# Overview

This help guide provides instructions on how to install the CAMWorksNesting License on your system.

### What is CAMWorksNesting?

CAMWorksNesting is an automatic, true-shape nesting program from Geometric Technologies that easily creates fast and efficient nested layouts. It is seamlessly integrated within SolidWorks<sup>®</sup> and allows nesting of flat or 3D solid or sheet metal parts and assemblies. The nested output is a SolidWorks assembly file for each unique sheet layout. CAMWorks Nesting can be used to create efficient layouts of metal, wood or composite based materials, producing the maximum number of parts from a single piece of raw material within minutes. CAMWorksNesting uses NestLib<sup>®</sup>, one of the fastest and most capable automatic true-shape nesting technology engines available in the industry.

However, the SolidWorks environment is not an absolute must for the functioning of CAMWorksNesting. The integrated Solid Modeler 'CAMWorks Solids' can be used in place of SolidWorks. It allows CAMWorksNesting to function as a standalone product without the need to purchase an additional Solid Modeler like SolidWorks.

### The CAMWorksNesting License

Your <u>CAMWorksNesting license</u> authorizes the use of CAMWorksNesting on a specific computer or computers on a network. CAMWorksNesting provides licensing in the form of software encryption. This method is designed to protect you and Geometric Technologies from unauthorized use of CAMWorksNesting.

# **Types of Licenses**

Only one type of license is currently available for CAMWorksNesting: Commercial License.

# **CAMWorksNesting Online Help**

## **CAMWorksNesting Online Help**

Welcome! This online Help system is a reference guide that provides a comprehensive explanation of CAMWorksNesting features and functions for true-shape nesting. Use the Contents, Index and Search tabs on the left to quickly find the information you need.

## How Do You Learn to Use CAMWorks Nesting?

We recommend that before you try to use CAMWorks Nesting, you go through the exercises in the **CAMWorksNesting User Guide & Tutorials**. When you install CAMWorksNesting, the User Guide is copied to a folder on your PC. These tutorials are in Adobe Portable Document Format (PDF) files

that can be viewed, searched and printed using the Acrobat Reader.

To start the Reader and open a tutorial file:

- 1. Click the Start button on the Windows taskbar and select Programs on the menu.
- 2. Select CAMWorksNesting 2013, then select 'User Guide & Tutorials'.

If the file does not open, you need to install the Acrobat Reader from the Adobe web site (<u>www.adobe.com</u>).

The exercises in the manuals provide an opportunity to learn CAMWorksNesting through a step-by-step tour of the features and functions. Go through these tutorials. If you need more information, simply look in the online help.

# **System Requirements**

### **Supported Windows® Operating Systems**

CAMWorksNesting is a Windows operating system based software program. It is designed to run on both 32-bit and 64-bit systems. Given below is the compatibility table of CAMWorksNesting with different Windows based Operating Systems.

Operating System	CAMWorks Nesting	CAMWorks Nesting
	32-bit	64-bit
Windows Vista Ultimate (32-bit)	1	×
Windows Vista Business (32-bit)	1	×
Windows Vista Enterprise (32-bit)	1	×
Windows Vista Ultimate (64 bit)	×	1
Windows Vista Business (64 bit)	×	1
Windows Vista Enterprise (64 bit)	X	1
Windows 7 Professional (32-bit)	1	×
Windows 7 Ultimate (32-bit)	1	×
Windows 7 Enterprise (32-bit)	1	×
Windows 7 Professional (64 bit)	×	1
Windows 7 Ultimate (64 bit)	X	1
Windows 7 Enterprise (64 bit)	×	1

Ensure that if you have a 32-bit system, you download and install the CAMWorks Nesting Release for the 32-bit system. Same rule applies for 64-bit systems.

## Solid Modeler: SolidWorks or CAMWorks Solids

CAMWorksNesting works within the SolidWorks/ CAMWorks Solids environment. The following SolidWorks versions are compatible with CAMWorksNesting.

Supported Versions	CAMWorksNesting	CAMWorksNesting
	32-bit	64-bit
SolidWorks 2010/ CW Solids 2010 (32-bit)	1	×
SolidWorks 2010/ CW Solids 2010 (64 bit)	×	1
SolidWorks 2011/ CW Solids 2011 (32-bit)	1	×
SolidWorks 2011/ CW Solids 2011 (64 bit)	×	1
SolidWorks 2012/ CW Solids 2012 (32 bit)	1	×
SolidWorks 2012/ CW Solids 2012 (64 bit)	×	~
SolidWorks 2013/ CW Solids 2013 (32 bit)	1	×
SolidWorks 2013/ CW Solids 2013 (64 bit)	×	~

In addition to the above mentioned versions, CAMWorksNesting is also compatible with SolidWorks Premium and SolidWorks Professional (both 32-bit and 64-bit versions)

## Hardware requirements

## RAM

- 1GB
- Recommended: 2GB or more

# CPU

- Platform: Intel<sup>®</sup> and AMD<sup>®</sup> processors
- Intel<sup>®</sup> Pentium<sup>®</sup> 3, AMD Athlon<sup>™</sup> and Athlon XP CPU's are not supported.
  - CPU must support SSE2 (Streaming SIMD Extensions 2).

# Video

• A certified OpenGL workstation graphics card and driver. For a listing of tested and certified graphics cards and driver combinations visit the SolidWorks website

## Other

- Mouse or other pointing device
- CAMWorks License

### **Software Requirements**

• SolidWorks® or CAMWorks Solids: Refer to the table on the previous page for supported versions. The installation program will not install CAMWorks Nesting 2011 unless a supported version is found.

## **Optional Software**

• Adobe® Reader®: The CAMWorksNesting installation includes manuals on installation, registration, machining with CAMWorks Nesting etc. in Adobe Portable Document Format (PDF). The manuals can be viewed and printed using the Adobe Reader. You may already have the Reader installed.

If the Reader is not installed, you can install it from the Adobe web site: www.adobe.com.

<u>top</u>

# **Features in the CAMWorksNesting Module**

### **Key Benefits of CAMWorksNesting Module**

#### Ease of Use

Parts imported from other CAD applications or created in SolidWorks as well as assemblies can be directly used as an input without the need to convert them to flat patterns.

#### Full Associativity with SolidWorks

Updates are tracked and flagged whenever the component is changed. Refresh rebuild the nest to reflect the updated designs.

#### SolidWorks Compatible Output

Provides the nested output as a new SolidWorks assembly and retains the original part and assembly model files. The SolidWorks nested assembly can then be used for further processing, such as tool-path and NC Code generation with CAMWorks or any other CAM software, if required.

#### Part Requirements automatically assigned

Automatically nests multiple parts, based on material and thickness, within an assembly in a single run.

This feature helps users eliminate manual efforts in segregating individual parts with the same material and thickness for a nesting operation.

#### **Material Optimization**

The advanced true-shape automatic nesting algorithms reduce raw material consumption by providing optimized and compact layouts.

#### Nesting with multiple tool heads

An optional feature to nest two or more identical nesting layouts using multiple tool heads is provided. This feature is useful for flame cutting applications.

### **Features provided in the CAMWorks Nesting Module.**

- Automatic, True Shape Nesting of complex parts on rectangular and non-rectangular sheets.
- Facility to provide the grain direction for parts as well as sheets.
- Facility to <u>nest parts on sheets containing holes</u>.
- Facility to nest multiple sheets of different sizes in a single run efficiently.
- <u>Part rotation control</u> with user defined step angle of rotation for each part.
- Facility to nest the collection (of inter-related parts) as a unit with no constraint on the relative positioning of these parts. This feature is known as Grouping of Parts. Use the '<u>Nest by Folder</u>' option to nest such a collection of parts.
- Facility to nest filler parts only up to the nested height for all the sheets.
- Facility to nest parts inside the holes of larger parts before nesting the rest of the sheet. This feature is known as <u>Preferential Hole Filling</u>.
- Facility to allow <u>Nesting depending on Thickness and/or Material of Sheet and Parts</u>.
- Option to enable <u>saving the nested layouts in the .dxf file format</u> after the nesting job is executed.
- Option to facilitate <u>Nesting using multiple tool heads</u>.

# **License Information**

You can verify whether you are licensed to run CAMWorksNesting by clicking Help on the menu

bar, then selecting **CAMWorksNesting 2013>>License Info**. The CAMWorksNesting License Info dialog will be displayed.

## **CAMWorksNesting License Info Dialog**

The CAMWorksNesting License Info dialog contains the following information:

**Licensed Module Available:** If you are a client on a floating network license, the number indicates how many licenses are available for each module. When 0 is displayed, there are no available licenses.

**Module:** This section identifies the CAMWorksNesting module you are licensed to run.

- If you have a standalone installation, then the CAMWorksNesting module is enabled and the checkbox next to its name is checked indicating its availability. If not available, the checkbox will be grayed out. With a standalone license, multiple sessions of CAMWorksNesting can be run on the same PC.
- If you are a client on a floating network license, the CAMWorksNesting module is enabled indicating its availability. To access the functions of the CAMWorksNesting module, check the box next to its name. If the module is grayed out, it indicates that the module is not available in the floating network license.

**Startup:** If you are a client on a floating network license, this section allows you to specify whether you want to run CAMWorksNesting when SolidWorks/CAMWorks Solids is launched when a license is available. If a license is not available for CAMWorksNesting module, the following message will be displayed: "One or more floating licenses that were requested are not available."

**'Update License' button:** The Update Licenses button updates the availability of modules on a floating network license.

# **Quick Tour 1- Single Part Single Sheet Nesting**

- 1. Load the CAMWorksNesting Add-In in SolidWorks.
- 2. Open the part file **Tutorial\_2.sldprt** in the ... \CAMWorksNestingData\CAMWorksNesting 2013\Examples\Tutorials\Parts folder.
- 3. Select *Create Nesting Job* from the CAMWorksNesting menu bar.
- 4. The Create Nesting Job dialog is displayed. The *Part Data* tab is displayed. Use the Part data tab to set the parameters for the part.
- 5. The solid part Tutorial\_2.sldprt displayed in the graphics area is listed in the Part List along with its nesting parameters.
- 6. Set the following part parameters in the Part data tab:
  - a. **Thickness:** CAMWorksNesting extracts the part parameter of Thickness from the Solid Part and displays it in the Thickness field as default thickness for the part. The thickness of the part, as extracted from the solid part, is displayed as 10 mm.
  - b. **Material:** CAMWorksNesting extracts the material info from the Solid Part and displays it in the material field. The material for this part, as extracted from the solid part, is Steel.
  - c. **Quantity:** The default quantity value is displayed in the Quantity field (*As per default value defined in the DefaultValues.ini file*). Click on the 'Quantity' field in the Part list. Set the Part Quantity to '100'.
  - d. **Angle:** Click on the Angle column of the Part List. Edit and assign an angle of 30 degrees.
  - e. Grain Direction: Leave the Grain direction is set to 'None'.
  - f. **Normal Face:** By default, CAMWorksNesting chooses the face with the largest surface area. So the bottom face of the solid part is chosen by default. The normal direction is indicated by an arrow in the graphics area. To chose the top face (indicated by pink color) as the normal face, do either of the following:
- 7. Click on the Sheet Data tab. Set the following sheet parameters in the sheet data tab.

- a. Observe that the assigned thickness and material of the sheet are identical to those of the part to be nested.
- b. We will nest the part using a Standard size sheet. Click on the Standard size dropdown list. Observe the Standard Sheet sizes defined in the Standard size dropdown list.
- c. Set the sheet quantity to '1'.
- d. In the grain direction dropdown list, select 'None'.
- e. Observe that the standard sizes defined the StandardSheets-MM.ini file are listed in the dropdown list. In this example, we will choose the second sheet displayed in the list. (with Length = 1800 mm & Width = 1500 mm)
- f. Click 'Add Sheet'. The Sheet is added to the Sheet List.
- 8. Observe the Nesting Data Group Box. Use this group box to set the nesting parameters:
  - a. Set a Part to Part distance of 4 mm is set and a Part-to-Sheet distance of 4mm.
  - b. Click on the 🖾 button to select the location to save the output Assembly file and Summary text file.
  - c. Set the Nesting method to 'Fast Nesting'.
- 9. After setting the part, sheet and nesting parameters, click OK. This sets into motion the process to generate a nested layout.
- 10. After the Nesting process is completed, CAMWorksNesting will display a message indicating the location of the text file containing the **Summary of the Nest Results**. Click OK to close the message. The Text file will be displayed.
- 11. The **Nested layout assembly** will be displayed in the Graphics area. Both these files are saved in the location indicated Output Assembly File path stated in the Create Nesting Job dialog.
- 12. In this example, we will observe the 3 nesting results:
  - a. Nesting layout generated when top face of the part is chosen as normal face
  - b. Nesting layout generated when bottom face of the part is chosen as normal face

- c. Nesting layout when Grain direction is set for part and the sheet.
- 13. **Result A:** Follow all the above steps from step 1 to 9 and view the Nested layout. Observe that all the 100 instances of the part (specified quantity) have been nested.
- 14. **Result B:** Repeat all the above steps from steps 1 to 9 but omit Step 6-f (the default Normal direction is maintained). View the nesting layout. Observe that all the 100 instances of the part (specified quantity was 100) have been nested.
- 15. **Result C:** Repeat all the above steps from steps 1 to 9. This time, in Step 6-e, set the Grain Direction of the Part to X direction. In Step 7-d, set the Grain Direction of the Sheet to X direction. View the nesting layout. All the parts are nested along the specified grain direction. Observe that only 96 instances of the part are nested while the quantity specified was 100. The same result will be obtained if the Grain direction of both the part and sheet are set to Y direction.

# **Quick Tour 2- Nest by Folder**

- 1. Load the CAMWorksNesting Add-In in SolidWorks.
- 2. Select *Nest by Folder* option in the CAMWorksNesting menu bar.
- 3. The 'Browse for folder' dialog opens. Browse to the folder named 'Tutorial4' in the ...\CAMWorksNestingData\CAMWorksNesting 2013\Examples\Tutorials\Assemblies.
- 4. CAMWorksNesting opens all the parts contained in the folder as an assembly in the SolidWorks Graphics area.
- 5. The 'Create Nesting Job' dialog is displayed. All the parts present in the folder are listed in the Part List of the Part data tab.
- 6. Observe the Part list. Two of the parts viz. 'TutPart4A SM [Default]' and 'TutPart4D SM [Default]' are sheet metal parts of 3mm thickness each. Observe that these sheet metal parts displayed in the graphics area are automatically flattened. The other two parts, 'TutPart4B SM [Default]' and 'TutPart4C SM [Default]' are solid parts of thickness 20 mm each.
- 7.
- a. **Thickness:** CAMWorksNesting extracts the part parameter of Thickness from the Solid Part and displays it in the Thickness field as default thickness for the part. The thickness of the sheet metal parts, 'TutPart4A SM [Default]' and 'TutPart4D SM [Default]' is 3mm each while that of 'TutPart4B SM [Default]' and 'TutPart4C SM [Default]' each.
- b. Material: Since Material related information is not defined for this sheet metal part, CAMWorksNesting will display the first material in the Material drop down list as the default material. In this tutorial, we will assign a material 'Copper' to all the parts. This material is listed in the Material Dropdown list. Select 'Copper' from the Material dropdown list.
- c. **Quantity:** Set the following quantities for the parts displayed in the Part list:

Part Name	Part Quantity	Thickness
TutPart4B 20mm.SLDPRT	30	20 mm
TutPart4C 20mm.SLDPRT	20	20 mm
TutPart4A SM.SLDPRT	65	3 mm
TutPart4D SM.SLDPRT	65	3 mm

- d. Angle: Assign an angle of 90° to all the parts.
- e. Grain Direction: Leave the Grain direction is set to 'None'.
- f. **Normal Face:** No changes are made to the default normal face selection for any of the parts.
- 8. Click on the Sheet Data tab. To nest all the four parts in the part list, two different sheets of varying thickness and material 'Copper' need to be added to the sheet list. Set the following sheet parameters in the sheet data tab.
  - a. The sheet metal parts 'TutPart4A SM [Default]' and 'TutPart4D SM [Default]' will be nested in a sheet of DXF format. Following are the steps to define a sheet using a 'DXF' file format:
    - i. Click on the Sheet Data tab. In the Sheet list, click on 'Select to add sheet'. Select the option 'Sheet DXF'.
    - ii. This activates the field used to indicate the path of the DXF file. Click on the button to browse to the folder containing the DXF file.
    - iii. Select the DXF file named Tutorial4\_sheet.dxf from ..\CAMWorksNestingData\CAMWorksNesting 2012\Examples\Tutorials\Sheets
    - iv. CAMWorksNesting populates the thickness and material field for each prospective sheet to be added to the sheet list based on the serial order of the parts listed in the part tab. Hence, by default, the Thickness field and the Material field will display the values of the first part listed in the part list. In this illustration, the thickness and material of the first part (3mm and Copper respectively) will be displayed as default values. In case this value is not displayed in the fields, assign the appropriate values.

- v. Click 'Add sheet' to add the dxf file in the Sheet List. The dxf file is added to the Sheet List. The Sheet preview indicates that this sheet is a remainder sheet.
- b. The solid parts 'TutPart4B SM [Default]' and 'TutPart4C SM [Default]' will be nested in a standard sheet. Following are the steps to define a standard sheet:
  - i. In the Sheet list, click on 'Select to add sheet'.
  - ii. To add a standard sheet, select the 'S1 (6' X 4') Len: 1800 mm Width: 1200 mm' sheet from the Standard Size dropdown List.
  - iii. As per the principle given in step 7-a-ii, the thickness and material field will display values of the next part in the part list which has either its thickness or material or both different from the previous part. Thus, thickness field will display a value of 20mm and material field will display 'Copper'.
  - iv. Ensure that the sheet material assigned is 'Copper', assign Sheet quantity as '1', Grain direction as 'None'.
  - v. Click 'Add sheet' to add the standard sheet to the Sheet List.
- 9. Observe the Nesting Data Group Box. Use this group box to set the nesting parameters:
  - a. Leave the Part to part distance and Part to sheet distance set to '0'.
  - b. Click on the 🔙 button to select the location to save the output Assembly file and Summary text file.
  - c. Set the Nesting method to 'Fast Nesting'.
- 10. After setting the part, sheet and nesting parameters, click OK. This sets into motion the process to generate a nested layout.
- 11. After the Nesting process is completed, CAMWorksNesting will display a message indicating the location of the text file containing the **Summary of the Nest Results**. Click OK to close the message. The Text file will be displayed.
- 12. The **Nested layout assembly** will be displayed in the Graphics area.

