



USER GUIDES



EsaBend3DM User Guide

Welcome to the **EsaBend3DM** user guide.

Should you have any questions, please contact **EsaBend3DM** support at service@esautomation.com.

EsaBend3DM is a user-oriented application for offline press brake simulation and programming.

These are some of the **EsaBend3DM** features:

- Direct part transfer from 3D CAD packages and import of industry-standard 3D and 2D files
- Automatic calculation for tooling, collision-free bend sequencing, and finger positions
- Graphic control of automatic calculations
- 3D simulation with collision detection
- Native NC code creation for driving machine controls
- Production-oriented job reports
- Flat part export for accurate cutting dimensions of blanks
- Automatic batch processing using pre-configured rules, including strategies for processing failures

EsaBend3DM helps your overall fabrication abilities in the following ways:

- Collision detection ensures smooth production startup for new parts
- Offline programming minimizes machine down time
- Easy porting of parts between machines allows shop-floor production optimization
- Production-ready tooling and bend sequences require fewer experts on hand
- Fully automatic batch processing reduces time spent on part preparation

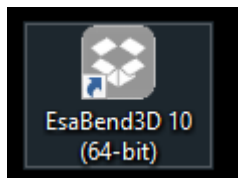
1 Initial Configuration

After installing **EsaBend3DM**, you can configure it to match your needs, as described in this section.

1.1 Opening EsaBend3DM for the First Time

The first time you open **EsaBend3DM** you must run it as an Administrator, like this:

1. Right-click the **EsaBend3DM** shortcut on the desktop.

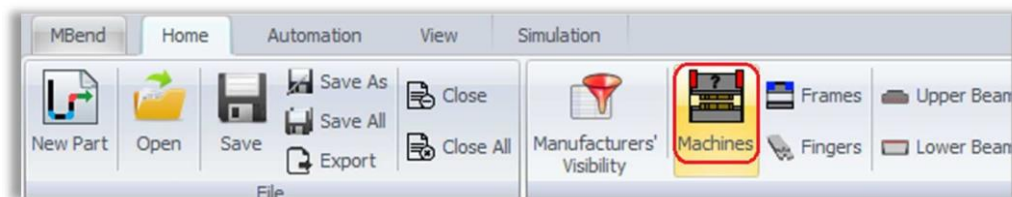


2. Select the **Run as Administrator** option:

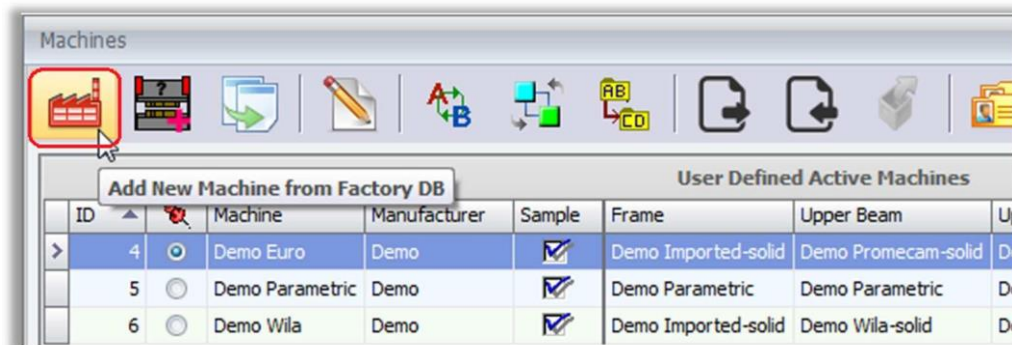
1.2 Adding Your Machine

To add a machine:

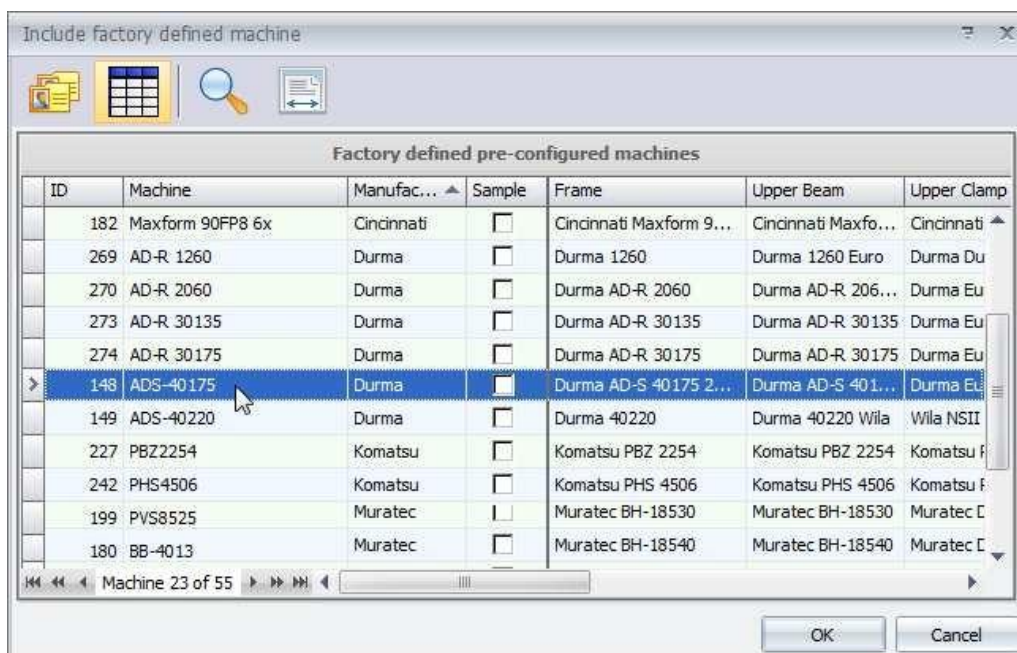
1. Click the **Home** tab => **Machines**:



2. The **Machines** dialog box opens. Click **Add New Machine from Factory DB**:

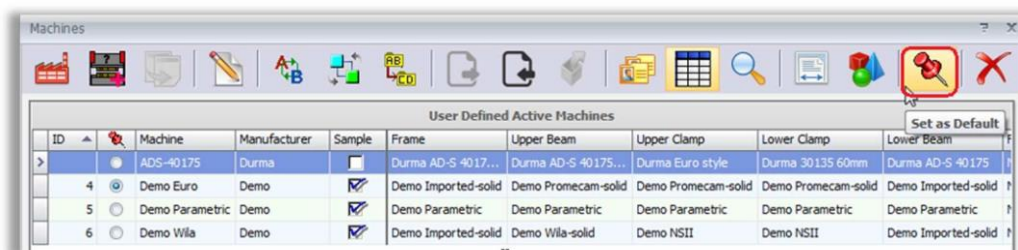


- A list of available machines is displayed. Select your machine, e.g., **ADS-40175** as shown below, and click **OK**:

