same components could have a different part configuration.

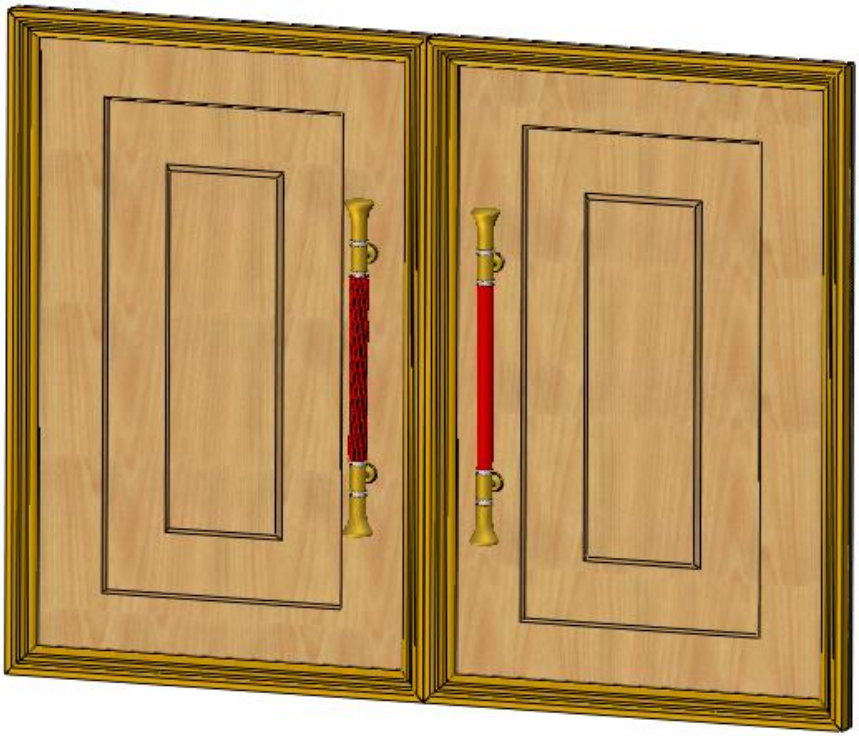


Figure51 Same Components with Different Part Configuration

**Summary**

Configurations allow designers to create multiple variations of a part with different part attributes, variables, features and dimensions, or a different version of an assembly with different part configuration, component status and constraint parameters. Configuration flexibility in product design gives the efficient design work.

Library design consists of part seriation and library definition, which can speed up the design process, save time, increase productivity and reduce mistakes.The library can be easily created based on configuration data or defined by the excel file. During the design process, you could select the suitable part or assembly to reuse the library to raise efficiency.