Both these files are saved in the location indicated Output Assembly File path stated in the Create Nesting Job dialog.

13. Use the SolidWorks/ CAMWorks Solids Configurations Manager tree to view the Nesting layouts generated.

# Quick-Tour 3- Multi Part, Multi Sheet Nesting (Assembly Nesting)

- 1. Load the CAMWorksNesting Add-In in SolidWorks.
- 2. Ensure that the <u>Preferential Hole Filling' functionality is enabled</u>. This is done by setting the *PreferHoleFilling* flag in the [NestingData] section of the <u>DefaultValues.ini</u> file to '1'.
- 3. Select *Nest by Folder* option in the CAMWorksNesting menu bar.
- The 'Browse for folder' dialog opens. Browse to the folder named *Tutorial\_5* in the ...\CAMWorksNestingData\CAMWorksNesting 2013\Examples\Tutorials\Assemblies directory.
- 5. CAMWorksNesting opens all the parts contained in the folder as an assembly in the SolidWorks Graphics area.
- 6. The *Create Nesting Job* dialog is displayed. All the parts present in the folder are listed in the Part List of the Part data tab.
- 7. Set the following part parameters in the *Part data* tab:
  - a. **Thickness & Material:** The thickness and material of the solid parts extracted from the solid models is displayed in the Part List.
- The part named Tut5\_Part1 and Tut5\_Part4 have the same material 'Alloy Steel (SS)' and thickness (10 mm).
- The remaining parts Tut5\_Part2, Tut5\_Part3, Tut5\_Part5 and Tut5\_Part6 have the identical material 'Steel' and thickness (12.7 mm).

Only parts with identical material and thickness can be nested within the same sheet. Based on the above observation, it is clear that 2 different sheets need to be defined to generate a nested layout. Each such sheet can nest two parts having the same material and thickness.

- b. **Normal Face:** No changes are made to the default normal face selection for any of the parts.
- c. **Quantity:** Set the following quantities for the parts:

Part Name	assigned
Tut5_Part1	12
Tut5_Part2	10
Tut5_Part3	11
Tut5_Part4	10
Tut5_Part5	10
Tut5_Part6	9

- d. **Angle:** Click on the Angle column of the Part List. Edit and assign an angle of 90 degrees to all the parts.
- e. **Grain Direction:** Leave the Grain direction is set to 'None' for all the parts.
- 7. Click on the *Sheet Data* tab. To nest all the six parts in the part list, two different sheets of varying thickness and material need to be added to the sheet list. Set the following sheet parameters in the sheet data tab.
  - a. Adding a standard sheet:
    - i. In the Sheet list, click on Select to add sheet.
    - ii. By default, the Thickness field will display the thickness of the first part listed in the part list. The thickness of the first part listed in the Part list is 10mm. In case this value is not displayed in the thickness field, assign a 10mm value.
    - iii. By default, the Material field will display the material thickness of the first part listed in the part list. The material of the first part listed in the Part list is 'Alloy Steel (SS)'. In case this value is not displayed in the material field, type the material name into the field.
    - iv. To add a standard sheet, select the 'S13 (10' X 4') Len: 3000 mm Width: 1200 mm' sheet from the Standard Size dropdown List.
    - v. In the Quantity field, assign a quantity of '1'.
    - vi. Leave the Grain Direction set to 'None'.

vii. Click 'Add Sheet' to add the sheet to the Sheet list.

 b. Next, the parts 'Tut5\_Part2', 'Tut5\_Part3', 'Tut5\_Part5' and ''Tut5\_Part6' have identical material (Steel) and thickness (12.7 mm). They can be nested on the same sheet. Use a standard sheet to nest these two parts.

Follow the same steps 1 to 7 given above to add the standard sheet to nest these parts. However, in step 7-a-iv, choose the standard sheet of size 'S24 (12' X 10') – Len: 3600 mm Width: 3000 mm'.

In Step 7-a-iii, a thickness of 12.7mm needs to be assigned to the sheet. Observe that CAMWorksNesting already now displays 12.7mm as the default thickness. In case this value is not displayed in the thickness field, assign a 12.7mm value.

- 8. Observe the *Nesting Data* Group Box. Use this group box to set the nesting parameters:
  - a. Set a Part to Part distance of 5mm is set and a Part to Sheet distance of 5mm.
  - b. Click on the 🔲 button to select the location to save the output Assembly file and Summary text file.
  - c. Set the Nesting method to Fast Nesting.
- 9. After setting the part, sheet and nesting parameters, click OK. This sets into motion the process to generate a nested layout.
- 10. After the Nesting process is completed, CAMWorksNesting will display a message indicating the location of the text file containing the **Summary of the Nest Results**. Click OK to close the message. The Text file will be displayed.
- 11. The **Nested layout assembly** will be displayed in the Graphics area. Both these files are saved in the location indicated Output Assembly File path stated in the *Create Nesting Job* dialog.
- 12. Use the SolidWorks/ CAMWorks Solids *Configurations Manager* tree to view the Nesting layouts generated.
- 13. The Summary text file indicates that all the parts have been nested.

Observe that the smaller parts have been nested in the holes of the larger parts resulting in better sheet utilization (preferential hole filling).

Single Part Nesting

### **Part Model:**

In CAMWorksNesting, your part model is a solid created with SolidWorks/CAMWorks Solids or imported into SolidWorks from another CAD system via an IGES, STEP, Parasolid, SAT or other neutral translators.

### **Nesting of Parts:**

CAMWorks Nesting facilitates the nesting of flat or 3D sheet metal parts in addition to solid parts.

Both SolidWorks parts and imported parts can be nested.

Additionally, multi-body parts (parts containing multiple bodies) too can be nested. To know more, read: <u>Nesting for Multi-body parts</u>.

Solid Parts as well as sheet metal parts can be nested using CAMWorksNesting commands that automatically nest multiple instances of the part on a pre-defined sheet and generates a best fit resulting in high sheet utilization and minimal scrap.

CAMWorksNesting provides the facility to nest either a single part or multiple parts in a single Nesting job. Based on the user-input number of instances of the part to be nested and the sheet size(s) defined, either a single nested layout or multiple layouts are generated.

# Steps to generate a nested layout for a Single Part:

- 1. Load the CAMWorksNesting Add-In in SolidWorks/ CAMWorks Solids.
- 2. The CAMWorksNesting Menu will be added to the SolidWorks/ CAMWorks Solids menu bar.
- 3. Model or open a sheet metal part/ solid part model in SolidWorks/ CAMWorks Solids.
- 4. Select 'Create Nesting Job' from the CAMWorksNesting menu bar.
- 5. The 'Create Nesting Job' dialog is displayed. Under the Part Data tab, modify or assign the Part controller parameters for the part(s) as required. These parameters include thickness, material, grain direction, quantity, Step angle, Normal Face Selection as required.
- 6. Under the <u>sheet data tab</u>, select the required sheet size(s). Modify or assign the sheet parameters such as sheet name, sheet thickness, sheet material, sheet quantity, grain direction, sheet length and width as required.
- 7. In the 'Nesting Data' section (bottom section of the dialog), assign appropriate values to the parameters of <u>Part-to-Part distance</u> and <u>Part-to-Sheet</u>
  <u>distance</u>. Use the browse button 
  to assign a new location for the output file rather than the default location given in the Output

Assembly File field. <u>Fast Nesting</u> and <u>Optimal Nesting</u> indicate the two different sets of algorithms used to implement Nesting. Select the option that best suits your requirements.

8. After all the parameters are set, click 'OK' to execute the Nesting Job.

This sets into motion the process to generate a nested layout. Generating the layout might take some time depending on the complexity of the part.

- Two files will be generated during the nesting process, namely a text file and an assembly file.
- After the Nesting process is completed, CAMWorksNesting will display a message indicating the location of the text file containing the **summary of the Nest Results**. Click OK to close the message. The Text file will be displayed.
- The **Nested layout assembly** will be displayed in the Graphics area. Both these files are saved in the location indicated Output Assembly File path stated in the Apply Nesting dialog.

#### Note:

To understand **how to nest a multi-body body part**, read: <u>Steps to generate a</u> <u>nested layout for a multi-body part</u>.

# **Assembly Nesting**

### **Assembly Model:**

In CAMWorksNesting, your **part model** is a solid created with SolidWorks/CAMWorks Solids or imported into SolidWorks/CAMWorks Solids from another CAD system via an IGES, STEP, Parasolid, SAT or other neutral translators.

Similarly, an **assembly** is a group of inter-related parts created with SolidWorks//CAMWorks Solids or imported into SolidWorks from another CAD system.

## **Nesting of Assemblies:**

CAMWorks Nesting also facilitates the nesting of an assembly comprising flat or 3D sheet metal parts as well as solid parts. Both SolidWorks assemblies and imported assemblies can be nested. Additionally, **assemblies containing multi-body parts** (parts containing multiple bodies) too can be nested. To know more, read: <u>Nesting of multi-body</u>

parts and assemblies.

Solid Parts as well as sheet metal parts in the assembly can be nested using CAMWorksNesting commands that automatically nest multiple instances of the part on a pre-defined sheet and generates a best fit resulting in high sheet utilization and minimal scrap.

CAMWorksNesting provides the facility to nest either a single part or multiple parts in a single Nesting job. Based on the user-input number of instances of the part to be nested and the sheet size(s) defined, either a single nested layout or multiple layouts are generated.

CAMWorksNesting supports assemblies comprising parts with multiple configurations.

# Steps to generate Nested layout for an Assembly:

- 1. Load the CAMWorksNesting Add-In in SolidWorks/ CAMWorks Solids.
- 2. The CAMWorksNesting Menu will be added to the SolidWorks/ CAMWorks Solids menu bar.
- 3. Model or open a sheet metal / solid assembly in SolidWorks/ CAMWorks Solids.
- 4. The assembly to be nested will be displayed in the SolidWorks Graphical User Interface.
- 5. Select 'Create Nesting Job' from the CAMWorksNesting menu bar.
- 6. The 'Create Nesting Job' dialog is displayed. Under the Part Data tab, all the parts comprising the assembly are displayed. Modify or assign the Part parameters for these parts as required. These parameters include thickness, material, grain direction, quantity, Step angle and Normal Face Selection.
- 7. Under the <u>Sheet data tab</u>, select the required sheet size(s) to nest

according to the varying thickness and material of the parts.. Modify or assign the sheet parameters such as sheet name, sheet thickness, sheet material, sheet quantity, grain direction, sheet length and width as required.

- 8. In the 'Nesting Data' section (bottom section of the dialog), assign appropriate values to the parameters of <u>Part-to-Part distance</u> and <u>Part-to-Sheet</u> <u>distance</u>. Use the browse button is to assign a new location for the output file rather than the default location given in the Output Assembly File field. <u>Fast Nesting</u> and <u>Optimal Nesting</u> indicate the two different sets of algorithms used to implement Nesting. Select the option that best suits your requirements.
- 9. After all the parameters are set, click 'OK' to execute the Nesting Job.
- 10. This sets into motion the process to generate a nested layout. Generating the layout might take some time depending on the complexity of the part.
  - Two files will be generated during the nesting process, namely a text file and an assembly file.
  - After the Nesting process is completed, CAMWorksNesting will display a message indicating the location of the text file containing the **summary of the Nest Results**. Click OK to close the message. The Text file will be displayed.
  - The **Nested layout assembly** will be displayed in the Graphics area. Both these files are saved in the location indicated <u>Output</u> <u>Assembly File path</u> stated in the Apply Nesting dialog.

### Note:

- CAMWorksNesting does not support multiple assemblies in one single nesting job.
- Only one assembly can be nested at a time.
- To understand how to nest an assembly which contains one or more multi-body body parts, read: <u>Steps to generate a nested layout for an assembly</u> <u>containing multi-body parts</u>.

**Multi-Part Nesting (Nest by folder)** 

### **Part Model:**

In CAMWorksNesting, your part model is a solid created with SolidWorks/CAMWorks Solids or imported into SolidWorks/CAMWorks Solids from another CAD system via an IGES, STEP, Parasolid, SAT or other neutral translators.

### **Nesting of Parts:**

CAMWorks Nesting also facilitates the nesting of flat or 3D sheet metal parts in addition to solid parts.

Both SolidWorks parts and imported parts can be nested.

Solid Parts as well as sheet metal parts can be nested using CAMWorksNesting commands that automatically nest multiple instances of the part on a pre-defined sheet and generates a best fit resulting in high sheet utilization and minimal scrap.

CAMWorksNesting provides the facility to nest either a single part or multiple parts in a single Nesting job. Based on the user-input number of instances of the part to be nested and the sheet size(s) defined, either a single nested layout or multiple layouts are generated.

## **Multi-Part Nesting:**

CAMWorks Nesting provides the facility to nest a collection (of interrelated parts) as a unit with no constraint on the relative positioning of these parts. Such a collection of parts may include solid parts or sheet metal parts or both. Parts may vary in thickness and material. In other words, multiple parts can be nested on the same sheet or multiple sheets as per the requirements.

## **Nest by Folder**

- The 'Nest by Folder' is the option available under the CAMWorksNesting menu to nest multiple parts in a single nesting job.
- The 'Nest by Folder' option does not support assemblies.
- To use this option, all the parts which are to be nested in a single nesting job must be located within a singular folder.
- When the Nest by folder option is chosen from the CAMWorksNesting menu, the 'Browse for Folder' dialog is displayed. Use this dialog to browse to the folder containing the parts to be nested. Click OK in the dialog to finalize the folder selection.
- The below steps explain how to use the 'Nest by Folder' option to generate a nested layout.
# Steps to generate Nested layout for Multiple Parts using 'Nest by Folder':

- 1. Load the CAMWorksNesting Add-In in SolidWorks/ CAMWorks Solids.
- 2. The CAMWorksNesting Menu will be added to the SolidWorks/ CAMWorks Solids menu bar.
- 3. Select 'Nest by Folder' from the CAMWorksNesting menu bar
- 4. Use the displayed **'Browse for folder'** to browse to the folder containing the parts to be nested. Click OK.
- 5. A temporary assembly file comprising of all the parts in the selected folder is created and displayed in the SolidWorks Graphical User Interface.
- 6. Select 'Create Nesting Job' from the CAMWorksNesting menu bar.
- 7. The 'Create Nesting Job' dialog is displayed. Under the <u>Part Data tab</u>, all the parts within the selected folder are displayed. Modify or assign the Part controller parameters for these parts as required. These parameters include thickness, material, grain direction, quantity, Step angle and Normal Face Selection.
- 8. Under the <u>sheet data tab</u>, select the required sheet size(s). Modify or assign the sheet parameters such as sheet name, sheet thickness, sheet material, sheet quantity, grain direction, sheet length and width.
- 9. In the 'Nesting Data' section (bottom section of the dialog), assign appropriate values to the parameters of <u>Part-to-Part distance</u> and <u>Part-to-Sheet</u> <u>distance</u>. Use the browse button is to assign a new location for the output file rather than the default location given in the Output Assembly File field. <u>Fast Nesting</u> and <u>Optimal Nesting</u> indicate the two different sets of algorithms used to implement Nesting. Select the option that best suits your requirements.
- 10. After all the parameters are set, click 'OK' to execute the Nesting Job.

This sets into motion the process to generate a nested layout. Generating the layout might take some time depending on the complexity of the part.

- Two files will be generated during the nesting process, namely a text file and an assembly file.
- After the Nesting process is completed, CAMWorksNesting will display a message indicating the location of the text file containing the **summary of the Nest Results**. Click OK to close the message. The Text file will be displayed.
- The **Nested layout assembly** will be displayed in the Graphics area. Both these files are saved in the location indicated Output Assembly File path stated in the Apply Nesting dialog.

#### Note:

- CAMWorksNesting support nesting of multiple solid and sheet metal parts in one single nesting job.
- However, it does not support multiple assemblies in one single nesting job. Only one assembly can be nested at a time.
- Parts containing multiple bodies too can be nested using the Nestby-Folder option. To understand how to nest an assembly which contains one or more multi-body body parts, read: <u>Steps to generate a nested</u>

layout for an assembly containing multi-body parts.

top of page

Nesting for Multi-body Parts and Assemblies containing multi-body parts

#### Part Model and Assembly:

In CAMWorksNesting, your **part model** is a solid created with SolidWorks or imported into SolidWorks/CAMWorks Solids from another CAD system via an IGES, STEP, Parasolid, SAT or other neutral translators.

A part may or may not contain multiple bodies. Parts containing multiple bodies are known as **multi-body parts**.

An **assembly** is a group of inter-related parts created with SolidWorks/CAMWorks Solids or imported into SolidWorks from another CAD system.

### **Nesting of Multi-body Parts and Multi-body Assemblies**

CAMWorks Nesting supports <u>Single Part Nesting</u>, <u>Assembly Nesting</u>, <u>Multi-part nesting (Nest</u> by Folder) and <u>Nesting using multiple tool heads</u>.

Additionally, CAMWorksNesting supports nesting of multi-body parts and assemblies containing multi-body parts. However, additional steps must be executed in order to nest such a part or assembly.