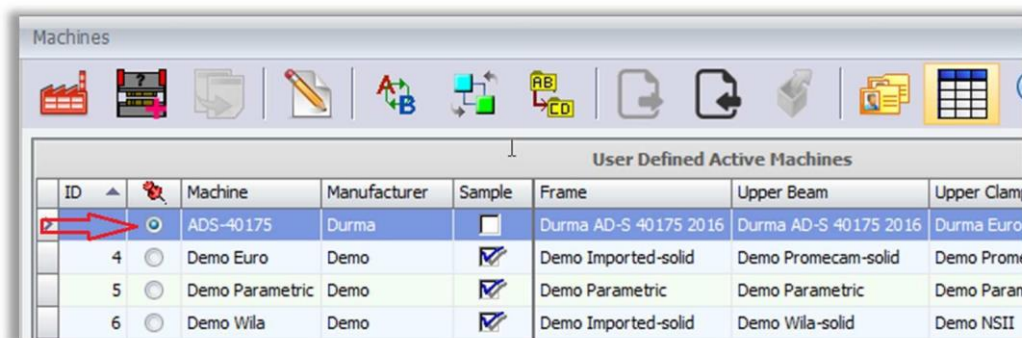


EsaBend3DM adds your machine to the list of active machines.

- To make this the default machine when opening and creating new parts, select the machine and click **Set as Default**:



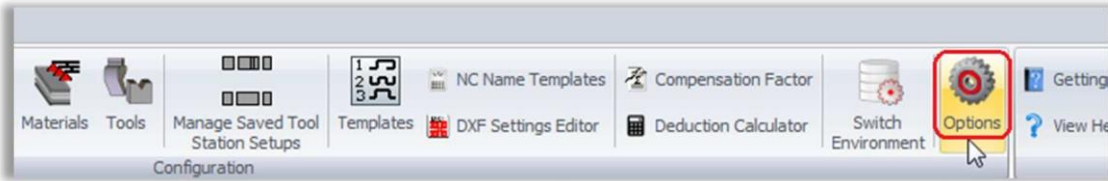
The green button indicates that this is the selected machine:



- Click **OK**.

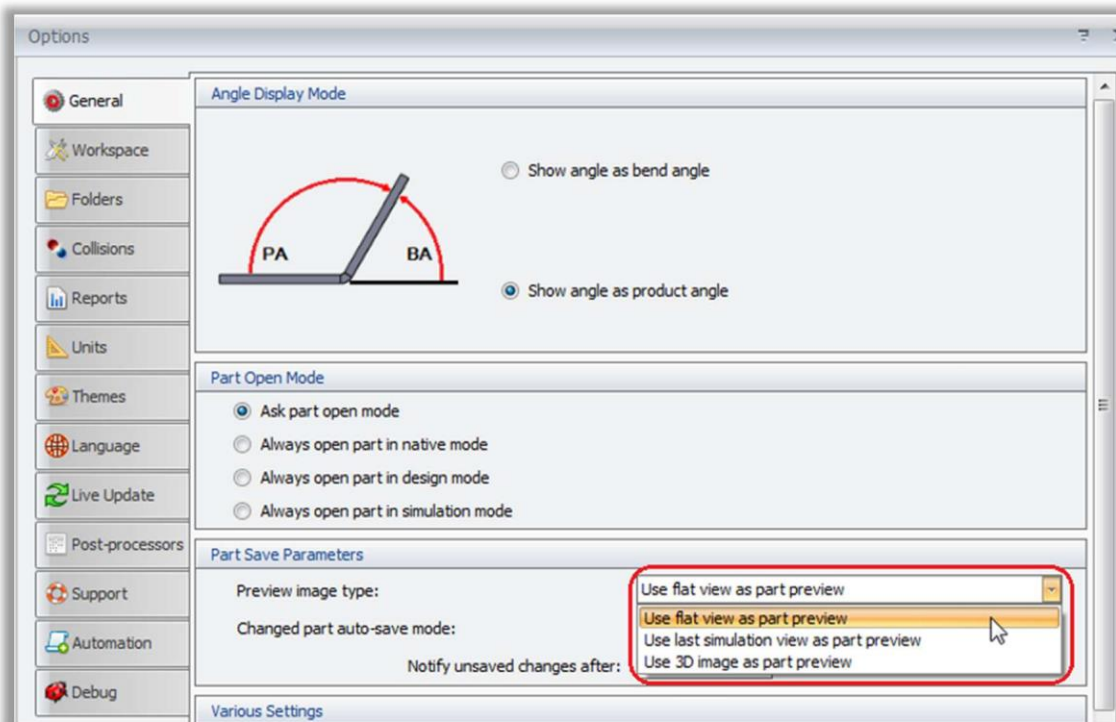
1.3 Setting General Options

Configure general settings by clicking **Options**:



1.3.1 Setting the Saved Preview Option

This option in the **General** tab determines how the **EsaBend3DM** file preview looks when saved:



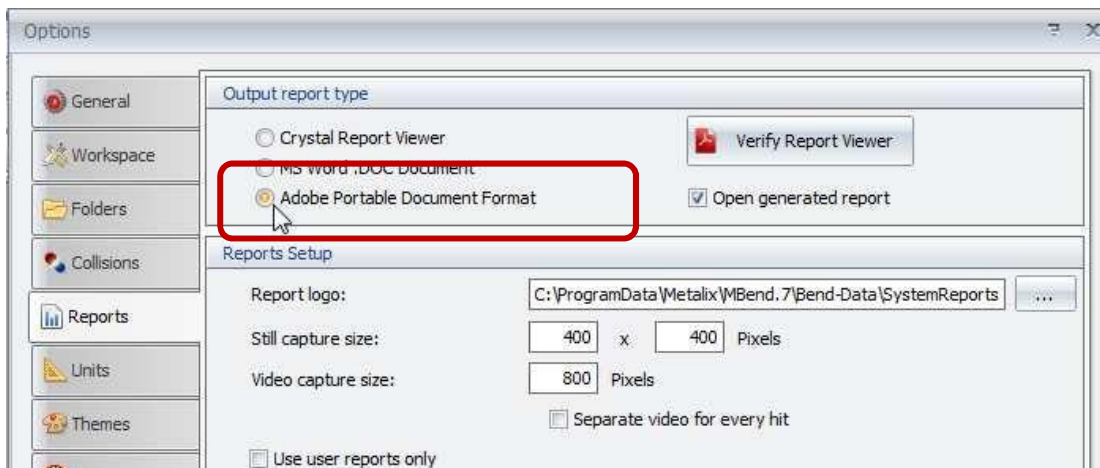
- See more about this option in the Help file in **EsaBend3DM Configuration => Options Dialog => General Options => Part Save Parameters => Preview Image Type**.

1.3.2 Setting Report Options

You can configure the **EsaBend3DM** report setup in the **Reports** tab.

1.3.2.1 Setting the Default Output Format

It is recommended you set the report output to **PDF**:

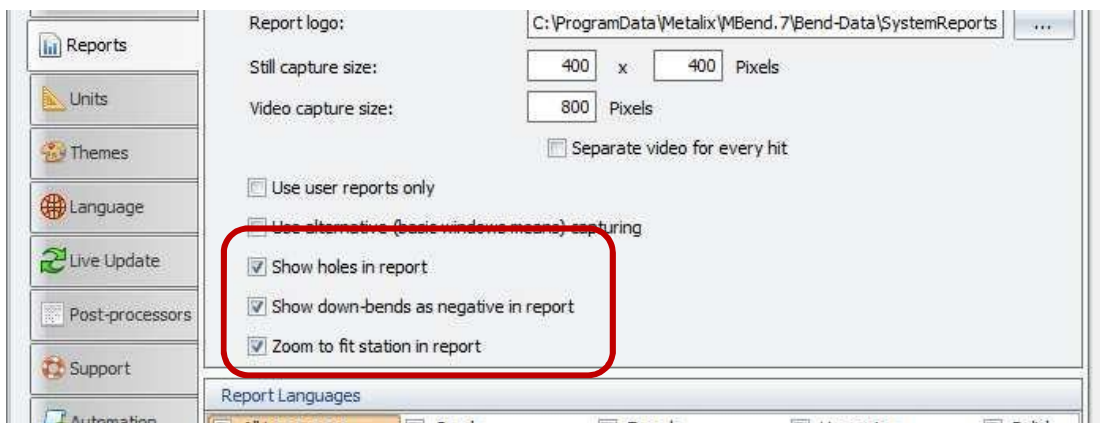


1.3.2.2 Adding a Company Logo

You can change the **Report Logo**, locating the file using the Browse button .

1.3.2.3 Setting Holes in Reports

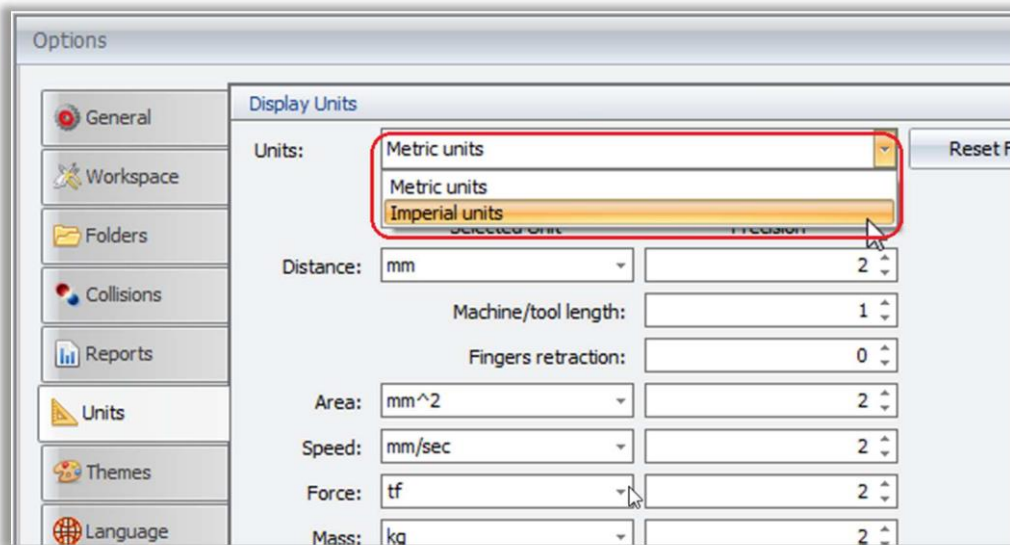
Use these options to display or hide holes, angle display, and zooming into the reports:



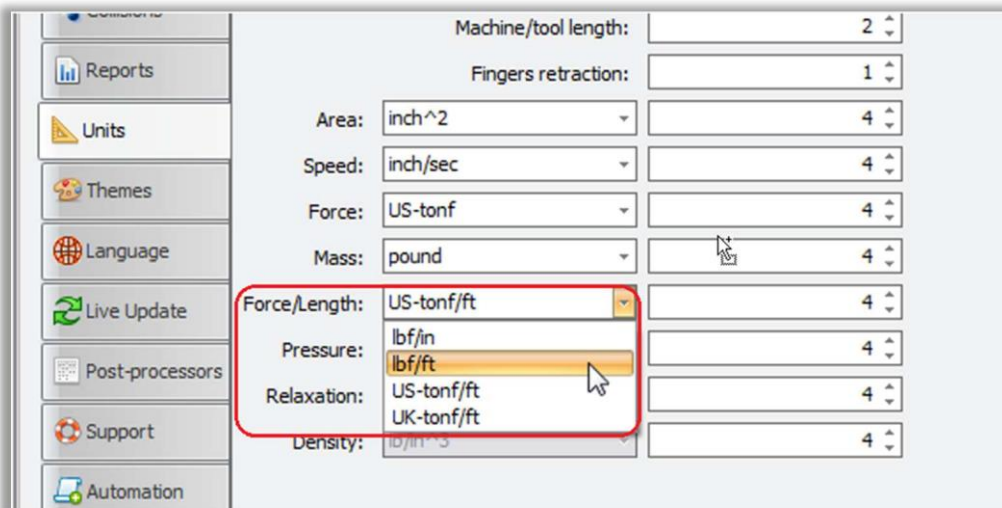
1.3.3 Setting Display Units

Configure how **EsaBend3DM** displays units for length, force, etc. in the **Units** tab:

6. Select between the **Metric\Imperial** systems:



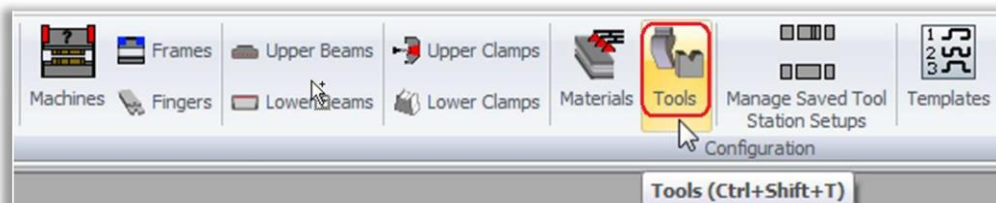
7. Set the unit of measurement you want for each category; e.g., the **Force/Length** units:



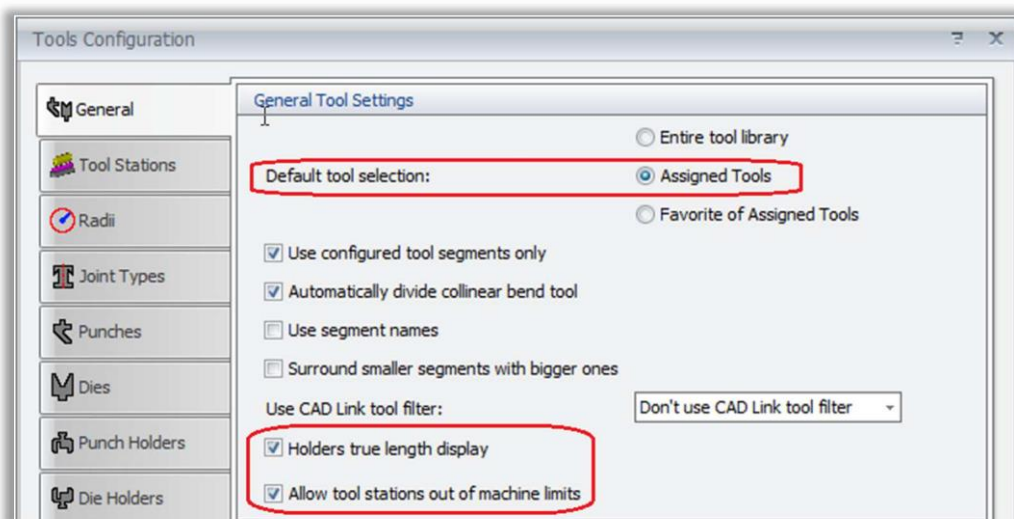
- You can set a different **Precision** for each category, which is the number of digits displayed after the decimal point.

1.4 Setting Tool Options

Configure tool-related options by clicking **Tools**:

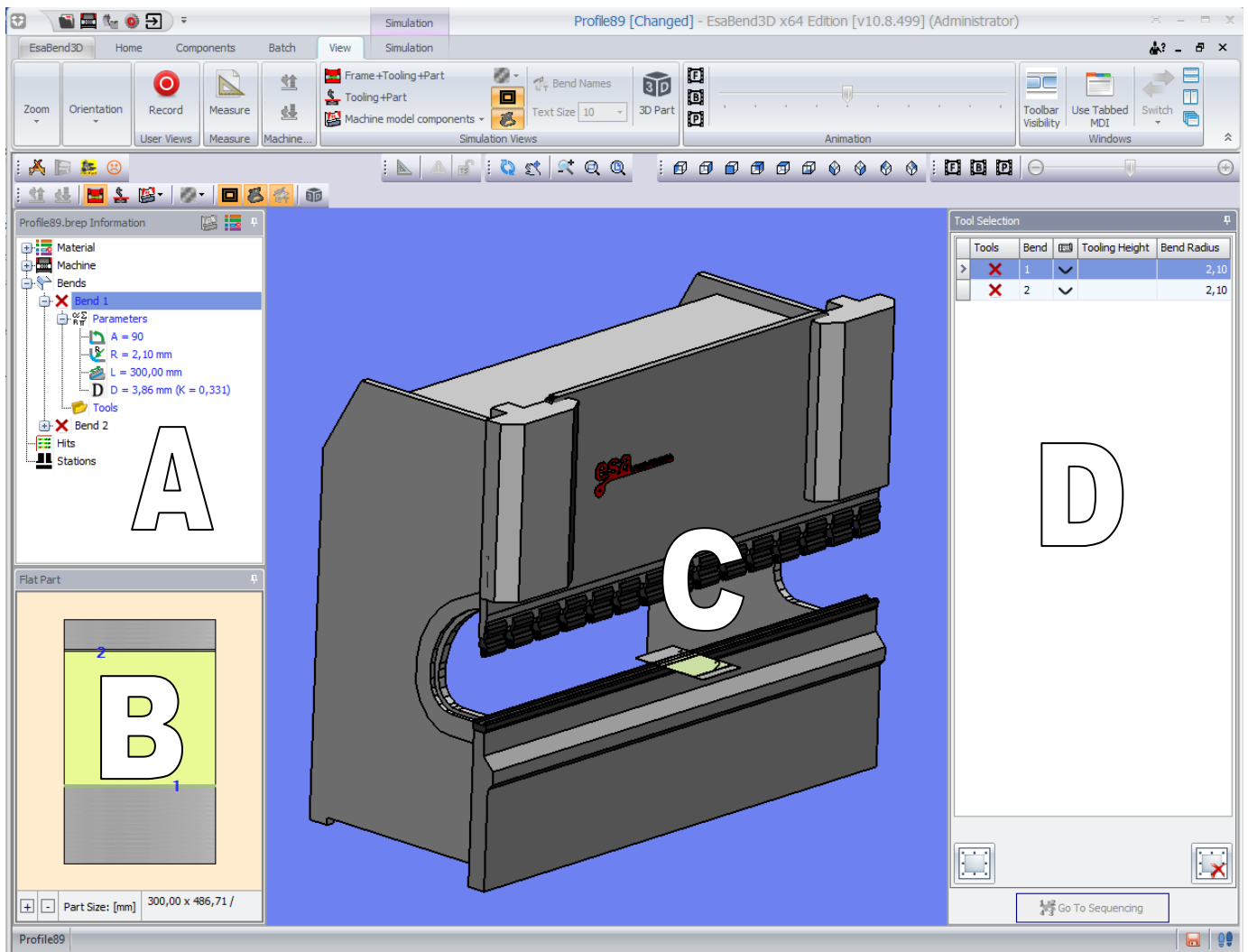


In the **General** tab, set these recommended options:



2 Simulation Mode

This section explains the options available when using **EsaBend3DM** in **Simulation** mode, including the



Simulation tab, the areas of the screen, and the changing views.