**Nesting a multi-body part:** Before nesting a multi-body part, CAMWorksNesting creates and saves each body contained in the multibody part as a new part. It then proceeds to create an assembly comprising these newly created parts. This newly created assembly becomes the active document considered for the nesting process.

Read: <u>Steps to generate a nested layout for an assembly containing multi-body parts</u>

**Nesting assemblies containing multi-body part(s) :** Before nesting an assembly, CAMWorksNesting checks the assembly for parts containing multiple bodies. If found, CAMWorksNesting will create a new part out of each body of the multi-body part(s). After this action, either a new assembly containing parts with single bodies will be created or the existing assembly will be modified to with the multiple body part(s) being replaced with the newly created parts. The action executed is based on the choice input by you. The newly created assembly or modified existing assembly becomes the active document considered for the nesting process.

Read: <u>Steps to generate a nested layout for an assembly containing multi-body parts</u>

### Steps to generate a nested layout for a multi-body part:

- 1. Load the CAMWorksNesting Add-In in SolidWorks/ CAMWorks Solids.
- 2. The CAMWorksNesting Menu will be added to the SolidWorks menu bar.
- 3. Model or open a sheet metal part/ solid part model in SolidWorks/ CAMWorks Solids.
- 4. Select 'Create Nesting Job' from the CAMWorksNesting menu bar.
- 5. CAMWorksNesting will check the part for multiple bodies.
- 6. If the part has multiple bodies, you will be prompted with a message

box stating that each body of the part will be saved as a new part and that a new assembly will be created for this multi body part with each body as a separate component. Click OK to continue.

- 7. If you agree to proceed, a new part will be created for each body and will be stored in a new folder located inside the folder containing the parent part (original part with multiple bodies). Suppose the name of the parent part is 'PartName'. Then the new folder will be named as 'PartName\_WithoutMultiBodyParts'. If a folder with such a name already exists, then the newly created folder will be named 'PartName\_WithoutMultipleBodyParts1' and so forth. The new part made out of the first body of the parent part will be named as 'PartName\_1'; the second body will be named 'PartName\_2' and so forth. A new assembly named 'Assembly.SLDASM' comprising these new parts will be created and saved in the newly created folder.
- 8. If the folder which contains the parent part does not have write permissions, you will be prompted to choose a folder location to save the newly created parts and to input the name of the new assembly to be created. The parts created out of the parent part with multiple bodies will be saved inside the folder specified by you. The new assembly comprising these parts will be saved inside the same folder with the name input by you.
- This new assembly comprising parts created out of the parent part will now become the active document considered for nesting process. The single body parts are listed under the <u>Part Data</u> tab of the Create Nesting Job dialog.
- 10. Follow steps 6 to 10 of <u>Steps to generate a nested layout for an assembly</u> to complete the nesting process.

# Steps to generate a nested layout for an assembly containing multi-body part(s)

- 1. Load the CAMWorksNesting Add-In in SolidWorks/ CAMWorks Solids.
- 2. The CAMWorksNesting Menu will be added to the SolidWorks menu bar.
- 3. Model or open the Assembly to be nested in SolidWorks/ CAMWorks

Solids.

- 4. Select 'Create Nesting Job' from the CAMWorksNesting menu bar.
- 5. CAMWorksNesting will check the Assembly for parts with multiple bodies.
- 6. On detecting part(s) with multiple bodies in the assembly, you will be prompted with a message box stating that each body of the part will be saved as a new part and that either a new assembly will be created or the existing assembly will be modified. Click 'Yes' to create a new assembly else click 'No' to modify the existing assembly.
- 7. If you click 'Yes', a new assembly containing all parts with single bodies will be created. If you click 'No', the existing assembly will be modified with the multi-body part being replaced with single body parts. (In either assembly, the multi-body part will be removed). Note that in case of modifying the existing assembly, the sub-assemblies (if there are any) will be removed and all parts will have the existing assembly as their immediate parent.
- 8. Suppose the name of the existing assembly to be nested is 'XYZ.sldasm' and it contains two multi-body parts, say 'X' and 'Y' and a single body part named 'Z'.

Then CAMWorksNesting creates new parts out the multi-body parts and either generates the new assembly or modifies the existing assembly in the following manner:

- A new folder named 'XYZ\_WithoutMultiBodyParts' is created within the folder where the existing assembly is located.
- The new parts created out of the multiple bodies of part 'X' will be named 'X\_1', 'X\_2' and so on and these parts will be saved in this 'XYZ\_WithoutMultiBodyParts' folder.
- Similarly, the new parts created out of the multiple bodies of part 'Y' will be named 'Y\_1', 'Y\_2' and so on and these parts will also be saved in the same folder.
- The single body part named 'Z' too will be copied into this newly created folder.
- If you clicked 'Yes' (chose to create a new assembly with single body parts), then this newly created assembly will be named

'Assembly.sldasm' and this file too will be saved in the 'XYZ\_WithoutMultiBodyParts' folder. This new assembly file will comprise of all new parts (X\_1,X\_2 etc.; Y\_1,Y\_2, etc.) created out the original multi-body parts as well as the single-body parts (Z).

- If you clicked 'No' (chose to modify the existing assembly [XYZ.sldasm]), then the existing assembly will be modified to now contain parts saved within the 'XYZ\_WithoutMultiBodyParts' folder. Effectively, the original multi-body parts will be replaced with their corresponding parts created out of the multiple bodies.
- 9. Thus the newly created assembly or modified existing assembly containing single body parts will become the active document considered for nesting process. The single body parts are listed under the <u>Part Data</u> tab of the *Create Nesting Job* dialog.
- 10. Follow steps 5 to 10 of <u>Steps to generate a nested layout for an assembly</u> to complete the nesting process.

#### Note:

If the root folder which contains the assembly to be nested does not have write permissions, you will be prompted to choose a folder location to save the newly created assembly. The new parts created out of the multi-body parts as well as the new assembly will be saved inside the folder specified by you. The nomenclature followed for naming the new parts created out of multi-part bodies will be the same as that described in <u>Step 8</u>.

top of page

## **Nesting using Multiple Tool heads**

#### What is Multiple Tool Head Nesting?

For flame cutting applications, CAMWorksNesting provides an optional functionality known as *Multiple Tool Head Nesting*. This functionality allows you to nest two or more identical layouts simultaneously within a single sheet using multiple tool heads. Machines which support nesting using multiple tool heads are known as *Multi tool head machines*.

The tab named <u>Multi head options</u> is available in the Create Nesting Job which allows you to define/edit parameters nesting with multiple tool heads.

#### **Default Settings in the Multi Head Options Tab**

When you open the <u>Multi head options</u> tab in the Create Nesting Job dialog, the default machine displayed in the Machine field is SingleTHMachine. The Number of tool heads for this machine is '1'.

**SingleTHMachine:** *SingleTHMachine* is representative of machines with a single tool head. Such machines are usually used for the nesting process. When this machine is selected in the *Multi Head Options* tab, the functionality of nesting with multiple tool heads will be disabled for the current nesting job. All the parameters fields related to Multiple Tool Head Nesting in the tab are disabled, indicating that Multiple Tool Head Nesting functionality is disabled.

#### **Enabling the functionality of Nesting with Multiple Tool heads**

To view/edit the parameters associated with nesting with multiple tools, CAMWorksNesting provides an interactive interface in the form of <u>Multi</u> <u>head options</u> tab in the Create Nesting Job dialog. This tab is visible in the Create Nesting Job dialog when the flags named <u>MultiHeadFlag and</u> <u>ShowMultiHeadDialog are set to '1' in the Machine.ini</u> file.

In the <u>Multi head options</u> tab, the default machine chosen in the <u>Machine list</u> is the *SingleTHMachine*, which has only a single tool head.

To generate nested layouts using a machine with multiple tool heads instead of the default Single Tool Head machine, you need to select a machine with multiple tool heads in the Machine list of the Multi Head Options tab.

#### How the functionality of nesting with multiple tool heads works

When nesting layout(s) are to be generated using multiple tool heads, CAMWorksNesting will first attempt to nest the parts using the userspecified number of tool heads. Suppose this tool heads number is 'n'. If a best-fit layout is achievable, CAMWorksNesting will generate 'n' identical nesting layouts on the sheet.

If a best-fit nesting layout is not achievable with this number, then CAMWorksNesting will try to nest using 'n-1' number of tool heads. If this number too fails, then it will try to nest using 'n-2' tool heads and so on until finally nesting with a single tool head.

#### Steps to generate Nested layout for multiple Parts using Multiple Tool heads:

- 1. Load the CAMWorksNesting Add-In in SolidWorks/ CAMWorks Solids.
- 2. In the Machine.ini file, set the flags named *MultiHeadFlag* and *ShowMultiHeadDialog* to '1' to activate the feature of nesting with multiple tool heads.
- 3. The CAMWorksNesting Menu will be added to the SolidWorks/ CAMWorks Solids menu bar.
- If you want to nest a single part, model or open a sheet metal part/ solid part model in SolidWorks/ CAMWorks Solids.
  OR

If you want to nest an assembly, either model or open the sheet metal / solid assembly in SolidWorks/ CAMWorks Solids. The assembly to be nested will be displayed in the SolidWorks Graphical User Interface.

OR

If you want to nest multiple parts, select '**Nest by Folder'** from the CAMWorksNesting menu bar. Use the displayed '**Browse for folder'** to browse to the folder containing the parts to be nested. Click OK. A temporary assembly file comprising of all the parts in the selected folder is created and displayed in the SolidWorks Graphical User Interface.

If you want to nest a multi-body assembly, follow steps 3 to 9 of <u>Steps to</u> generate a nested layout for an assembly containing multi-body part(s).

- 4. Select 'Create Nesting Job' from the CAMWorksNesting menu bar.
- 5. The 'Create Nesting Job' dialog is displayed. Under the Part Data tab, all the parts within the selected folder are displayed. Modify or assign the Part controller parameters for these parts as required. These parameters include thickness, material, grain direction, quantity, Step angle and Normal Face Selection.
- 6. Under the <u>Sheet data tab</u>, select the required sheet size(s). Modify or assign the sheet parameters such as sheet name, sheet thickness, sheet material, sheet quantity, grain direction, sheet length and width.
- 7. Under the Multi Head Options tab, for a highlighted sheet in the Sheet list, select the desired machine from the Machine list instead of the default SingleTHMachine. For the selected machine, modify or assign values to the parameters of Number of Tool heads, Multi-tool Nesting type, Rail direction and Tool head distance.
- 8. In the 'Nesting Data' section (bottom section of the dialog), assign appropriate values to the parameters of <u>Part to Part distance</u> and <u>Part to Sheet</u> <u>distance</u>. Use the browse button in to assign a new location for the output file rather than the default location given in the Output Assembly File field. <u>Fast Nesting</u> and <u>Optimal Nesting</u> indicate the two different sets of algorithms used to implement Nesting. Select the option that best suits your requirements.
- 9. After all the parameters are set, click 'OK' to execute the Nesting Job.

This sets into motion the process to generate a nested layout. Generating the layout might take some time depending on the complexity of the part.

- Two files will be generated during the nesting process, namely a text file and an assembly file.
- After the Nesting process is completed, CAMWorksNesting will display a message indicating the location of the text file containing the **summary of the Nest Results**. Click OK to close

the message. The Text file will be displayed.

• The **Nested layout assembly** will be displayed in the Graphics area. Both these files are saved in the location indicated Output Assembly File path stated in the Apply Nesting dialog.

## **Defining Part Parameters - Part Data Tab**

Use the **Part Data tab** of the *Create Nesting Job* dialog to view and edit the part related parameters.

The Part Data tab is the default tab displayed when the *Create Nesting Job* dialog is displayed.

The below data fields are available and can be defined/edited in the *Part Data* tab. Click on the links provided to understand more:

- Part List
- <u>Thickness</u>
- <u>Quantity</u>
- <u>Material</u>
- Grain Direction
- Normal Face Selection
- Rotation Angle

#### **Editing Part Parameters**

The part parameters of Part Name, Thickness, Material, Rotation Type, Rotation Angle, Grain direction and Quantity are displayed in the **Part List**. These parameters can directly be edited in the part list. For a part highlighted in the Part List, all its part parameters are also displayed in fields given below the Part List.

These fields can also be used to edit the part parameters. Changes made in these fields are reflected for the corresponding part in the Part List.

The Part parameter of Normal Face Selection cannot be executed in the Part List. To learn more about how to edit this parameter, read <u>'Steps to</u>

change the Normal Face Direction of a Part'.

## Part List

The Part List grid is displayed under the Part Data tab in the Create Nesting Job dialog box.

The Part List grid displays the part or list of parts to be nested within the selected sheet(s). Various part parameters affecting the nesting of the parts are displayed in the grid. The part parameters displayed in the grid include:

- Part Name
- Thickness
- Quantity
- Material
- Rotation Type
- Part Angle
- Grain Direction

When you highlight a part in the Part List, it is correspondingly highlighted in the Graphics area. Also, the corresponding parameters of the part are displayed in the fields below the Part List grid.

#### **Part List for Single Part Nesting**

If nesting only a single part, then only one part is displayed in the Part List - the part to be selected by for nesting.

- Open the part to be nested in the SolidWorks Environment.
- Under the CAMWorks Nesting Menu, select 'Create Nesting Job'.
- The Create Nesting Job dialog is displayed. The Part Data tab is displayed by default.
- Observe that the selected part is displayed in the Part List.
- The parameters of the part are displayed in the various parameter fields.

#### **Part List for Multiple Part Nesting (Nest by Folder)**

If nesting multiple parts on a sheet or multiple sheets, then all such parts to be nested will be displayed in the Part List. Use the 'Nest by Folder' option in the CAMWorksNesting menu to nest multiple parts.

- In the CAMWorks Nesting Menu, choose 'Nest by Folder' option. The 'Browse for Folder' dialog is displayed.
- Browse to the folder containing exclusively the parts to be nested. Click OK.
- The Create Nesting Job dialog is displayed. The Part Data tab is displayed by default
- Observe that all the parts present in the selected folder are displayed in the Part List.

#### **Part List for Assembly Nesting**

If nesting an assembly, then all the parts comprising the assembly which are to be nested will be displayed in the Part List. Use the 'Create Nesting Job' option in the CAMWorks Nesting menu to nest the assembly.

- Open the Assembly to be nested in the SolidWorks Environment.
- Under the CAMWorks Nesting Menu, select 'Create Nesting Job'.
- The Create Nesting Job dialog is displayed. The Part Data tab is displayed by default.
- Observe that the parts comprising the assembly are displayed in the Part List.

#### **Selective Nesting of Parts in the Part List**

For Assembly Nesting and Multi-Part nesting, CAMWorksNesting provides the option to nest only selected parts displayed in the Part List. In order to selectively nest parts, following are the steps:

- Observe the left-most column in the Part List. This column contains check boxes which are selected by default. Such a selected checkbox indicates that the associated part will be taken up for Nesting during the Nesting process.
- To selectively nest parts displayed in the Part List, unselect the checkbox against those parts that you do not wish to nest.

## **Defining Part Thickness**

'Thickness' is a part related parameter.

Use the Part Data tab of the Create Nesting Job dialog to view and edit all part related parameters.

In the Part Data tab, thickness of the Part is displayed in two areas:

- 1. The part thickness of all the parts in the Part List is displayed in the 'Thickness' column.
- 2. The thickness of the part highlighted in the Part List is displayed below the Part List in the field labeled 'Thickness'. This is also true for all other parameters.

#### **Default Part Thickness**

CAMWorksNesting extracts the part parameter of Thickness from the Solid Part/ sheet metal part and displays it in the Thickness field as default thickness for the part. To overwrite the default thickness and assign a user-defined thickness, enter the desired thickness value in the Thickness field.

#### **Editing the Part Thickness in the Part List grid**

- 1. In the Part list, highlight the part for which you wish to edit the parameter.
- 2. For the highlighted part, double-click on the 'Thickness' column in the Part List.
- 3. Edit the value in the Thickness field as required.
- 4. If you try to assign an invalid value, a warning message will be displayed indicating to enter values between permissible limits. For example, if you try to enter a value below 0mm, the warning message will be displayed.
- 5. After assigning the value, click on the Tab button or any other parameter field to shift the focus. Observe that the 'Thickness' value for this part has changed accordingly in the Thickness field below the Part List for the edited part.

#### **Editing the Part Thickness using the Thickness field**

- 1. In the Part list, highlight the part for which you wish to edit the parameter.
- 2. The parameters for the highlighted part are displayed in the fields below the Part List. Edit the value in the Thickness field as desired.
- 3. You can use spin control to increase or decrease the Thickness value. Spin control increases the value in steps of +10 units and decreases it in steps of -10 units.
- 4. If you try to assign an invalid value, a warning message will be displayed indicating to enter values between permissible limits. For example, if you try to enter a value below 0mm, the warning message will be displayed.
- 5. After assigning the value, click on the Tab button or any other parameter field to shift the focus. Observe that the 'Thickness' value for this part has changed accordingly in the Part List.

#### **Correlation between Part Thickness and Sheet Thickness**

- In a nesting job, parts and sheets need to be of identical type. In other words, a part can only be nested within a sheet if the 'Thickness' and 'Material' parameters of the part and sheet are identical to each other. For example, a part with a thickness of 10 mm and material 'steel' can only be nested in sheet with the same material and thickness.
- CAMWorksNesting has a very useful feature which allows you to input parts and sheets with different materials and thicknesses for nesting. CAMWorksNesting will then internally nest appropriate parts on appropriate sheets. This will ease the efforts at your end to classify the parts and sheets while creating a nesting job.
- If multiple parts of varying materials or thicknesses are to be nested, then you need to define Multiple sheets in the Sheet Data tab of corresponding materials/ thickness in order to ensure that the parts are nested. Some intelligence is added in CAMWorksNesting such that it ensures all sheets with relevant **materials and thicknesses** are available for nesting all the parts in the assembly/ multi-part nesting.