A Part Information panel – All the information about the part and the machine.

B Flat Part panel – A view of the flattened part and the bend numbers. The active bend is colored green by default.

TIP: You can change the default in **Options=>Themes tab=>Drawing and Info Colors=>Selected Bend**.

C Part display area – Visual of the machine, tools, and the bending simulation.

D Workflow panel – Changes according to the workflow stage that is currently active, i.e. **Tooling**, **Sequencing**, **Simulation** or **Output** (in this case, the tooling stage).

2.1 Simulation Tab

The icons at the top of the **EsaBend3DM** window allow you to access many **EsaBend3DM** features:



The explanations in this section are divided into sections according to the name of each toolbar.

2.1.1 Switch To Toolbar

The **Switch To** toolbar allows you to change from one operation mode to another:



- Send the part to **Design** mode. Available only if the part was designed in **EsaBend3DM**.
- Export the part's (unfolded) flat to **cncKad**.
- Export to a **Viewer** for display on the machine control. This option is only available for some machines.

2.1.2 Actions Toolbar

The **Actions** toolbar lets you reset part definitions and set collision options:



2.1.2.1 Reset

This action deletes all simulation data from the part – tooling, sequencing, finger positions, and stations – and recalculates its geometry to match the way it was before tooling.

2.1.2.2 Reset (Current) Workflow Stage

This action deletes the current stage's information and recalculates it.

If you click this icon during any one of the simulation stages, any manual changes you made in this stage are erased and the part is reset to the beginning of this stage.

2.1.2.3 Configure Collision Tests

Configure which collisions are tested during different simulation stages:

- **Manual Sequence + Fingers** – collisions tested in the sequencing and fingers stage.
- **Simulation** – collisions tested in the simulation stage.

These settings apply to the current part, during the manual collision testing. You can define them differently in the [Auto Tools Selection dialog box \(in Full Mode\) for use during automatic testing](#).

You can also set these options globally for all parts, in the **Options=>Collisions tab**.

2.1.3 Workflow Toolbar

The **Workflow** toolbar icons move the part between the workflow stages.

🟢 **NOTE:** The icons become active only when the part is ready for that stage. For example, **Output** is available only after the part has been simulated in the **Simulation** stage.



2.1.3.1 Tooling

This icon moves the part to the [Tooling](#) stage.

2.1.3.2 Sequencing

This icon moves the part to the [Sequencing](#) stage.

2.1.3.3 Fingers

This icon moves the part to the [Fingers](#) stage.

2.1.3.4 Simulation

This icon moves the part to the [Simulation](#) stage.

2.1.3.5 Output

This icon brings the part to the [Output](#) stage.

2.1.4 Machine Manipulations Toolbar

The **Machine Manipulations** toolbar options allow you to move the machine's beam down towards the part or back up to the default position without performing additional simulation:



🔔 **NOTE:** These options are only available in the [Simulation](#) stage.

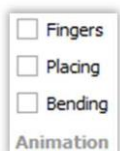
Only one option is active at a time.

These options help you decide how the punch is positioned just before it starts the pressing action.

🔔 **TIP:** In the **Sequencing** or **Simulation** stages, if you move the beam down then click **Play Current Hit Forward**, the beam will rise to the up position before **EsaBend3DM** simulates the hit.

2.1.5 Animation Toolbar

The **Animation** toolbar options allow you to determine what is visible when animating the bends in the [Simulation](#) stage.



If no options are selected, all you see is the part and the bending tools.

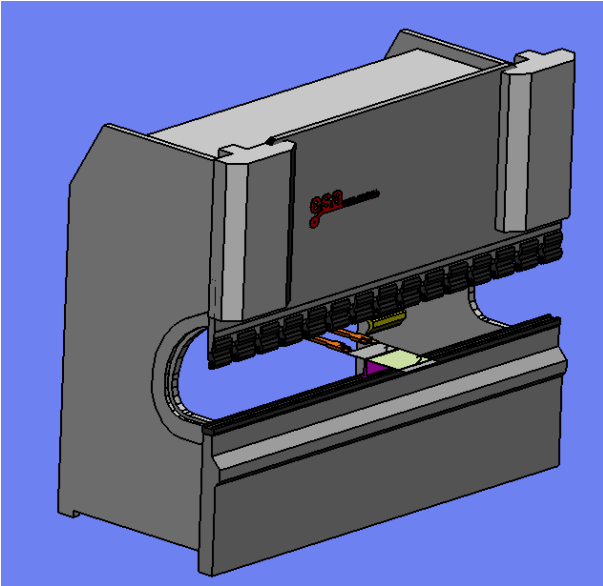
2.1.6 Simulation Views Toolbar

The **Simulation Views** toolbar options switch between different views of the part.

🔔 **NOTE:** These views do not change the tooling or the machine configuration, they only show or hide elements of them.



2.1.6.1 Frame+Tooling+Part

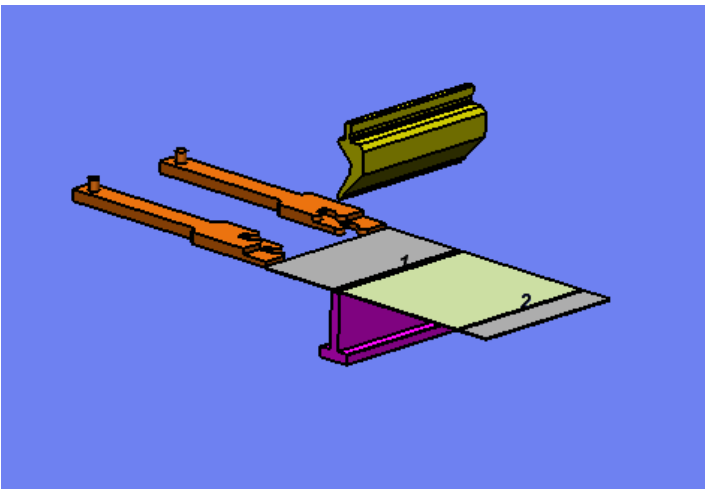


This view shows the part, tooling, fingers, and complete machine:

In this view the simulation shows only the beginning and end of the hits, without the intervening movement.