## **Defining Part Quantity**

'Quantity' is a part related parameter. It indicates the number of instances of the part to be nested.

Use the Part Data tab of the Create Nesting Job dialog to view and edit the part related parameters.

In the Part Data tab, Quantity of the Part is displayed in two areas:

- 1. The part quantity of all the parts in the Part List is displayed in the 'Quantity' column.
- 2. The Quantity of the part highlighted in the Part List is displayed below the Part List in the field labeled 'Quantity'. This is also true for all other parameters.

### **Default Quantity**

The default value assigned is based on the value defined in the **DefaultValues.ini** file. You can edit the default Quantity displayed in the Part. For details, read: 'Defining default Part quantity'.

To assign the number of instances of the part to be nested, edit the Quantity field for the Part under Part Data tab.

#### **Editing the Part Quantity in the Part List grid**

- 1. In the Part list, highlight the part for which you wish to edit the parameter.
- 2. For the highlighted part, double-click on the 'Quantity' column in the Part List.
- 3. Edit the value in the Quantity field as required.
- 4. If you try to assign an invalid value, a warning message will be displayed indicating to enter values between permissible limits. For example, if you try to enter a value below 0mm, the warning message will be displayed.
- 5. After assigning the value, click on the Tab button or any other parameter field to shift the focus. Observe that the 'Quantity' value for this part has changed accordingly in the Quantity field below the Part List for the edited part.

#### **Editing the Part Quantity using the Quantity field**

- 1. In the Part list, highlight the part for which you wish to edit the parameter.
- 2. The parameters for the highlighted part are displayed in the fields below the Part List. Edit the value in the Quantity field as desired.
- 3. You can use spin control to increase or decrease the Quantity value. Spin control increases the value in steps of +1 unit and decreases it in steps of -1 units. When using spin control buttons to edit the value, observe that the Quantity field in the Part List changes simultaneously.
- 4. If you try to assign an invalid value, a warning message will be displayed indicating to enter values between permissible limits. For example, if you try to enter a value below 0mm, the warning message will be displayed.
- 5. After assigning the value, click on the Tab button or any other parameter field to shift the focus. Observe that the 'Quantity' value for this part has changed accordingly in the Part List.

## **Defining Part Material**

'Material' is a part related parameter indicative of the material of the part to be nested.

Use the Part Data tab of the Create Nesting Job dialog to view and edit all the part parameters.

In the Part Data tab, 'Material' of the Part is displayed in two areas:

- 1. The part material of all the parts in the Part List is displayed in the Material column.
- 2. The Material of the part highlighted in the Part List is displayed below the Part List in the combo box labeled 'Material'. This is also true for all other parameters.

#### **Default Part Material**

CAMWorks Nesting extracts Material related information from the solid part in the SolidWorks environment and displays it in the Material dropdown list field as default material for the part.

If the material value is not extracted from the 3D model, then CAMWorks Nesting assigns a default value. This default material will be the first material listed in the material dropdown list.

#### **Editing the Part Material in the Part List grid**

- 1. In the Part list, highlight the part for which you wish to edit the parameter.
- 2. For the highlighted part, double-click on the 'Material' column in the Part List.
- 3. Select the desired material from the Material dropdown list.
- 4. After assigning the material, click on the Tab button or any other parameter field to shift the focus. Observe that the 'Material' type for this part has changed accordingly in the Material dropdown field below the Part List for the edited part.

Note:

You cannot use the Part List to assign a material (to the part) when the desired material is not part of the Material dropdown list. In such cases, use the Material combo box given below the Part List to enter the Material name into the Material drop down field.

#### **Editing the Part Material using the Material combo box**

- 1. In the Part list, highlight the part for which you wish to edit the parameter.
- 2. The parameters for the highlighted part are displayed in the fields below the Part List. Select the desired material from the Material dropdown list.
- 3. In case the material you wish to assign is not available in the dropdown list, you can directly enter the name of the material in the Material field.
- 4. After assigning the material, click on the Tab button or any other parameter field to shift the focus. Observe that the 'Material' type for this part has correspondingly changed in the Part List.

#### **Correlation between Part Material and Sheet Material**

- In a nesting job, both the part(s) as well as the sheet in which they will be nested should be of identical in material and thickness. In other words, a part can only be nested within a sheet if the 'Thickness' and 'Material' parameters of the part and sheet are identical to each other. For example, steel parts need to be cut from steel sheets.
- CAMWorks Nesting has a very useful feature which allows you to input parts and sheets with different materials and thicknesses for nesting. CAMWorks Nesting will then internally nest appropriate parts on appropriate sheets. This will ease the efforts at the your end to classify the parts and sheets while creating a nesting job.
- If multiple parts of varying materials or thicknesses are to be nested, then you need to define Multiple sheets in the Sheet Data tab of corresponding materials or thickness in order to ensure that the parts are nested. Some intelligence is added in CAMWorksNesting such that it ensures all sheets with relevant **materials and thicknesses** are available for nesting all the parts in the assembly/ multi-part nesting.

#### Note:

- You can add, delete or edit the materials displayed in the Material dropdown list. To know more, see: Adding Materials to Material List
- When the material is not defined for the solid part to be nested, the default Material assigned is the first material in the Material dropdown list.

## **Grain Direction**

Rolled metal sheets have a property called **grain direction**, which affects the strength of the parts cut from that sheet.

To ensure accuracy and avoid defects such as breaking of parts during the subsequent mechanical operations like bending, it is necessary to cut critical parts, such that they have pre-defined and proper grain direction.
#### **Setting Grain Direction in CAMWorks Nesting**

CAMWorks Nesting provides the option to attach grain direction with each part and sheet. The user must separately define grain direction for part and sheet.

- The Grain Direction field in the Part Data tab of the Create Nesting Job dialog allows you to set Grain direction for the Part.
- The Grain Direction field in the Sheet Data tab of the Create Nesting Job dialog allows you to set Grain direction for the Sheet.

The Grain direction field is a drop down list from which you must choose any one option. The options are:

- 1. X direction
- 2. Y direction
- 3. None (default option for both part and sheet)

## **Default Grain Direction**

By default, the grain direction for all parts and sheets is set to 'None'.

#### **Assigning Grain directions**

The Grain Direction which you can assign to a particular sheet is dependent on the Grain Direction of the Parts which will be nested within that sheet.

The allowed relationship between the *Grain Direction* of the part(s) and sheet is given in the following table:

Grain Direction of Part	Allowed Grain Direction for Sheet	Description
х	X or Y but not None	If a part has grain direction "X", th least one of its corresponding she should have either "X" or "Y" but I "None" as its grain.
Y	X or Y but not None	If a part has grain direction "Y", th least one of its corresponding she should have either "X" or "Y" but I "None" as its grain.
None	X or Y or None	If a part has grain direction "None the corresponding sheets can hav "X" or "Y" or "None" as its grain di

#### **Steps to set Grain Direction using the Part List/ Sheet List**

- 1. In the Part Data tab of the Create Nesting Job dialog, highlight the part in the Part list for which you wish to set the Grain Direction.
- 2. In the part list, double click on the column labelled *Grain Direction* for the highlighted part. Choose the desired *Grain Direction* from the dropdown list.
- 3. Observe that the *Grain Direction* field for this part has changed accordingly in the Grain direction field given below the Part List.
- 4. Now click on the *Sheet data* tab of the *Create Nesting Job* dialog.
- 5. In the Sheet List, highlight the sheet on which the part will be nested.
- 6. In the Sheet List, double click on the column labelled *Grain Direction* for the highlighted sheet. Choose the desired Grain Direction from the dropdown list. Note that Grain Direction can be assigned only as per the rules given in the table above.
- 7. Observe that the *Grain Direction* field for this sheet has changed accordingly in the Grain Direction field below the Sheet List.

#### Steps to set Grain Direction for Part/Sheet using the dropdown List

- 1. In the *Part Data* tab of the *Create Nesting Job* dialog, highlight the part in the *Part list* for which you wish to set the Grain Direction.
- 2. The parameters of the highlighted part will be displayed in the fields below the Part List grid.
- 3. In the Dropdown list labelled 'Grain Direction', choose the desired Grain Direction.
- 4. Observe that the 'Grain Direction' field for this part has changed accordingly in the Part List.
- 5. Now click on the *Sheet data* tab of the *Create Nesting Job* dialog.
- 6. In the sheet list, highlight the sheet on which the part will be nested. The parameters of the highlighted sheet will be displayed below the sheet list.
- 7. Set the *Grain Direction* for the sheet. Note that Grain Direction can be assigned only as per the rules given in the table above.
- 8. Observe that the *Grain Direction* field for this sheet has changed accordingly in the *Sheet List*.

## **Normal Face Selection**

For solid/imported parts, CAMWorks Nesting uses the part face with the largest surface area as a normal plane for generating a silhouette profile of the part to be nested.

However, for certain solid/imported parts, a need may arise to select another part face for various reasons such as ease of machining, single setup machining etc.

For such situations, CAMWorks Nesting provides the option to manually define the Normal face.

#### **Normal Face selection**

Use the Part Data tab of the Create Nesting Job dialog to define the Normal Face. However, the Normal Face selection cannot be executed in the Part List grid.

The **Normal Face** selection is used to select the part face to be used as a normal plane for generating silhouette profile of the part to be nested.

#### **Steps to select Normal Face Direction for a part**

- 1. In the Part list, highlight the part for which the normal face is to be defined.
- 2. The parameters of the highlighted part are displayed in the fields below the Part List grid.
- 3. Observe the graphics area. A blue (default color) arrow indicates the Normal direction.
- 4. Click on the part face which you wish to assign as normal face.
- 5. The selected face is indicated in the field labeled 'Normal Face'.
- 6. To change the normal direction, click the 'Reverse Direction' icon. The arrow indicating the direction changes accordingly in the graphics area.

#### **Reversing the Normal Direction**

To change the Normal direction, click 'Reverse Direction' <sup>2</sup>. The arrow indicating Normal direction in the Graphics area of CAMWorks Nesting changes accordingly.

## **Part Rotation Control**

Use the Part Data tab of the Create Nesting Job dialog to view and edit the part parameters.

'Rotation Type' is a part related parameter.

CAMWorks Nesting provides an option of applying the rotation control for each part in two ways:

- 1. Step Angle
- 2. Angle List

#### **Setting Rotation Type for a part**

This can be done in two ways:

- In the Rotation Angle group box of the Part Data tab, choose either Step Angle or Angle List using the Radio button to set the Rotation type. After selecting the Rotation Type, click on the Tab button or any other parameter field to shift the focus. Observe that the 'Rotation Type' setting for this part has changed accordingly in the Part List.
- In the Part List, highlight the part for which you want to set the Rotation Type. Double click on the column labelled 'Rotation Type' for the highlighted part. Choose the desired Rotation type as either 'Step Angle' or 'Angle List' from the dropdown list. After setting the Rotation type, enter the desired angle(s) in the **Angle** column.

#### **Step Angle**

This is the singular angle that specifies the step in which the part is tried for nesting. For example, if the step angle provided for the part is 90 degrees, then that part will be tried in 0, 90, 180, and 270 degrees. In the Part Data tab, if the step Angle is set in the 'Rotation Angle' group box instead of the Part List, you can use spin control to increase or decrease the Step Angle value. Spin control increases the value in steps of +1 and decreases it in steps of -1.

The default step angle is 1 degree.

#### Angle List

This is the second way in which the rotation control can be applied on a part. The set of angles need to be input in a list. CAMWorks Nesting will then try nesting the parts only for the specified set of angles.

For example, if the angle list provided is 90, and 270 degrees for a specific part, then that part will be tried in 90 and 270 degrees only.

To specify an Angle List in the Create Nesting Job dialog, separate the angles by a comma. Spacing is not required between the commas. For example, to specify angles of 10, 20, 30, 60 and 90 degrees, you must enter '10,20,30,60,90' in the Part Angle List field.

## Note: If the angle list is provided, then CAMWorks Nesting will ignore the step angles supplied for the part.

## **Defining Sheet Parameters - Sheet Tab**

Use the **Sheet Data tab** of the Create Nesting Job dialog to add sheet(s) and set the parameters for sheet(s) in which parts will be nested.

The below data fields are available in the Sheet Data tab. Click on the links provided to understand more:

- <u>Sheet Size</u>
- <u>Sheet List</u>
- <u>Thickness</u>
- <u>Quantity</u>
- <u>Material</u>
- Length
- <u>Width</u>
- Grain Direction
- Assembly Template

#### Note:

- If a <u>Standard Size sheet</u> is added, then its parameters of 'Thickness', 'Quantity', 'Material', 'Grain Direction' and 'Assembly template' can be edited in the Sheet List. The parameters of 'Sheet name', 'Length' and 'Width cannot be edited.
- If a <u>custom Size sheet</u> is added to the Sheet List, all its parameters can be edited in the Sheet List.
- If a <u>sheet of type 'DXF</u>' is added, then its parameter of 'Thickness', 'Quantity', 'Material', 'Grain Direction' and 'Assembly template' can be edited in the Sheet List. The parameter 'Sheet name' cannot be edited. The parameters of Length and Width are not applicable to such a sheet.

#### **Defining Sheet Parameters**

Observe that the <u>Sheet list</u> grid will initially be empty when you click on the Sheet Data tab of the Create Nesting Job dialog. The size of the sheet in which the part(s) will be nested needs to be defined and then added to the Sheet List. Define the sheet size and set the Sheet Parameters. Click <u>'Add Sheet'</u> to add the sheet to the Sheet List. Add multiple sheets, if require din this manner.

When you highlight a Sheet in the Sheet List, its corresponding parameters are displayed in the fields below the Sheet list grid.

## Sheet List

Use the Sheet Data tab of the Create Nesting Job dialog to add sheet(s) and set the parameters for sheet(s) in which parts will be nested.

The Sheet List grid is displayed in the Sheet Data tab.

In the Create Nesting Job dialog, when you click on the Sheet Data tab, the Sheet List is initially empty. The sheet parameters including the dimensions of the sheet in which the part(s) will be nested need to be defined before a sheet can be added to the Sheet List. <u>Define the sheet</u> parameters and <u>Sheet size</u> and then click '<u>Add Sheet</u>' to add a sheet to the Sheet List.

Once the sheet(s) are added, the Sheet List displays the sheets in which parts listed in the part list will be nested. Sheet parameters are also displayed in the grid. The sheet parameters displayed in the Sheet list can be edited.

#### The sheet parameters displayed in the grid include:

- <u>Sheet Name</u>
- <u>Length</u>
- <u>Width</u>
- <u>Thickness</u>
- <u>Material</u>
- <u>Quantity</u>
- Grain Direction
- Assembly Template

#### Sheet Parameters which can be edited in the Sheet List:

- If a <u>Standard Size sheet</u> is added, then its parameters of 'Thickness', 'Quantity', 'Material', 'Grain Direction' and 'Assembly template' can be edited in the Sheet List. The parameters of 'Sheet name', 'Length' and 'Width cannot be edited.
- If a <u>custom Size sheet</u> is added to the Sheet List, all its parameters can be edited in the Sheet List.
- If a <u>sheet of type 'DXF'</u> is added, then its parameter of 'Thickness', 'Quantity', 'Material', 'Grain Direction' and 'Assembly template' can be edited in the Sheet List. The parameter 'Sheet name' cannot be edited. The parameters of Length and Width are not applicable to such a sheet.

## **Defining Sheet Size**

Use the Sheet Data tab of the Create Nesting Job dialog to add sheet(s) and set the parameters for sheet(s) in which parts will be nested.

The Sheet dimensions is one of these parameters. The **Sheet size** option allows the user to set the dimensions of the sheet.

The Sheet List is initially empty when you click on the Sheet Data tab of the Create Nesting Job dialog. The sheet parameters including the dimensions of the sheet in which the part(s) will be nested need to be defined before the sheet can be added to the Sheet List.

CAMWorks Nesting provides three options with respect to defining the sheet dimensions.

#### **Options to choose sheet sizes:**

The Sheet data tab of the Apply Nesting dialog provides three options with respect to sheet size.

## **1. Standard Size:**

The Standard Size dropdown box lists all the standard sheet sizes listed in the <u>StandardSheets.ini</u> file. This option is best exercised if you have defined the standard sheet sizes used at your facility in the StandardSheets.ini file.

#### To add a standard size sheet, following are the steps:

- In the Sheet list grid of the Sheet data tab, click on the row indicating 'Select to add sheet' in the Sheet list.
- Under the Sheet list, select the option 'Standard Size' to define the sheet size.
- In the Standard Size dropdown list, select the required sheet size.
- Set the parameters of Thickness, Material, Quantity, Grain direction and Assembly template as required.
- Click on the Add Sheet button.
- The sheet is now added to the sheet list.

## 2. Custom Size:

The Custom Size option is best used when adding a non-standard size rectangular sheet or adding a custom sheet size.

#### To add a Custom Size sheet, following are the steps:

- In the Sheet list grid of the Sheet data tab, click on the row indicating 'Select to add sheet' in the Sheet list.
- Under the Sheet list, select the option 'Custom Size' to define the sheet size.
- The Length and Width fields are activated on selecting this option. Enter the required values for Length and Width.
- You can use spin control to increase or decrease the Length and Width values. Spin control increases the value in steps of +10 units and decreases it in steps of -1 units.

- Set the parameters of Thickness, Material, Quantity, Grain direction and Assembly template as required.
- Click on the Add Sheet button.
- The sheet is now added to the sheet list.

## 3. Sheet DXF:

Only rectangular sheets can be defined using *Standard Size* and *Custom Size*. The Sheet DXF option is best used when adding a non rectangular sheet or remnant sheet. In order to nest parts in such a non-rectangular or remnant sheet, the sheet should be saved in CAD data file format called *Drawing Exchange format* (.dxf).