 **NOTE:** If the hit includes a retraction movement, **EsaBend3DM** simulates it as well.

2.1.6.2 Tooling+Part



This view shows the part, the tooling, and the fingers:

When you select this option, you can run a more detailed animation in the simulation stage and change the simulation [speed](#).

2.1.6.3 Transparency

When you click the **Transparency** option, you can select which components (frame/fingers/lower beam/upper beam/lower clamp/upper clamp/upper tools/lower tools) are transparent or fully visible. You define the [transparency](#) percentage in the **Options** -> **Workspace** tab.

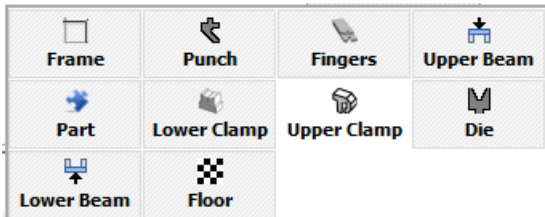


2.1.6.4 Display Options

By default, only two display options are shown at a time. To see all the options, click the More arrow  :



Select from amongst the nine items (fingers, upper beam, etc.) to show or remove them from the display.



 **NOTE:** Hiding the frame does **not** switch to the **Tooling+Part** view.

2.1.6.5 Machine Outline

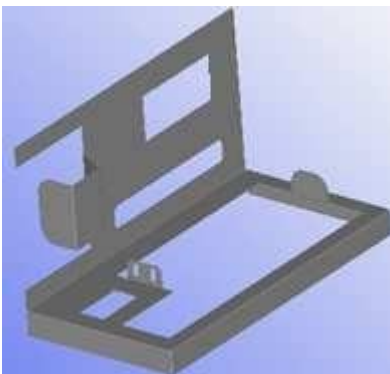
This option shows the outline of the machine components, marking it with a black line.

2.1.6.6 Mark Holes

This option marks the positions of holes on the part.

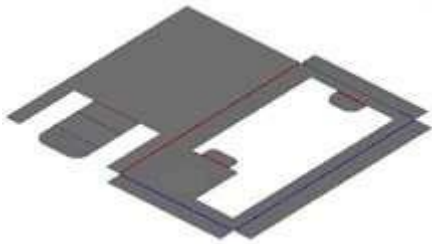
If a hole touches on a bend, it is always displayed; only holes that have no bends are marked or hidden.

When a part looks like this:

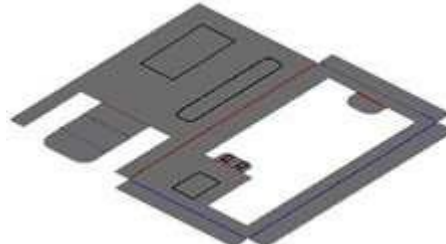


Then this is what you see:

Without hole marking:



With hole marking:

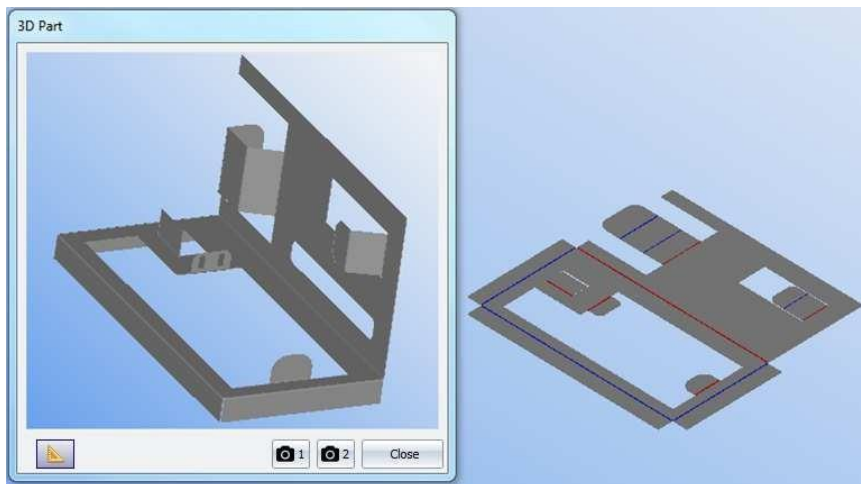


2.1.6.7 Bend Names

This option shows the bend numbers on the visual display of the part.

2.1.6.8 3D Part

This option opens a window with a 3D view of the folded part:



You can move and resize this window independently of the main **EsaBend3DM** window. Options:

-  **Measure** – Measure the part's size, useful for QA.
-   **Snapshots** – Take two snapshots of part details to use in the Setup Report.
-  **TIP:** You can rotate the part and zoom in and out in this 3D window as you do in the simulation window.

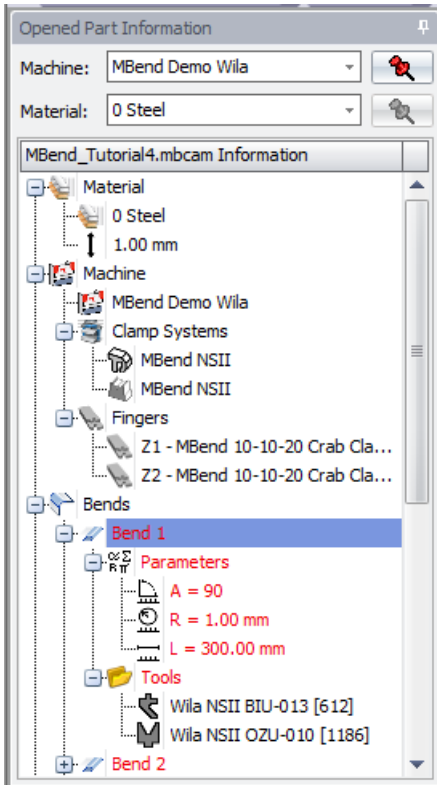
2.1.7 Simulation Speed Toolbar

This slider controls the speed of the moving simulation in the sequence and simulation stages. This option is only visible when the tooling stage is complete and only has an effect when one of the items in the **Simulation** tab => **Animation** group is selected.

Available speeds are 1 through 10.

2.2 Part Information Panel

This panel on the left of the screen displays information about the current part's machine configuration, clamps, fingers, bends, and hits:



2.2.1 Machine Selection

Use this dropdown menu to switch between machines.

⚠ Switching between machines may result in a loss of simulation information.