- In the Sheet list grid of the Sheet data tab, click on the row indicating 'Select to add sheet' in the Sheet list.
- Under the Sheet list, select the option 'Sheet DXF' to define the sheet size.
- Click on the button to browse to the location where the DXF file is located.
- Set the parameters of Thickness, Material, Quantity, Grain Direction and Assembly template as required.
- Click on the 'Add Sheet' button.
- The Sheet in DXF file format will be added to the sheet list.
- A thumbnail view of the shape of the sheet will be displayed in the *Sheet Preview*.

## **Adding & Removing Sheet from the Sheet list**

#### **Adding Sheets**

Use the Sheet Data tab of the Create Nesting Job dialog to add sheet(s) in which parts will be nested.

In the Create Nesting Job dialog, when you click on the Sheet Data tab, the Sheet List is initially empty. The sheet parameters of the sheet in which the part(s) will be nested need to be defined before it can be added to the Sheet List.

Define the sheet parameters and sheet size and then click 'Add Sheet' to add a sheet to the Sheet List.

Sheets listed in the sheet list can be removed by clicking 'Remove Sheet' button.

CAMWorks Nesting provides the facility to add multiple sheets for nesting parts.

#### Add sheet Button

- Use the 'Add sheet' button to add a sheet to the Sheet List after setting its parameters.
- The 'Add sheet' button is inactive when a sheet in the sheet list is highlighted.
- To activate the 'Add sheet' button, click on the 'Select to add sheet' field in the Sheet List.
- To add a new sheet to the Sheet list, following are the steps:
- 1. Click on the 'Select to add sheet' field in the Sheet List.
- 2. <u>Define the sheet size</u> as required.
- 3. Set the <u>sheet parameters</u> as required.
- 4. Click on the 'Add sheet' button. The sheet is now added to the Sheet list.
- 5. Repeat the above steps to add another sheet to the Sheet list.

#### **Remove Sheet Button**

- Use the 'Remove sheet' button to remove/delete a sheet to the Sheet List.
- The 'Remove sheet' button is inactive when the 'Select to add sheet' field in the Sheet List is highlighted.
- To remove a sheet from the Sheet List, select the sheet to be deleted in the Sheet List and click 'Remove Sheet'.

## **Defining Sheet Name**

The 'Sheet Name' column of the Sheet List displays the name of the sheet(s) added for the Nesting Job.

- If a sheet of Standard size is added, then the sheet name of the standard sheet as defined in the StandardSheets-INCH.ini file or StandardSheets-MM.ini will be displayed. The sheet name of a standard sheet cannot be edited in the Sheet List or otherwise..
- If a sheet of type 'DXF' is added, then the name of the selected sheet is displayed in the sheet list. The sheet name of such a DXF sheet is read-only within the sheet list.
- If the sheet of 'Custom Size' is added, then the sheet name as well as all the other parameters can be edited in the Sheet List itself. To understand how to edit the name of Custom Size sheet in StandardSheets.ini, <u>click here</u>.

## **Defining Sheet Length and Width**

Use the Sheet Data tab of the Create Nesting Job dialog to add sheet(s) and set the parameters for sheet(s) in which parts will be nested. The sheet Length and Width dimensions are mandatory sheet parameters for nesting (except for sheets of DXF format).

#### Length and Width of Standard Size Sheets:

The length and width for standard sized sheets are defined in the <u>StandardSheets-INCH.ini</u> and **StandardSheets-MM.ini** file. Consequently, if you choose a standard size sheet in the Sheet data tab, the pre-defined length and width dimensions of the sheet will be used for nesting. You cannot edit the length and width of a Standard sheet in the Sheet Data tab.

To change the length and width for a Standard sheet present in the Sheet list, remove the sheet from the sheet list and add another sheet with desired length and width.

The Length and Width fields are disabled for Standard Size sheets.

#### Length and Width for Custom Size sheets:

Custom Size sheets are non-standard rectangular sheets. If you choose a Custom Size sheet, the Length and Width fields in the Sheet Data tab are activated. Enter the desired length and width values in this fields before adding the sheet to the Sheet List.

Once a Custom Size sheet is added to the Sheet List, you can edit its Length and Width within the Sheet List. Alternatively, you can use the Length and Width fields given below the Sheet list grid to change its values.

To change the Unit system used in the Create Nesting Job dialog, change the Unit system in SolidWorks settings.

The Length and Width can be entered in MMGS or IPS unit system (all of these are supported by SolidWorks).

To view the steps to insert a Custom Size Sheet, click here.

#### Length and Width for Sheet DXF:

If you choose 'Sheet DXF' type of sheet, the length and width parameters will not be applicable. The perimeter of such a sheet can only be edited only in the CAD software in which it is designed. You cannot edit the length and width of a Sheet DXF in the Sheet Data tab. The Length and Width fields are disabled for Sheet DXF sheets.

## **Defining Sheet Thickness**

Use the Sheet Data tab of the Create Nesting Job dialog to add sheet(s) and set the parameters for sheet(s) in which parts will be nested.

'Thickness' is a sheet parameter.

In the Sheet Data tab, thickness of the sheet is displayed in two areas:

- 1. The thickness of the selected sheet (Standard size, Custom size or Sheet DXF) is displayed in the field labeled 'Thickness'.
- 2. The thickness of all the sheets added to the sheet list is displayed in the 'Thickness' column of the Sheet list grid.

#### **Default Sheet Thickness**

#### **Default thickness for Single Part Nesting**

The intelligence added in CAMWorksNesting automatically extracts the material and thickness of the singular part present in the Part List and assigns it as the default value in the Material and Thickness field respectively for the sheet.

# Default thickness for Multi-Part Nesting/ Assembly Nesting

The intelligence added in CAMWorksNesting ensures all sheets with relevant **materials and thicknesses** are available for nesting all the parts in the assembly. CAMWorksNesting automatically extracts the thickness and material of the first part in the part list and assigns these as the default value of the first sheet. CAMWorksNesting automatically checks for different material and thickness, if any, in the part list and assigns these as the default value of the second sheet and so on till all required sheets with relevant material and thickness are added.

#### **Editing the Sheet Thickness**

Use the thickness field given below the sheet list to set the thickness value before adding the sheet to the Sheet List. Once the sheet is added to the Sheet List, the thickness value can be edited directly within the Sheet List in the column labeled 'Thickness'.

#### **Correlation between Part Material and Sheet Thickness**

CAMWorks Nesting allows only parts having same material and thickness to be nested together within a sheet. The sheet too must have material and thickness identical to those of the parts nested in it.

In other words, a part can only be nested within a sheet if the 'Material' and 'Thickness' parameters of the part and sheet are identical to each other.

If multiple parts of varying materials or thickness are listed in the Part List, then you need to add Multiple sheets of corresponding materials or thickness in the Sheet Data tab in order to ensure that the parts are nested.

For example, if the Part List comprises parts with two different thicknesses, then you need to define two separate sheets in the sheet list to nest both the parts.

## **Defining Sheet Quantity**

Use the Sheet Data tab of the Create Nesting Job dialog to add sheet(s) and set the parameters for sheet(s) in which parts will be nested. 'Quantity' is a sheet parameter.

In the Sheet Data tab, Quantity of the Sheet is displayed in two areas:

- 1. The quantity of the selected sheet (Standard size, Custom size or Sheet DXF) is displayed in the field labeled 'Quantity'.
- 2. The quantity of all the added sheets is displayed in the Quantity column of the Sheet list grid.

## **Default Quantity**

CAMWorks Nesting assigns default quantity to the sheet added (Standard Size, Custom Size or Sheet DXF) based on default values defined **DefaultValues.ini** file.

The default quantity value can be changed by editing the Quantity field for the sheet. However, this must be done before the sheet is added to the sheet list.

#### **Setting the Sheet Quantity**

The quantity for each sheet must be defined before adding it to the Sheet List.

## Steps to set the quantity for a sheet before adding the sheet to the sheet list

- 1. Select the type of sheet you want to add viz. Standard Size, Custom Size or Sheet DXF.
- 2. In the Sheet data tab, set the material, thickness and grain direction as required.
- 3. To set the Quantity, enter the numeric value in the field labeled 'Quantity' or use the Spin Control buttons to increase or decrease the quantity.
- 4. Click on the Add Sheet button.
- 5. The sheet is added to the Sheet list. Observe that the sheet quantity for the added sheet is the value defined in Step 3.

#### Note:

You can edit the default Quantity to be assigned for sheets. To know more, see: <u>Defining Default Sheet Quantity</u>

## **Defining Sheet Material**

Use the Sheet Data tab of the Create Nesting Job dialog to add sheet(s) and set the parameters for sheet(s) in which parts will be nested. **'Material'** is a sheet parameter.

In the Sheet Data tab, material of the sheet is displayed in two areas:

- 1. The material of the selected sheet (Standard size, Custom size or Sheet DXF) is displayed in the field labeled 'Material'.
- 2. The materials of all the sheets added to the sheet list is displayed in the 'Material' column of the Sheet list grid.

#### **Default Sheet Material**

## **Default material for Single Part Nesting**

The intelligence added in CAMWorksNesting automatically extracts the material and thickness of the singular part present in the Part List and assigns it as the default value in the Material and Thickness field respectively for the sheet.

# Default thickness for Multi-Part Nesting/ Assembly Nesting

The intelligence added in CAMWorksNesting ensures all sheets with relevant **materials and thicknesses** are available for nesting all the parts in the assembly. CAMWorksNesting automatically extracts the thickness and material of the first part in the part list and assigns these as the default value of the first sheet. CAMWorksNesting automatically checks for different material and thickness, if any, in the part list and assigns these as the default value of the second sheet and so on till all required sheets with relevant material and thickness are added.

#### **Editing the Sheet Material**

Use the material dropdown given below the sheet list to set the material type before adding the sheet to the Sheet List. Once the sheet is added to the Sheet List, the material type can be edited directly within the Sheet List in the column labeled 'Material'.
### **Correlation between Part Material and Sheet Material**

CAMWorks Nesting allows only parts having same material and thickness to be nested together within a sheet. The sheet too must have material and thickness identical to those of the parts nested in it.

In other words, a part can only be nested within a sheet if the 'Material' and 'Thickness' parameters of the part and sheet are identical to each other.

If multiple parts of varying materials or thickness are listed in the Part List, then you need to add Multiple sheets of corresponding materials or thickness in the Sheet Data tab in order to ensure that the parts are nested.

For example, if the Part List comprises parts with three different materials, then three different sheets of corressponding materials need to added to the sheet list to generate nested layouts.

### Note:

You can add, delete or edit the materials displayed in the Material dropdown list. To know more, see: <u>Adding Materials to Material List</u>

# **Defining Assembly Template for Sheets**

### **Specifying the Assembly Template for Sheets in the Sheet List:**

- Once the nesting job is executed, a nested layout assembly will be generated for each sheet in the Sheet List.
- The assembly template for each such nested assembly generated can be defined for each sheet added to the sheet list.
- Different assembly templates may be specified for each sheet in the Sheet list.

Following are the two ways to set the Assembly template to be applied for each sheet in the sheet list:

# Steps to set Assembly template for a sheet using the Sheet List

- 1. In the Sheet Data tab, highlight the sheet in the Sheet list for which you wish to set the Assembly Template.
- 2. In the Sheet list, double click on the column labelled 'Assembly Template' for the highlighted part. Choose the desired Assembly template from the dropdown list. (This dropdown list is populated with assembly templates present in the Assembly Template folder location specified in the <u>Assembly Template path</u> in the Nesting data group box.)
- 3. Observe that the 'Assembly Template' field for this sheet has changed accordingly in the Assembly Template field given below the Sheet list.

# Steps to set Assembly template for a sheet using the Assembly Template dropdown list

- 1. In the Sheet Data tab, highlight the sheet in the Sheet list for which you wish to set the Assembly Template.
- 2. The parameters of the highlighted sheet will be displayed in the fields below the Sheet list grid.

- 3. In the Dropdown list labelled 'Assembly Template', choose the desired Assembly template. (This dropdown list is populated with assembly templates present in the Assembly Template folder location specified in the <u>Assembly Template path</u> in the Nesting data group box.)
- 4. Observe that the 'Assembly template' field for this sheet has changed accordingly in the Sheet List.

### **Part to Part Distance**

The Part to Part Distance indicates the distance to be maintained between two nested parts in the sheet. The default value is zero. You can assign the required value by entering it in the field.



18 parts nested when Part to Part Distance is 10 mm



21 parts nested when Part to Part Distance is 2 mm

### Note:

The default value for Part to Part distance can be set in the initialization file DefaultValues.ini.

## **Part to Sheet Distance**

The Part to Sheet Distance indicates the distance to be maintained between a part and the edge of the sheet. The default value is zero. You can assign the required value by entering it in the field.

#### Note:

The default value for Part-to-Part distance can be set in the initialization file DefaultValues.ini.

## **Output Assembly File Location**

In the Apply Nesting dialog, when the user clicks OK, the nesting command is executed and two files are output:

- 1. Assembly of nested parts
- 2. Results Summary Text File

The path given in the field 'Output Assembly File' indicates the location where the generated Assembly of nested parts and the Results Summary text file will be saved. Click on the 🖸 button to select an alternate location to save the Assembly file.

# **Assembly Template**

### **Assembly Template:**

An assembly template (\*.asmdot) is a template document that includes user-defined parameters and customized options which forms the basis for new assemblies.

### **Specifying the Assembly Template Folder Location:**

- The Assembly template location is specified in the field named 'Assembly template' within the Nesting Data group box.
- Use the button given next to the Assembly template field to browse to the folder where the desired assembly templates are saved.
- In CAMWorksNesting, the default assembly template loaded is the one defined in the Default Templates section of the SolidWorks/CAMWorks Solids Systems Options.
- Once the Assembly Template folder location is specified, CAMWorks Nesting populates the <u>Assembly Template dropdown list under the Sheet</u> <u>Data tab</u> with all the available Assembly Templates within the specified folder.

# Save output as dxf

### **The .dxf File Format**

The CAD data file format called *Drawing Exchange format* (.dxf) is an international standard which enables data interoperability between AutoCAD and other programs.

### The 'Save output as dxf' checkbox option

When nested layout(s) are generated after the execution of a nesting job, CAMWorksNesting always saves the nested layout(s) as assembly file(s).

CAMWorksNesting also provides the optional feature to save the nested layout(s) which are output in the **.dxf** format. This is provided in the form of a **Save output as dxf** checkbox option in the Nesting Data group box within the *Create Nesting Job* dialog.

# **Specifying the Folder Location to save the .dxf files which are output:**

- The folder location to save the .dxf files generated after executing a nesting job should be specified in the field next to the *Save output as dxf* checkbox.
- This field is enabled only when the *Save output as dxf* checkbox is checked.
- Use the button given next to this field to browse to the folder where the .dxf files are to be saved.
- When the *Save output as dxf* checkbox is checked and a nesting job is executed, the nested layouts generated will be saved in the .dxf file format in the folder location specified in this field.

### Saving the nested layout which is output in .dxf file format:

- When the **Save output as dxf** checkbox is checked and the nesting job is executed:
- The nested layout generated will be saved in the .dxf file format.
- The .dxf files will be saved to the folder location specified in the Nesting data group box.
- If multiple nested layouts are generated (saved either as separate configurations or as separate assembly files), then a separate .dxf file will be created for each nested layout that is output. These files will be saved in the folder location specified in the Nesting Data group box.
- The nested layout(s) generated will always be saved in the assembly file format (.sldasm) irrespective of whether the Save output as dxf option is used or not. The assembly files will be saved to the <u>Output Assembly File Location</u>.
- When the *Save output as dxf* checkbox is not checked, then the nested layout(s) which are generated after executing a nesting job will be saved only in the assembly file format (.sldasm).

### **Assigning Default Settings:**

By default, the *Save output as dxf* checkbox is checked.

You can assign or change the default settings within CAMWorksNesting to specify whether the *Save output as dxf* checkbox should be checked or unchecked whenever the *Create Nesting Job* dialog is opened for a new nesting job. This setting is available in the DefaultValues.ini file. To understand how to assign or change this setting, <u>click here</u>.

### **Automatically select sheet**

For a nesting job containing multiple parts and sheet types, it is difficult for the user to select the best sheet type or best sequence of sheets in order to obtain best yield based on the sheet utilization factor. Since it is very important to predict and procure the inventory in correct numbers, an Inventory Forecasting Module (IFM) which forecasts the optimum sheet inventory is necessary.

The Inventory Forecasting Module operates within CAMWorksNesting in the form of '**Automatically Select Sheet**' checkbox option. This option is available under the *Nesting Data* group box in the *Create Nesting Job* dialog.

### 'Automatic Sheet Selection' supports two methods:

- 1. **Unique Sheet Forecaster:** If this method is selected, the feature would select one best sheet among the set of sheets considered, depending upon overall utilization obtained. After knowing which sheet type is the best for that particular nesting order, the user can place an order for that much quantity of the sheet type. This will help in reducing the sheet variety thus reducing the time required for machine specific sheet settings.
- 2. **Combinatorial Sheet Forecaster:** If this method is selected, the feature selects a combination of sheet types from the set of sheets available in the Sheet list, depending on the overall utilization obtained.

### Setting the Forecaster Method in DefaultValues.ini

At any given point of time, only one of the above mentioned Forecaster methods can be used. These settings are available in the *DefaultValues.ini* file. The default method is *Combinatorial Sheet Forecaster*.

To learn more about how to change the Inventory Forecaster method in DefaultValues.ini, <u>click here</u>.

### How 'Automatically select sheet' works

- When the 'Automatically select sheet' option is not selected, CAMWorksNesting nests the part(s) on a sheet layout based on the chronological sequence of the sheets listed in the Sheet list.
- When the 'Automatically select sheet' option is selected, CAMWorksNesting nests the part on a sheet layout based on the utilization factor. If the Inventory Forecasting method used is 'Unique Sheet Forecaster', then CAMWorksNesting will nest the parts only in sheet providing maximum utilization factor. If the Inventory Forecasting method used is 'Combinatorial Sheet Forecaster', then CAMWorksNesting will nest the part(s) in a combination of sheets in descending order of its utilization factor.

### Note:

- The 'Automatically select sheet' option is active only multiple sheets are present in the sheet list on to which a part/parts can be nested.
- You can change the default settings in CAMWorksNesting if you wish to keep the 'Automatically select sheet' option enabled by default. To understand how to change the settings, <u>click here</u>.

### **Illustration:**

### **Nesting Job details:**

Consider a part which can be nested on two sheets 'S1' and 'S2' listed in the Sheet List. The number of instances of the part to be nested (quantity) is 1000. Sheet S1 has a utilization factor of 50% and can nest 100 instances of the part in each sheet layout. Its quantity is '7'. Sheet S2 has a utilization factor of 60% and can nest 150 instances of the part in each sheet layout. Its quantity is '6'.

### Nesting Job executed without 'Automatically select sheet'

When the 'Automatically select sheet' option is not selected, CAMWorksNesting will nest 100 instances of the part based on the chronological sequence of the sheets in the Sheet list. Since S1 is listed first in the Sheet list with a quantity of 7, seven layouts with sheet S1 will be generated, each nesting 100 instances of the part. Next, two layouts with Sheet 'S2' will be nested, each nesting 150 instances of the part. Thus, all thousand instances [(100 X 7 = 700); (150 X 2 = 300)]of the part will be nested.

### Nesting Job executed with 'Automatically select sheet' using 'Unique Sheet Forecaster'

When the 'Automatically select sheet' option is selected and the IFM method is set to 'Unique Sheet Forecaster' in the DefaultValues.ini, CAMWorksNesting will only consider the sheet with the higher utilization factor. Since sheet 'S2' has a higher utilization factor than 'S1', the parts will be nested only on sheet 'S2'. The sheet quantity for sheet 'S2' is '5'. Five layouts with sheet S2 will be generated, each nesting 150 instances of the part. Thus, 900 instances [150 X 6 = 900] of the part will be nested.

# Nesting Job executed with 'Automatically select sheet' using 'Combinatorial Sheet Forecaster'

When the 'Automatically select sheet' option is selected and the IFM method is set to 'Combinatorial Sheet Forecaster' in the DefaultValues.ini, CAMWorksNesting will only first nest the part on the sheet with the highest utilization factor. Since sheet 'S2' has a higher utilization factor than 'S1', the parts will be nested first on sheet 'S2'. The

sheet quantity for sheet 'S2' is '5'. Hence, five layouts with sheet S2 will be generated, each nesting 150 instances of the part. Thus, 900 instances [150 X 6 = 900] of the part will be nested. After the specified quantity for 'S2' is exhausted, CAMWorks nesting will use sheet 'S1' to nest the remaining 100 parts. One layout with sheet S1 will be generated, nesting 100 instances of the part. Thus, 1000 instances [(150 X 6 = 900); (100 X 1 = 100)] of the part will be nested.

### **Create separate assembly**

The *Create separate assembly* checkbox option is available under the Nesting Data group box in the *Create Nesting Job* dialog.

When multiple nesting layouts are generated after the execution of a nesting job, CAMWorksNesting lists all the nested layouts under the *Configurations Manager* Tab of SolidWorks. These nested layouts are saved as a part of a single assembly file. (*.sldasm*)

### The 'Create separate assembly' checkbox option

If you wish to generate separate assemblies for each such nested layout generated, then check the *Create Separate Assembly* checkbox option. When this option is thus enabled, then after executing a nesting job, all the nested layouts will then be saved as separate assemblies in the destination folder specified in the <u>Output Assembly File location</u>.

### **Assigning Default Settings:**

By default, the *Create separate assembly* checkbox is not checked. You can assign default settings within CAMWorksNesting to specify whether the *Create separate assembly* checkbox should be checked or unchecked whenever the *Create Nesting Job* dialog is displayed for a new nesting job. This setting is available in the DefaultValues.ini file. To understand how to assign or change this setting, <u>click here</u>.

### Nomenclature of the generated assemblies:

If the *Create separate assembly* option is enabled, then the nomenclature syntax of the each layout saved as a separate assembly will be:

**NestAssm-LayoutX-[MaterialName\_thickness\_QntyY].sldasm** where

### X = numerical indicating the serial order of the layout Y= quantity for the sheet

### Illustration:

Consider a part named 'RPG.sldprt' with a thickness of 1 mm, material 'Copper' which is nested on three sheets of same thickness and material but different quantities. The first has a quantity '2'; second sheet has quantity '3' and third sheet has quantity '1'. As the part is nested in three separate sheets, three separate assemblies will be generated.

### The names for the three assemblies generated will be:

- NestAssm-Layout1-[Copper\_1mm\_Qnty2].sldasm
- NestAssm-Layout2-[Copper\_1mm\_Qnty3].sldasm
- NestAssm-Layout3-[Copper\_1mm\_Qnty1].sldasm

# **Fast Nesting**

Two options for Nesting are provided in the Nesting Tab viz. Fast Nesting and Optimal Nesting.

### **Nested layout with Fast Nesting**

- **Grid Fit for Single Parts:**For nesting a single part, both Fast Nesting and Optimal generate a uniform grid like arrangement of nested parts. This feature is used for improving material utilization. Fast Nesting first analyses the part type and generates a suitable unit (i.e., either a single instance of the same part or a suitable pair) which can be repeated at fixed distances in horizontal and vertical directions.
- **Center of Gravity Fit for Multiple Parts:** For nesting multiple parts, Fast Nesting uses the position of the centre of gravity of each part to achieve a better nested pattern compared to Grid Fit.
- **Circular shaped Parts:** Circles and parts, whose outermost boundary is a complete circle, are treated specially. It is well known that such parts offer the best utilization, when they are arranged in hexagonal packing structure. With Fast Nesting, CAMWorks Nesting uses special internal parameters, which decide whether such parts should be nested in a hexagonal or rectangular pattern.
- Fast Nesting considers the angle list input by the user while generating the nested layout in both Grid Fit and Center of Gravity Fit pattern.
- **Note:** If used for nesting multiple parts, the material utilization factor resulting with Fast Nesting is some percentage factor less compared to Optimal Nesting. However, the time taken for Fast Nesting is considerably less compared to Optimal Nesting. You must consider the material utilization factor and time factor to decide the type of Nesting - Fast Nesting or Optimal Nesting.

# **Optimal Nesting**

Two options for Nesting are provided in the Nesting Tab viz. **Fast Nesting and Optimal Nesting.** 

- Optimal Nesting, as the name suggests, focuses on optimal utilization of the sheet by running multiple algorithms and chooses the best result in terms of utilization.
- It is the default setting for CAMWorksNesting.
- Time constraints can be applied to optimal nesting. Use the Max Nesting time value field to enter nesting time limit in minutes. This will restrict the maximum allowable time for nesting to the set value.
- The default value for max nesting time field is 'No constraint', which indicates that a full optimal nesting will be run without any time constraints.

### **Nested layout with Optimal Nesting**

Optimal Nesting runs different trials with each trial based on a certain set of rules. This method helps to ascertain the trial which will achieve better utilization of the sheet compared to Fast Nesting where fewer trials are used.

#### Note:

If numerous complex parts of varying thicknesses, materials and or quantities are nested using Optimal Nesting, the time taken could run into minutes or hours if a time constraint is not applied.

# **Max Nesting Time**

### 'Max Nesting Time' Constraint in Optimal Nesting:

Optimal nesting is provided along with a time constraint. In the Nesting tab, the combo box field labeled 'Max Nesting Time' is used to indicate the time to be taken for Optimal Nesting.

Time constraint is applicable only for Optimal Nesting and not for Fast Nesting. The 'Max Nesting Time' combo box is deactivated (grayed out) if Fast Nesting is chosen.

#### **Default value for 'Max Nesting Time' Constraint:**

The default value for Maximum Nesting Time constraint is 'No constraint'.

Note that for numerous complex parts of varying thicknesses, materials and or quantities, the time taken could run into minutes/ hours if a time constraint is not applied to Optimal Nesting.

### Setting the 'Max Nesting Time' Constraint:

To limit the time taken by Optimal Nesting, you can enter the time (in minutes) in the Max Nesting Time combo box.

# **Defining Multi Head Options Parameters**

### The Multi Head Options tab

The *Create Nesting Job* dialog is used to set the part, sheet and nesting parameters for Single Part nesting as well as Multi-Part nesting. For flame cutting applications, CAMWorksNesting provides an optional functionality known as <u>Multiple Tool Head Nesting</u>.

Use the **Multi Head Options tab** of the *Create Nesting Job* dialog to view and edit the parameters related to <u>nesting with Multiple Tool heads</u>.

This tab is visible in the *Create Nesting Job* dialog when the flags named <u>MultiHeadFlag and ShowMultiHeadDialog are set to '1' in the Machine.ini</u> file.

The below data fields and parameters are available and can be edited in the *Multi Head Options* tab. Click on the links provided to understand more:

- <u>Sheet List</u>
- <u>Machine Name</u>
- <u>Number of Tool Heads</u>
- <u>Multi-tool Nesting type</u>
- Rail Direction
- <u>Tool head distance</u>

# **Sheet List**

The *Sheet List* is populated by the sheets listed in the *Sheet data* tab of the *Create Nesting Job* dialog. Unlike the Sheet List grid in the Sheet Data tab, this grid is read-only. For nesting with multiple tool heads, a separate set of parameters needs to be defined for each individual sheet listed in the *Sheet List*.

To define these parameters related to nesting with multiple tool heads, highlight the desired sheet in the *Sheet List*. The default values for the parameters will be displayed below the *Sheet List* grid. Proceed to edit the parameters as desired.

# **Machine Name**

The *Machine* dropdown list displays a list of machines which support the nesting with multiple tool heads. Select the desired machine from the dropdown list. When you select a particular machine, the default parameters associated with that machine are displayed in the *Multi head options* tab.

### **SingleTHMachine**

The default machine displayed in the *Machine* field of the <u>Multi head Options</u> tab is the *SingleTHMachine*. When this machine (representative of Single Tool Head Machines) is selected, the functionality of Nesting with Multiple Tool Heads is disabled. All the other parameter fields in the *Multi Head Options* tab which are related to Multiple Tool Head Nesting will be disabled.

All the other machines listed in the *Machine* dropdown list support Nesting with Multiple Tool Heads. To enable nesting with multiple tool heads, select the desired machine (other than *SingleTHMachine*) from the dropdown list.

When such a machine is selected, the default parameter values associated with that machine are displayed in the *Multi head options* tab. These default parameter values for each machine are defined in the <u>Machine.ini</u> file.

### **Populating the Machine Name dropdown list**

The *Machine* dropdown list is populated with the <u>Machine names listed in the</u> <u>Machine.ini</u> file. Before executing a nesting job using multiple tool heads, ensure that you customize the <u>Machine.ini</u> file to suit your nesting job requirements.

# **Number of Tool Heads**

For every machine listed in the *Machine* dropdown list, the <u>maximum number of</u> <u>permissible tool heads</u> is defined in the *Machine.ini* file. When you select a particular machine from the *Machine* dropdown list, the maximum permissible number of tool heads for that machine is displayed in the *Number of tool heads* dropdown list.

Based on your nesting requirements, you have the option of choosing any number ranging from 1 to this maximum number from the *Number of tool heads* dropdown list.
# **Multi-Tool Nesting Type**

You can choose any one of the following *Multi-tool head nesting type* option:

a. **Fixed tool head distance**: When this option is chosen, the distance between the tool heads is fixed to the minimum tool head distance.

b. **Variable tool head distance**: When this option is chosen, the distance between tool heads can vary but will be greater than the minimum tool head distance.

When you select a particular machine from the <u>Machine dropdown list</u>, the default <u>Multi-tool head nesting type</u> option for that machine is displayed in the <u>Multi Head Options</u> tab. This <u>default option is assigned in the Machine.ini file</u>. You can change this default option to suit your nesting job requirements.

# **Rail Direction**

#### What is Rail Direction?

Rail direction is defined as the direction the master tool head follows while cutting. It can be either horizontal (X) or vertical (Y). When the rail direction is horizontal, the slave tool heads are either to the top or to the bottom of the master tool head. When the rail direction is vertical, slave tool heads lie either to the left or to the right of the master tool head. The tool heads are arranged along the height of the sheet when the rail direction is 'X' and along the length of the sheet if the rail direction is 'Y'.

### **Rail Direction in the Multi Head Options tab**

When you select a particular machine from the <u>Machine dropdown list</u>, the default *Rail direction* for that particular machine is displayed with the *Multi head options* tab. The Rail direction for a particular machine can either be 'X' or 'Y'. This <u>default value is defined in the Machine.ini file</u>. You can change the *Rail direction* to suit your nesting job requirements.

# **Tool head distance**

The *Tool head distance* value indicates minimum tool head distance to be used for a nesting job involving multiple tool heads.

When you select a particular machine from the <u>Machine.dropdown list</u>, the default *Tool head distance* value for that particular machine is displayed with the <u>Multi head options</u> tab. This <u>default value is defined in the <u>Machine.ini</u> file. You can edit this default value to suit your nesting requirements.</u>

## Settings: Assigning Default Values and Enabling/Disabling features

CAMWorks Nesting provides the facility to define and edit default values, settings, options and populate the dropdown fields. These values can be defined, set or edited in the initialization files (files with **.ini** extension) present in the CAMWorks Nesting installation folder.

## **Location of the Initialization files**

All initialization files are located in the CAMWorksNesting installation folder.

A typical installation path will

be: C:\CAMWorksNestingData\CAMWorksNesting 2013\Lang\English

# The initialization files present in the CAMWorks Nesting folder allows you edit the settings of the following:

- Define and store information on the standard sheet sizes
- Populating the Materials dropdown list
- Defining default part quantity
- Setting default sheet quantity and thickness
- Defining default dimensions for Custom sheet
- Defining default part-to-part distance and part-to-sheet distance
- <u>Setting for enabling/disabling the 'Preferential Hole Filling' feature</u>
- <u>Setting for 'Create separate assembly' feature</u>
- <u>Setting for 'Automatically select sheet' feature</u>
- <u>Setting for enabling/disabling the 'Flattening sheet metal part' option</u>
- <u>Setting for 'Fix component' option</u>
- <u>Setting for Inventory Forecasting (IFM) module's method</u>
- <u>Setting for enabling/disabling the option of saving the nested layouts in the .dxf format</u>
- <u>Settings for enabling/disabling the feature of nesting with multiple tools</u>

# **Defining Standard Sheets**

CAMWorks Nesting provides the option to define and store information on the standard sheet sizes used at your facility. This provides the benefit of automating repetitive operations and saves time during the nesting procedure by eliminating the need to define sheet dimensions and parameters.

- è To define the length and width of a sheet in IPS units, use the StandardSheets-INCH.ini file
- è To define the length and width of a sheet in MMGS units, use the StandardSheets-MM.ini file

# Viewing the StandardSheets-INCH.ini/ StandardsSheets-MM.ini file:

- 1. Go to the CAMWorks Nesting installation folder. (A typical installation path will be.... C:\CAMWorksNestingData\CAMWorksNesting 2013\Lang\English)
- 2. Based on the unit system used, open the file named StandardSheets-INCH.ini or StandardSheets-MM.ini.
- 3. The fifth line of both these files indicate the sheet count. For example, if 15 standard sheets have been defined, then the sheet count is set to 15.

#### Adding a sheet to the StandardSheets-INCH.ini/ StandardsSheets-MM.ini file

- 1. The parameters defined in for a standard sheet include its name, length, width.
- 2. Increment the Sheet count by 1 every time you add a sheet.
- 3. For example, suppose the StandardSheets-MM.ini file has 24 standard sheets defined. To add a 25th sheet with name 'S25', length of 3500 mm and width of 2200 mm, increment the sheet count by one and set it to 25. The format for defining this new sheet in the StandardSheets-MM.ini file is as follows

[Sheet1] Name = S25 Length = 3500 Width = 2200

### **Editing the parameters of a Standard Sheet:**

- 1. Once defined, the parameters of a sheet defined in the StandardSheets-INCH.ini and StandardSheets-MM.ini can be changed as and when the need arises.
- Consider this example: Suppose a sheet named 'S23(12' X8')' with a Length of 144 inches and width of 96 inches is defined in the StandardSheets-INCH.ini file. To change this sheet's name to 'Std\_Sheet23 (15' x10')' with a length of 180 inches and width of 120 inches.

Sheet Parameters before changing Sheet Parameters after changing [Sheet23] [Sheet23]

 [Sheet23]
 [Sheet23]

 Name = S23(12' X8')
 Name =

 Std\_Sheet\_23(15' X 10')
 Length =

 Length = 144
 Length =

 180
 Width = 96

 Width = 120
 Width = 120

#### Note:

• Increment the Sheet count of by 1 every time you add a sheet else the sheet will not be listed in the Standard Sheets dropdown list.

## **Defining Materials in Material Dropdown List**

The Material dropdown list available in the Pat Data tab allows you to assign the material of the part(s) to be nested.

CAMWorksNesting provides the option to populate the Material dropdown list and thus store information on the standard materials used at your facility. This provides the benefit of making the material selection easier by enabling you to select desired material from the dropdown list instead of manually typing it in.

## Viewing/Editing the Material.ini file:

- 1. Open the file named Material.ini located in the CAMWorks Installation folder.
- 2. The second line of this file indicates the number of materials already listed. For example, if 4 materials are defined in the file, then the *MaterialCount* is set to 4.
- 3. To add more materials to the list, enter the name of the new material in the same syntax as those already listed.
- 4. Increment the Material Count by 1 every time you add a material.
- 5. For example, to add a fifth material to a Material list, set the Material count to 5 and add the new material at the bottom of the list:

## [Material]

MaterialCount = 5 Material1 = Steel Material2 = Copper Material3 = Iron Material4 = Bronze Material5 = Aluminium

#### Note:

- CAMWorksNesting extracts the part parameter of Material from the Solid Part and displays it in the Material field as default material of the part.
- When the material cannot be extracted from the 3D model, CAMWorksNesting assigns the first material listed in the Material.ini file as the default material for the part.