If you have more than one machine, you can determine [which machine is displayed first](#) (as the default). To do this, highlight the preferred machine and click the pin icon .

2.2.2 Material Selection

Use this dropdown list to switch between materials.

⚠ Switching between machines may result in a loss of simulation information.

If you have more than one material, you can determine [which material is displayed first](#) (by default). To do this, highlight the preferred material and click the pin icon .

2.2.3 Material Information

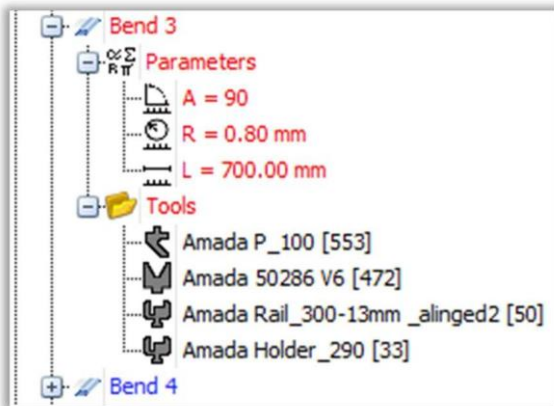
This branch shows type and thickness of the current part's material.

2.2.4 Machine

This branch shows information about the current part's machine components; specifically, the clamps and fingers.

2.2.5 Bends

This branch shows a list of the part's bends with detailed information about each one:



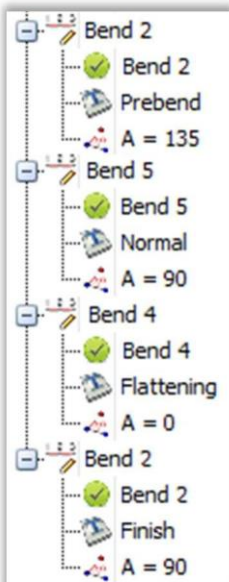
Details of the bend's geometry:

- **A** = angle – given as a design or product angle, depending on the [Angle Display Mode setting](#).
- **R** = radius – units taken from the [Display Units](#).
- **L** = length – units taken from the **Display Units**.

[Types of bends are described here.](#)

2.2.6 Hits

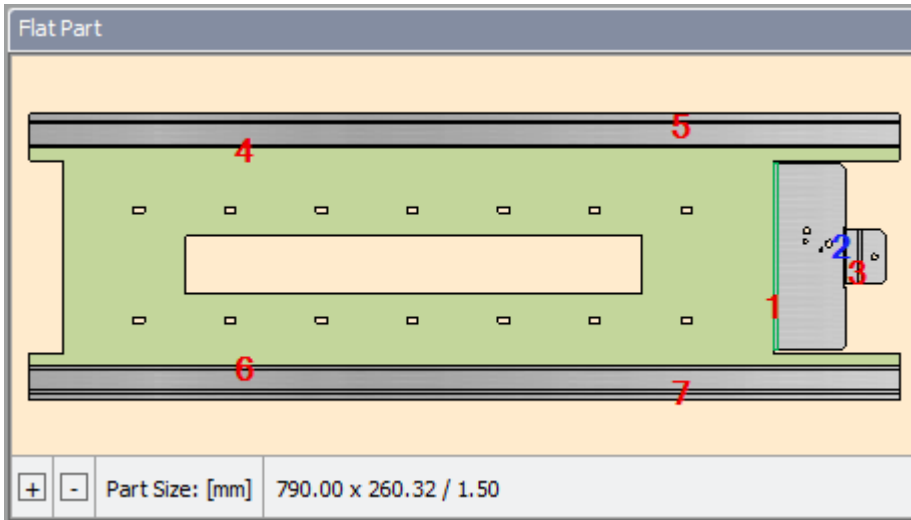
This branch shows a list of the part's hits with detailed information about each one. There are several types of hits, depending on their function in the sequence:



- **Prebend** – The hit is part of a number of hits that are needed to perform a bend, for example the prebend of a hemming action or a split bend.
- **Normal** – The hit is unchanged from its design, matching its bend.
- **Flattening** – The hit is the flattening action of the bend.
- **Finish** – The hit is the final action that closes a bend to its design angle.

2.3 Flat Part Panel

This panel (positioned by default on the bottom left of the screen) shows the (unfolded) flat together with information about it:



You can change the view of the flat using the mouse:

- Zoom in and out by rolling the wheel.
- Pan by clicking the part and moving the mouse.
- Zoom all with a double click.

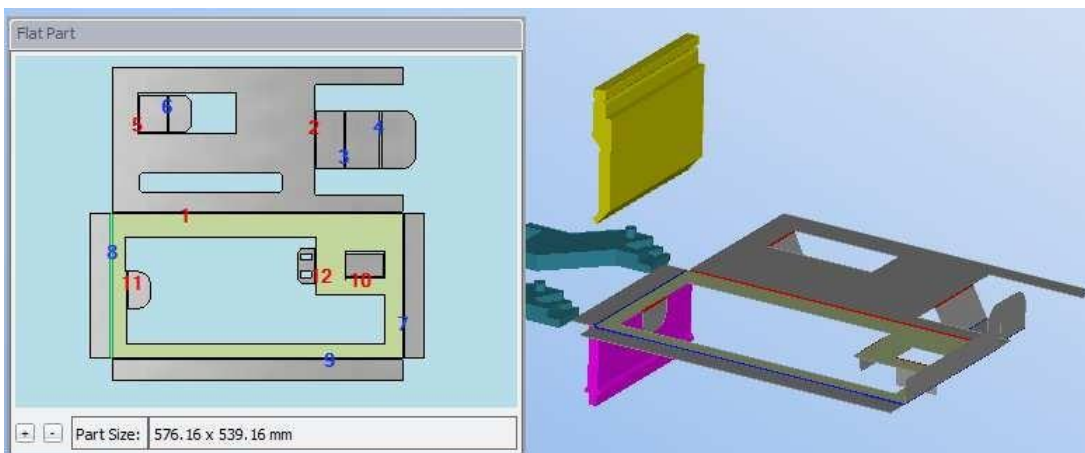
2.3.1 Bend Names

Each bend is designated by a name. Up-bends have one color and down-bends have another color.

- **NOTE:** The names can change when using the [Rename Hits By Order](#) function.
- **TIP:** You can change these colors. In **Home** menu => **Options**, **Themes** tab => **Drawing and Info Colors** tab, change the values for **Bend Up** and **Bend Down**.