# **Setting Default Part Quantity**

CAMWorksNesting provides the facility to assign the default quantity for parts to be nested.

This default value for Part Quantity is assigned in the **DefaultValues.ini** file. This value can be edited as per requirements.

### **Editing Part Quantity in the DefaultValues.ini file:**

- 1. Open the file named DefaultValues.ini <u>located in the CAMWorks Installation folder</u>.
- 2. Observe the section named [PartData]. The default quantity for parts is defined in this section.
- 3. Edit the quantity value to apply a new default value for quantity of the parts to be nested.
- 4. For example, to assign a new default part quantity of '6', the value in the DefaultValues.ini should be changed as follows:

# [PartData] ;Quantity only Integers, real values are not supported Quantity = 6

# **Setting Default Sheet Quantity and Thickness**

- For all the <u>sheet sizes</u> (*Standard Size*, *Custom Size* and *Sheet DXF*), the default thickness is defined in the **DefaultValues.ini** file.
- For all the <u>sheet sizes</u>, the default quantity to be displayed in the Sheet Data tab is defined in the **DefaultValues.ini** file.

# **Editing Sheet Quantity and Thickness in the DefaultValues.ini file:**

- 1. Open the file named DefaultValues.ini <u>located in the CAMWorks Installation folder</u>.
- 2. Observe the section named **[SheetData]**. The default quantity and thickness for a sheet are defined in this section.
- 3. The default quantity is always assigned as an integer. Edit the quantity value to apply a new default value for quantity of the sheets.
- 4. The thickness value is defined in both **millimeters** (MMGS units) and **inches** (IPS units). Edit these values to change the default value of thickness. Based on the units selected, CAMWorksNesting picks the appropriate value as default value.
- 5. For example, to assign a new default thickness of 50mm and a quantity of '2', the values in the DefaultValues.ini will be changed as follows:

## [SheetData]

;Quantity only Integers, real values are not supported Quantity = 2 Thickness-MM = 50 Thickness-Inch = 0.1

## **Assigning Default Dimensions for Custom Sheet**

For sheets of size <u>Standard Size</u>, the dimensions for each sheet is defined either in the <u>StandardSheets-INCH.ini</u> (when IPS unit system is used) or <u>StandardSheets-MM.ini</u> file (when MMGS unit system is used).

For sheets of size <u>Custom Size</u>, the dimensions are to be input by the user. When the Create Nesting Job dialog is opened for a new nesting job, default dimensions are displayed on selecting the sheet size 'Custom Size'.

These default dimensions are defined in the DefaultValues.ini file. Since the dimensions can be defined either in the MMGS or IPS unit system, the default values too are defined in MMGS and IPS units separately.

# **Editing the Default Custom Size Dimensions in the DefaultValues.ini file:**

- 1. Open the file named DefaultValues.ini <u>located in the CAMWorks Installation folder</u>.
- 2. Observe the section named [CustomSheet]. The default Length and Width to be displayed for 'Custom Size' in the Create Nesting Job dialog is assigned in this section.
- 3. The length and width is defined in both MMGS and IPS units. Edit these values to change the default Length and Width values.
- 4. For example, to assign a new default length of 2500mm and a Width of 800 mm (MMGS units) and a length of 120 inches and width of 72 inches (IPS units), the values under [CustomSheet] in the DefaultValues.ini should be changed as follows:

[CustomSheet] Length-MM = 2500 Width-MM = 800 Length-Inch = 120 Width-Inch = 72

## Assigning Default Part-to-Part & Part-to-Sheet Distance

The default values displayed for <u>Part-to-Part distance</u> and <u>Part-to-Sheet distance</u> are defined in the **DefaultValues.ini** file.

#### **Editing the Part-to-Part distance and Part-to-Sheet Distance:**

- 1. Open the file named DefaultValues.ini <u>located in the CAMWorks Installation folder</u>.
- 2. Observe the section named **[NestingData]**. The default values for Part-to-Part Distance and Part-to-Sheet Distance are defined here.
- 3. The Part-to-Part Distance and Part-to-Sheet Distance are defined in both MMGS and IPS units. Edit these values to change the default values. (Lines 5 to 8 under [NestingData] section)
- 4. For example, consider that a Part-to-Part Distance of 3mm and a Part-to-Sheet Distance of 2mm are to be assigned as new default values in MMGS units. Similarly, a Part-to-Part Distance of 0.125 inch and a Part-to-Sheet Distance of 0.25 inch are to be assigned as new default values in the IPS units.
- 5. To apply these changes, the values under [NestingData] in the DefaultValues.ini should be changed as follows:

## [NestingData]

•••

•••

```
PartToPartDistance-MM = 3
PartToPartDistance-Inch = 0.1250000
PartToSheetDistance-MM = 2
PartToSheetDistance-Inch = 0.250000
```

## **Enabling / Disabling the option of Preferential Hole** Filling

#### **Preferential Hole Filling**

Sheets generated from incremental nesting can possess material islands lying entirely within holes in the sheet geometry. These material islands exist due to the holes present in the parts that were nested on the sheet in the previous nesting session. The user may want to use these material islands first and then nest the parts on the remaining sheet space. Due to this feature, the space lying within material islands will not go waste.

Preferential hole filling is an optional feature. Be default, the Preferential Hole filling option is enabled. The setting to enable/disable this feature is available in the **DefaultValues.ini** file. (It cannot be set from the 'Create Nesting Job' dialog.)

# Editing the settings for 'Preferential Hole Filling' feature in DefaultValues.ini

- 1. Open the file named DefaultValues.ini <u>located in the CAMWorks Installation folder</u>.
- 2. Observe the section named [NestingData].
- 3. The setting to enable/disable the option for Preferential Hole Filling is given in Lines 11 and 12 under the [NestingData] section.
- 4. The flag named '**PreferHoleFilling**' indicates whether the option of Preferential Hole filling will be enabled or not.
- 5. When the 'PreferHoleFilling' flag is set to '1', the option of Preferential Hole Filling is enabled. This is the **default setting** at the time of installation.

### [NestingData]

```
...
;Options for PreferHoleFilling: 0 : No, 1 : Yes
PreferHoleFilling = 1
```

6. To avoid Preferential Hole Filling during the nesting process, set the value of the 'PreferHoleFilling' flag to '0' in order to disable this feature.

### [NestingData]

```
...
;Options for PreferHoleFilling: 0 : No, 1 : Yes
PreferHoleFilling = 0
```

## **Settings for 'Create Separate Assembly' option**

When multiple nesting layouts are generated after the execution of a nesting job, CAMWorksNesting lists all the nested layouts under the *Configurations Manager* Tab of SolidWorks. These nested layouts are saved as a part of a single assembly file. (*.sldasm*)

When the <u>Create Separate Assembly</u> checkbox option in the **Nesting Data** group box of the 'Create Nesting Job' dialog is checked, the multiple nested layouts generated after execution of the nesting job will each be saved as a separate assembly file.

You can assign the default settings whether the <u>Create Separate Assembly</u> checkbox should remain checked or unchecked whenever the 'Create Nesting Job' dialog for executing a new nesting job. This particular setting is available in the **DefaultValues.ini** file.

# Editing the settings for 'Create separate assembly' in DefaultValues.ini

- 1. Open the file named DefaultValues.ini <u>located in the CAMWorks Installation folder</u>.
- 2. Observe the section named [NestingData].
- 3. The setting for enabling/disabling the option to create separate assembly for each nested layout after the execution of nesting job is given in Lines 13 and 14 under the [NestingData] section.
- 4. The flag named '**CreateSeparateAssembly**' indicates whether the 'Create Separate Assembly' checkbox option will be checked or unchecked when the 'Create Nesting Job' dialog is displayed.
- 5. When the 'CreateSeparateAssembly' flag is set to '0', the 'Create separate assembly' checkbox will remain unchecked by default whenever the 'Create Nesting Job' dialog is displayed for a new nesting job. This is the default setting at the time of installation.

#### [NestingData]

. . .

... ;Options for CreateSeparateAssembly: 0 : No, 1 : Yes CreateSeparateAssembly = 0

- When set to '1', the 'Create separate assembly' checkbox will remain checked by default whenever 'Create Nesting Job' dialog is opened. [NestingData]
  - ... ;Options for CreateSeparateAssembly: 0 : No, 1 : Yes

CreateSeparateAssembly = 1

# **Settings for 'Automatically select sheet' option**

You can assign the default setting whether the <u>Automatically Select Sheet</u> checkbox option should remain checked or unchecked when the *Create Nesting Job* dialog is displayed for a new nesting job. This particular setting is available in the DefaultValues.ini file.

# **Editing the settings for the 'Automatically select sheet' checkbox option in DefaultValues.ini**

- 1. Open the file named DefaultValues.ini file located in the CAMWorks Installation folder.
- 2. Observe the section named [NestingData].
- 3. The settings for enabling/disabling the option to automatically select sheet is given in Lines 15 and 16 under [NestingData] section.
- 4. The flag named 'AutomaticallySelectSheet' indicates whether the 'Automatically Select Sheet' checkbox option will be checked or unchecked when the *Create Nesting Job* dialog is displayed.
- 5. When the 'AutomaticallySelectSheet' flag is set to '0', the <u>Automatically</u> <u>select sheet</u> checkbox in the 'Create Nesting Job' dialog will remain unchecked by default whenever the dialog is opened. This is the default setting at the time of installation.

#### [NestingData]

...

... ;Options for Tick / Un-tick AutomaticallySelectSheet: 0 : No, 1 : Yes AutomaticallySelectSheet = 0

6. When set to '1', the 'Automatically select sheet' checkbox in the 'Create Nesting Job' dialog will remain checked by default whenever the 'Create Nesting Job' dialog is opened.

## [NestingData]

```
...
;Options for Tick / Un-tick
AutomaticallySelectSheet: 0 : No, 1 : Yes
AutomaticallySelectSheet = 1
```

## Enabling / Disabling the option of Flattening sheet metal parts

With respect to nesting of sheet metal parts, you can choose whether the nested layout is to be computed based on the flattened or nonflattened sheet metal parts.

The setting to determine whether the sheet metal parts are to be flattened or not flattened can only be set from the **DefaultValues.ini** file. (It cannot be set from the 'Create Nesting Job' dialog.)

# Editing the settings for the feature of 'Flattening sheet metal' in DefaultValues.ini

- 1. Open the file named DefaultValues.ini <u>located in the CAMWorksNesting Installation</u> <u>folder</u>.
- 2. Observe the section named [NestingData].
- 3. The setting to enable/disable the option of flattening sheet metal parts before nesting is given in Lines 17 and 18 under the [NestingData] section.
- 4. The flag named '**FlattenSheetMetalPart**' indicates whether the sheet metal parts will be flattened before nesting or nor not.
- 5. When the 'FlattenSheetMetalPart' flag is set to '1', the option to flatten sheet metal parts before generating the nested layouts is enabled. This is the default setting at the time of installation.

### [NestingData]

... ;Options for FlattenSheetMetalPart: 0 : No, 1 : Yes FlattenSheetMetalPart = 1

6. When the 'FlattenSheetMetalPart' flag is set to '0', the feature for flattening sheet metal parts is disabled.

### [NestingData]

•••

;Options for FlattenSheetMetalPart: 0 : No, 1 : Yes FlattenSheetMetalPart = 0

# Settings for 'Fix component' and 'Mate-Lock' options

#### 'Fix component'

The nested layout generated after a nesting job is an assembly of parts. Sometimes, the parts may get accidentally repositioned from their original position in the nested assembly due to human error, thus disturbing the nested layout.

The 'Fix component' feature within SolidWorks/ CAMWorks Solids prevents the movement of parts within an assembly for which this feature is enabled.

CAMWorksNesting provides a setting in the DefaultValues.ini file wherein the '**Fix component**' feature of SolidWorks/ CAMWorks Solids can be activated by default for all the parts in nested layout(s) generated after the execution of a nesting job. Similarly, the '**Mate-lock**' feature of SolidWorks/CAMWorks Solids too can be used to serve the same purpose.

# Editing the settings for 'Fix component' feature in DefaultValues.ini

- 1. Open the file named DefaultValues.ini <u>located in the CAMWorks Installation folder</u>.
- 2. Observe the section named [NestingData].
- 3. The setting to enable/disable the 'Fix Component' option is given in Lines 19 and 20 under [NestingData] section.
- 4. The flag named '**FixComponent**' indicates whether the 'Fix Component' option or the 'Mate-Lock' option is active or not.
- 5. When the 'FixComponent' is set to '0', both the 'Fix component' and 'Mate-Lock' features of SolidWorks/CAMWorks Solids will remain inactive. This is the default setting at the time of installation.

# ;Option for FixComponent: 0 : No, 1 : Yes, 2: Mate - Lock

## FixComponent = 0

6. When the 'FixComponent' is set to '1', the 'Fix component' feature of SolidWorks/CAMWorks Solids is activated as default setting.

# ;Option for FixComponent: 0 : No, 1 : Yes, 2: Mate - Lock

## FixComponent = 1

7. When the 'FixComponent' is set to '2', the 'Mate-Lock' feature of SolidWorks/CAMWorks Solids is activated as default setting.

# ;Option for FixComponent: 0 : No, 1 : Yes, 2: Mate - Lock

FixComponent = 2

## Settings for Inventory Forecasting Module (IFM) method

The Inventory Forecasting Module operates within CAMWorksNesting in the form of '<u>Automatically Select Sheet</u>' checkbox option.

CAMWorksNesting supports two methods of Inventory Forecasting: <u>Combinatorial Sheet Forecaster</u> and <u>Unique Sheet Forecaster</u>.

The option as to which Inventory Forecasting method is to be used can only be set from the **DefaultValues.ini** file. (It cannot be set from the 'Create Nesting Job' dialog.)

### Editing the settings for 'Inventory Forecasting Module' (IFM) type in DefaultValues.ini

- 1. Open the file named DefaultValues.ini <u>located in the CAMWorks Installation folder</u>.
- 2. Observe the section named [NestingData].
- 3. The setting to assign the Inventory Forecasting method is given in Lines 21 and 22 under the [NestingData] section.
- 4. The flag named '**IFMType**' indicates the type of Inventory Forecasting Method used.
- 5. When the 'IFMType' flag is set to '2', the '<u>combinatorial Sheet Forecaster</u>' method of Inventory Forecasting is enabled. This is the **default setting** at the time of installation.

## ;Option for IFMType: 1 : For UNIQUE\_SHEET\_FORECASTER, 2: For COMBINATORIAL\_SHEET\_FORECASTER IFMType = 2

6. When the 'IFMType' flag is set to '1', the '<u>Unique Sheet Forecaster</u>' method of Inventory Forecasting is enabled.

;Option for IFMType: 1 : For UNIQUE\_SHEET\_FORECASTER, 2: For COMBINATORIAL\_SHEET\_FORECASTER IFMType = 1

# Settings for 'Save output as dxf' option

You can assign the default setting whether the <u>Save output as dxf</u> checkbox option should remain checked or unchecked when the 'Create Nesting Job' dialog is displayed for a new nesting job. This particular setting is available in the **DefaultValues.ini** file.

#### Editing the settings for the 'Save output as dxf' checkbox option in DefaultValues.ini

- 1. Open the file named DefaultValues.ini <u>located in the CAMWorksNesting Installation</u> <u>folder</u>.
- 2. Observe the section named [NestingData].
- 3. The setting for enabling/disabling the option for saving the nested layout output in a '.dxf' file format is given in the last two lines under the [NestingData] section.
- 4. The flag named '**DxfFile**' indicates whether the 'Save output as dxf' checkbox option will be checked or unchecked.
- 5. When the 'DxfFile' flag is set to '1', the 'Save output as dxf' checkbox will remain checked when the 'Create Nesting Job' dialog is displayed for a new nesting job. This is the **default setting** at the time of installation.

## [NestingData]

```
...
;Option for creating DXF file : 1 : Yes, 0 : No
DxfFile =1
```

6. When the 'DxfFile' flag is set to '0', the 'Save output as dxf' checkbox will remain unchecked when the *Create Nesting Job* dialog is displayed for a new nesting job.

## [NestingData]

```
...
;Option for creating DXF file : 1 : Yes, 0 : No
DxfFile =0
```

## **Functions of the Machine.ini File**

For flame cutting applications, CAMWorksNesting provides an optional functionality known as *Multiple Tool Head Nesting*. This functionality allows you to nest two or more identical layouts simultaneously within a single sheet using multiple tool heads. Machines which support nesting using multiple tool heads are known as *Multi tool head machines*. The nesting specific information and settings for such machines is defined in the *Machine.ini* file. This file needs to be customized depending on the nesting requirements at your facility.

### **Configuration Settings in the Machine.ini file**

The following settings are configured from the Machine.ini file:

- Enabling/Disabling the option of Nesting with Multiple Tool heads
- Enabling/disabling the display of the *Multi Head Options* tab in the *Create Nesting Job* dialog
- Defining the Machines which support nesting with multiple tools
- <u>Assigning default values to parameters of Machines which support nesting with multiple tools</u>
- Default Machine Configuration
- Adding/deleting machines in the machine list
#### Location of the Machine.ini file

This file is located in the CAMWorksNesting installation folder. A typical installation path will be: C:\CAMWorksNestingData\CAMWorksNesting 2013\Lang\English

### **Enabling/Disabling the feature of Nesting with Multiple Tools**

If you wish to execute Nesting jobs using the feature of Nesting with Multiple tool heads, then this feature option needs to be activated. The feature of nesting with multiple tools can be enabled/disabled from the <u>Machine.ini</u> file.

# Steps to enable/disable the feature of Nesting with Multiple Tool heads

1. Open the file named *Machine.ini* located in the CAMWorksNesting installation folder. Observe the first section named [MultiHeadData].

[MultiHeadData] ;Multi head flag; set to True(1) for multi tool head nesting, or else set to False(0) MultiHeadFlag = 1 ;Value to indicate whether Multi head api needs to be shown or not : Yes : 1, No , 0 ShowMultiHeadDialog = 1

- 2. The third line of this file contains a flag named **MultiHeadFlag**. This flag is used to enable/disable the functionality of nesting with multiple tools.
- When the *MultiHeadFlag* is set to '1', the option of nesting with multiple tool heads will be enabled. If the flag *ShowMultiHeadDialog* is also set to '1', then an interactive interface (the *Multi head options* tab in the *Create Nesting Job* dialog)to edit parameters related to nesting with multiple tools will be displayed. This is the default setting at the time of installation.
- When the *MultiHeadFlag* is set to '0', the option of nesting with multiple tool heads will not be available at all. No interactive interface to edit the parameters related to nesting with multiple tools will be displayed. The flag settings of *ShowMultiHeadDialog* will be immaterial since the function is disabled.

### Enabling/Disabling the display of the Multi Head Options tab in the Create Nesting Job dialog

The *Multi Head Options* tab in the *Create Nesting Job* dialog is the interactive interface that allows you to view/edit the parameters related to Nesting with Multiple Tool Heads. The setting to enable/disable the display of this tab is controlled from the <u>Machine.ini</u> file.

If you wish to execute Nesting jobs using the functionality of <u>Nesting with</u> <u>Multiple Tool Heads</u>, then the display of the <u>Multi Head Options</u> tab in the *Create Nesting Job* dialog needs to be enabled in order to allow you to edit the parameters associated with Nesting with Multiple Tool heads.

If the functionality of <u>Nesting with Multiple Tool Heads</u> is enabled but the display of the <u>Multi Head Options</u> tab in the *Create Nesting Job* dialog is disabled, then the nesting job will be executed using default parameters of the default machine defined in the <u>Machine.ini</u> file.

# Steps to enable/disable the feature of Nesting with Multiple Tool heads

1. Open the file named **Machine.ini** <u>located</u> in the CAMWorksNesting installation folder. Observe the first section named [MultiHeadData].

[MultiHeadData] ;Multi head flag; set to True(1) for multi tool head nesting, or else set to False(0) MultiHeadFlag = 1 ;Value to indicate whether Multi head api needs to be shown or not : Yes : 1, No , 0 ShowMultiHeadDialog = 1

2. The fifth line contains the **ShowMultiHeadDialog** flag. When MultiHeadFlag is set to '1', the option of nesting with multiple tool heads will be enabled. The 'ShowMultiHeadDialog' flag controls whether the *Multi Head Options* tab in the *Create Nesting Job* dialog will be displayed or not. In other words, it is used to set the option whether a nesting job will be executed interactively using user-specified parameters or with default parameter values assigned to the Default machine in the Machine.ini file.

This is explained as follows:

- If both the 'MultiHeadFlag' and 'ShowMultiHeadDialog' are set to '1', then the *Multi head Options* tab is displayed in the *Create Nesting Job* dialog. This tab allows you to view/edit the parameters for nesting with multiple tool heads. This is the default setting at the time of installation.
- If the 'MultiHeadFlag' is set to '1' and 'ShowMultiHeadDialog' is set to '0', then the feature of Nesting with Multiple Tool Heads will be active but *Multi head Options* tab will not be displayed in the *Create Nesting Job* dialog. Consequently, the next nesting job executed will use the default parameter values assigned to the Default machine in the Machine.ini file and complete the nesting process.
- If both the MultiHeadFlag and ShowMultiHeadDialog are set to '0', then

the feature of <u>Nesting with Multiple Tool Heads</u> will be disabled and the <u>Multi</u> <u>Head Options</u> tab will not be displayed in the *Create Nesting Job* dialog.

### **Defining the Machines which support nesting with multiple tools**

For machines at your facility which support nesting with multiple tools, you need to define their names and the number of such machines. You also need to specify the default machine to be used when multiple machines are present.

In the *Machine.ini* file, the machine names, machine count and default machine are defined in the **[DefaultMachine]** section.

- **MachineCount**: The integer value assigned to this setting indicates the number of machines which support the 'nesting with multiple tools' functionality. The machine count has to necessarily be an integer value greater than zero. Increment the 'MachineCount' by 1 every time you add a machine. For example, if you have three machines at your facility, the machine count will be '3'.
- Machine# = <machine name>: This setting indicates names of the machines which support the *nesting with multiple tools* functionality. Machine# denotes the machine number. # is a number greater than zero and less than/equal to the 'MachineCount' value. The <*machine name>* is an alphanumeric text string that represents the machine name. The defined machine names form a list of machines. In the <u>Multi head options</u> tab of the *Create Nesting Job* dialog (the interactive interface to edit the multiple tool head related parameters), the <u>Machine dropdown list</u> is populated by the Machines listed in this setting.
- **DefaultMachineName:** This setting is used to indicate the default machine from the list of machine(s) defined. When <u>MultiHeadFlag is set to '1'</u> and <u>ShowMultiHeadDialog is set to '0'</u>, the nesting job will be executed using <u>default parameter values</u> of the machine assigned in this setting.

# Assigning the Machine Count, machine names and default machine

- 1. Open the file named 'Machine.ini' <u>located</u> in the CAMWorksNesting installation folder.
- 2. Observe the section named [DefaultMachine].

[DefaultMachine] ;Machine# where # is a number greater than 0 and less than the value of "Machine Count" MachineCount = 5 Machine1 = SingleTHMachine Machine2 = MachineName1 Machine3 = MachineName2 Machine4 = MachineName3 Machine5 = MachineName4 ;Default machine name : # where # is a number between 0 and MachineCount DefaultMachineName = Machine1

- 3. The machine count, name of the machines and default machine to be used are defined here.
  - **Example:** Consider that you have three machines which support the *Nesting with multiple tools* functionality. First machine is named *SUN360*, second is named *RAK100* and the third *MARS99*. The first machine is to be assigned as the default machine. Then the settings under [DefaultMachine] section in the 'Machine.ini' file should be as follows:

MachineCount = 3 Machine1 = SUN360 Machine2 = RAK100 Machine3 = MARS99 DefaultMachineName = SUN360

### Assigning default parameter values for Machines which support nesting with multiple tools

For the Machines which support nesting with multiple tools at your facility, default values need to be assigned to the nesting-specific parameters.

Such <u>machines are listed in the [DefaultMachine] section</u> of the Machine.ini file. For every machine listed in this section, its default parameter values are set individually in the **[Machine#]** section (*# refers to Machine number*). When this Machine is selected in the *Multi head options* tab of the *Create Nesting Job* dialog, these default parameter values are displayed in the respective parameter fields.

#### Assigning default values to parameters of Machines which support Multiple tool head nesting

- 1. Open the file named *Machine.ini* located in the CAMWorksNesting installation folder.
- 2. Observe any of the sections named [Machine#]. (# refers to Machine number)
- 3. For every machine that was listed in the *[DefaultMachine]* section, the default parameters associated with nesting with multiple tool heads are assigned here. For every listed machine, a separate [Machine#] section with default parameter values needs to be created.

As an example, the parameter values for [Machine1] are given below:

[Machine2] ;Maximum number of tool heads MaxNoToolHeads = 5 ;Rail direction : X or Y RailDirection = X ;Tool head distance ToolHeadDistance-MM = 500 ToolHeadDistance-INCH = 20 ;Multi head nesting type : Fixed : 1 , Variable : 2 MultiToolHeadNestingType = 1

#### Assigning default values to parameters in the [Machine#] section

The parameters which are assigned default values in the [Machine#] section are as follows:

• **MaxNoToolHeads**: Indicates the maximum number of tool heads available for the machine.

For example, if the *MaxNoToolHeads* is 4 for a particular machine, then in the *Multi Head Options* tab of the *Create Nesting Job* dialog, the *Number of tool heads* dropdown list will be populated with integer values in the range of 1 to 4. You can assign the number of tool heads as any number from 1 to 4 by selecting it from the dropdown list.

- **RailDirection:** You can assign the default rail direction as 'X' or 'Y'. This default rail direction will be displayed in the *Multi Head Options*tab of the *Create Nesting Job* dialog. The default option can be changed within this dialog.
- **ToolHeadDistance-MM & ToolHeadDistance-INCH:** This value indicates the default minimum tool head distance to be used for nesting with multiple tool heads.
- When the MMGS units are used, CAMWorksNesting will display the value assigned to *ToolHeadDistance-MM* as the default Tool head distance in the *Multi Head Options* tab of the *Create Nesting Job* dialog. This default value displayed can be edited within the dialog.
- When the IPS units are used, CAMWorksNesting will display the value assigned to *ToolHeadDistance-INCH* as the default Tool head distance in the *Multi Head Options* tab of the *Create Nesting Job* dialog. This default value displayed can be edited within the dialog.
- **MultiToolHeadNestingType:** You can choose between *Fixed tool head distance* and *Variable tool head distance* for the multi-tool head nesting type.

The default multi-tool head nesting type option will be displayed in the *Multi Head Options* tab of the *Create Nesting Job* dialog. The default option can be changed within the dialog.

- Fixed tool head distance: Assign '1' to MultiToolHeadNestingType to indicate *Fixed tool head distance* as the default multi-tool head nesting type.
- Variable tool head distance: Assign '2' to MultiToolHeadNestingType to indicate Variable tool head distance as the default multi-Tool head nesting type.

## **Default Machine Configuration**

In the *Machine.ini* file, the <u>DefaultMachineName</u> parameter in the **[DefaultMachine]** section is used to indicate the default machine from the list of machine(s) defined. When <u>MultiHeadFlag is set to '1' and ShowMultiHeadDialog is</u> <u>set to '0'</u>, the nesting job will be executed using <u>default parameter values</u> of the machine assigned in this setting.

#### **Default Configuration at the time of installation**

At the time of installation, the <u>SingleTHMachine</u> is assigned as the <u>default machine</u> (Machine1). This machine contains only a single tool head and thus represents machines used to execute nesting jobs using a single tool head.

If majority of your nesting jobs are done using single tool head machines, then it is highly recommended you leave Machine1 (*SingleTHMachine*) set as the default machine. Using *SingleTHMachine* as the default machine ensures that all nesting job are executed considering a single tool head. This setting effectively keeps the feature of Nesting with multiple tool heads inactive unless another machine is manually chosen by the user in the <u>Multi head options</u> tab of the *Create Nesting Job* dialog.

If a majority of your nesting jobs are executed with single tool head machines, then it is highly recommended that you do not change the machine (*SingleTHMachine*) assigned as the Default Machine in the *Machine.ini* file.

## **Adding/Deleting machines in the Machine list**

For machines at your facility which support nesting with multiple tools, the machine names, machine count, default machine, nesting-related parameter values are defined in the Machine.ini file. You can add and delete the Machine specific information in this file.

#### Adding a new machine to the Machine List

The following example illustrates how to add a new machine to the list of machines in the *Machine.ini* file.

- **Example:** Consider that three machines named 'SUN360', 'RAK100' and 'MARS99' are already listed in the Machine.ini file with 'SUN360' assigned as the default machine. You wish to add a new machine with the name 'SKY444' to this list and assign it as the default machine. The default parameters for this machine are as follows:
  - è Max number of tool heads: 6
  - è Default Rail Direction: Y
  - è Tool Head Distance (in millimeters): **125mm**
  - è Tool Head Distance (in inches): **5 inches**
  - è Default multi-tool head nesting type: Variable tool head distance

#### Solution:

- 1. Open the Machine.ini file.
- 2. Go the section named [*DefaultMachine*] and make the following changes:
  - a. Increment the Machine count by 1.
  - b. Add the machine name of the new machine in the list of machines.
  - c. Assign the new machine as the default machine to be used.

[DefaultMachine] MachineCount =3 Machine1 =SUN360 Machine2 =RAK100 Machine3 =MARS99 DefaultMachineName = SUN360

#### [DefaultMachine]

MachineCount =4 Machine1 =SUN360 Machine2 =RAK100 Machine3 =MARS99 Machine4 = SKY444 DefaultMachineName = SKY444 3. Next, after the *[Machine3]* section in the Machine.ini file, add a new section named *[Machine4]* with the following values assigned to its parameters:

[Machine4] ;Maximum number of tool heads MaxNoToolHeads = 6 ;Rail direction : X or Y RailDirection = Y ;Tool head distance ToolHeadDistance-MM = 125 ToolHeadDistance-INCH = 5 ;Multi head nesting type : Fixed : 1 , Variable : 2 MultiToolHeadNestingType = 2

4. Save the changes made to *Machine.ini* file. The new machine will now be added to the list of machines. In the *Multi Head Options* tab of the *Create Nesting Job* dialog, this machine will be available in the dropdown list of available machines.

#### **Deleting an existing machine from the Machine List**

**Example:** Consider that three machines named 'SUN360', 'RAK100' and 'MARS99' are already listed in the Machine.ini file with 'SUN360' assigned as the default machine. You wish to delete the machine named 'SUN360' and assign 'MARS99' as the default machine.

#### Solution:

- 1. Open the Machine.ini file.
- 2. Go the section named [*DefaultMachine*] and make the following changes:
  - a. Decrement the Machine count by 1.
  - b. Delete the machine 'SUN360'.
  - c. Reassign the remaining machines in chronological order.

[DefaultMachine] MachineCount =3 Machine1 =SUN360 Machine2 =RAK100 Machine3 =MARS99 DefaultMachineName = SUN360

[DefaultMachine] MachineCount =2 Machine1 =RAK100 Machine2 =MARS99 DefaultMachineName = MARS99

[DefaultMachine] before changes [DefaultMachine] after changes

3. Next, delete the entire [Machine1] section in the

Machine.ini file which originally listed the default parameter values for the deleted machine.

- 4. Rename the [Machine2] section as [Machine1] and the [Machine3] section as [Machine2].
- 5. Save the changes made to Machine.ini file.

### Glossary

= 4 && typeof(BSPSPopupOnMouseOver) == 'function') BSPSPopupOnMouseOver(event);" class="BSSCPopup" onclick="BSSCPopup('Angle\_List.htm');return false;">Angle List

<u>= 4 && typeof(BSPSPopupOnMouseOver) == 'function') BSPSPopupOnMouseOver(event);"</u> class="BSSCPopup" onclick="BSSCPopup('Step\_angle.htm');return false;">Step Angle</u>

<u>= 4 && typeof(BSPSPopupOnMouseOver) == 'function') BSPSPopupOnMouseOver(event);"</u> class="BSSCPopup" onclick="BSSCPopup('Glossary\_Part\_Model.htm');return false;">Part\_model

<u>= 4 && typeof(BSPSPopupOnMouseOver) == 'function') BSPSPopupOnMouseOver(event);"</u> class="BSSCPopup" onclick="BSSCPopup('Glossary\_Assembly\_Model.htm');return false;">Assembly model

= 4 && typeof(BSPSPopupOnMouseOver) == 'function') BSPSPopupOnMouseOver(event);"

class="BSSCPopup" onclick="BSSCPopup('Glossary\_Grain\_Direction.htm');return false;">Grain Direction
= 4 && typeof(BSPSPopupOnMouseOver) == 'function') BSPSPopupOnMouseOver(event);"

class="BSSCPopup" onclick="BSSCPopup('Glossary\_Preferential\_Island\_Filling.htm');return false;">Preferential\_Island\_Filling

<u>= 4 && typeof(BSPSPopupOnMouseOver) == 'function') BSPSPopupOnMouseOver(event);"</u> class="BSSCPopup" onclick="BSSCPopup('Glossary\_Assembly\_Template.htm');return false;">Assembly Template

<u>= 4 && typeof(BSPSPopupOnMouseOver) == 'function') BSPSPopupOnMouseOver(event);"</u> class="BSSCPopup" onclick="BSSCPopup('Glossary\_Unique\_Sheet\_Forecaster.htm');return false;">Unique sheet forecaster

<u>= 4 && typeof(BSPSPopupOnMouseOver) == 'function') BSPSPopupOnMouseOver(event);"</u> class="BSSCPopup" onclick="BSSCPopup('Glossary\_Combinatorial\_Sheet\_Forecaster.htm');return false;">Combinatorial\_Sheet\_forecaster

<u>= 4 && typeof(BSPSPopupOnMouseOver) == 'function') BSPSPopupOnMouseOver(event);"</u> <u>class="BSSCPopup" onclick="BSSCPopup('Glossary\_Max\_Nesting\_Time.htm');return false;">Max nesting</u> <u>time</u>

<u>= 4 && typeof(BSPSPopupOnMouseOver) == 'function') BSPSPopupOnMouseOver(event);"</u> class="BSSCPopup" onclick="BSSCPopup('Glossary\_Fix\_Component.htm');return false;">Fix Component</u>

## Function of DefaultValues.ini File

This file is used to assign default values of part, sheet and nesting data parameters. Certain default settings which cannot be set in the *Create Nesting Job* dialog are set from the *DefaultValues.ini* file.

# The DefaultValues.ini initialization file allows you edit the settings of the following:

- Defining default part quantity
- <u>Setting default sheet quantity and thickness</u>
- Defining default dimensions for Custom sheet
- Defining default part-to-part distance and part-to-sheet distance
- <u>Settings for enabling/disabling the 'Preferential Hole Filling' feature</u>
- <u>Settings for 'Create separate assembly' feature</u>
- <u>Settings for 'Automatically select sheet' feature</u>
- <u>Settings for enabling/disabling the 'Flattening sheet metal part' option</u>
- <u>Settings for 'Fix component' option</u>
- <u>Settings for Inventory Forecasting (IFM) module's method</u>