2.3.2 Base Flange

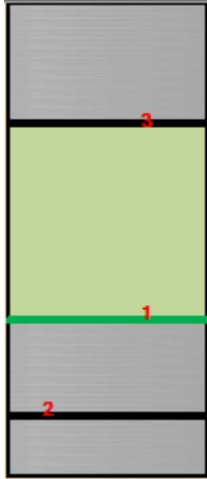
One of the flanges on the flat is a different color from the rest to allow the 3D part in the main window to be oriented to the flat representation:



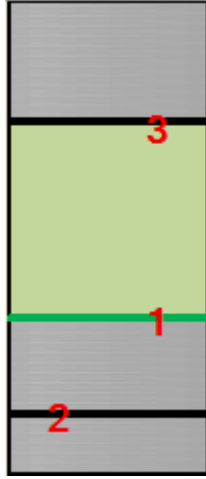
2.3.3 Font Size

The size of the bend names' font is relative to the size of the part. On a large part the names may be small, making them difficult to read. You can use the   icons to enlarge or reduce the font size.

Before:



After:



2.3.4 Part Size

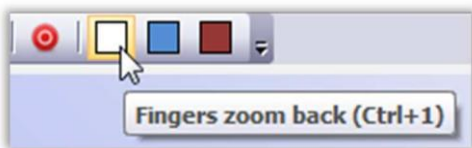
This shows the dimensions of the part's bounding rectangle and material thickness.

2.4 Part Display Area

This area shows the 3D part with its machine, tools, and fingers, depending on the [Simulation Views](#) settings and the workflow stage. You can manipulate the image using the [Orientation](#) and [Zoom](#) toolbars and your mouse wheel button.

2.4.1 Record User View Icon

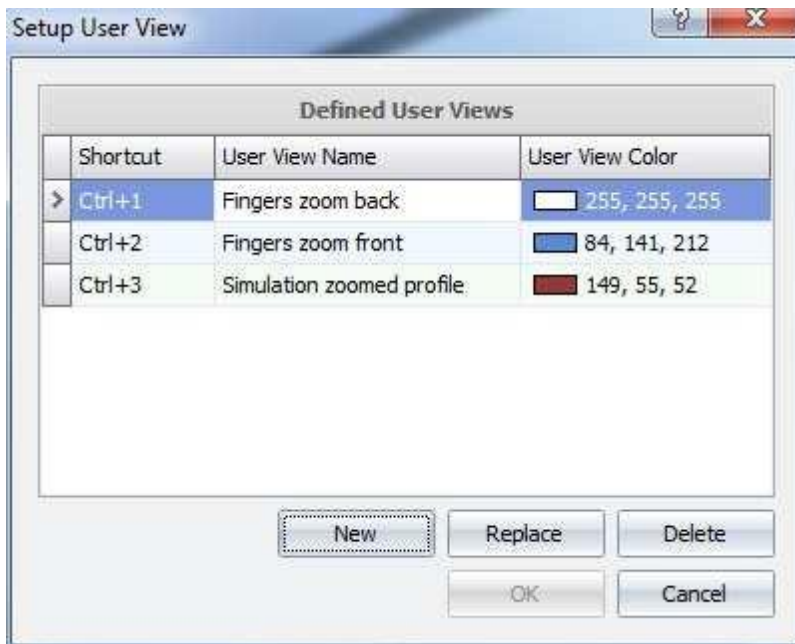
You can save a new view of the graphical representation, giving it a name and a color. The new color appears on the **Orientation** toolbar, allowing you quick access to the saved views:



To add a view:

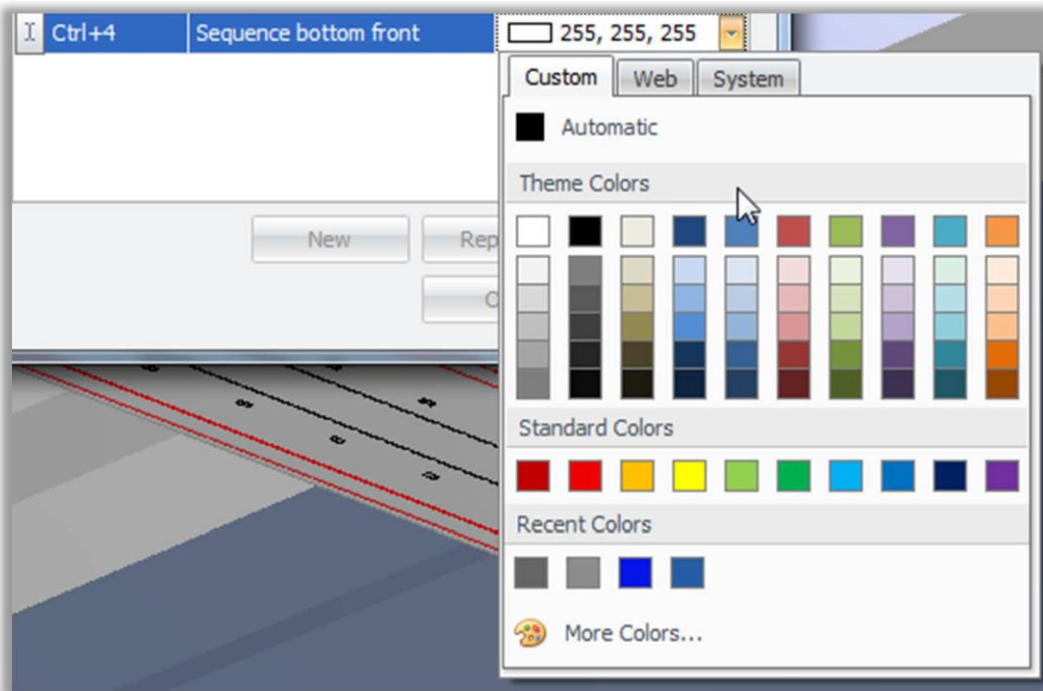
8. Rotate and zoom the part to the view you wish to capture.
9. Click the **Record User View** button.

10. The **Setup User View** dialog box opens, allowing you to add the view (as **New**) or to **Replace** an existing view:



EsaBend3DM automatically assigns a shortcut to each view.

When you select **New** you must type a name for the view and select the color that will identify it on the toolbar:



2.4.2 Measure Icon

To measure the size of the part:

11. Click the **Measure** icon .
12. Click a point on the part. You will see a small blue circle at that point.
13. Click another point. Another small blue circle appears.

The **Measure** dialog box opens with all the measurements:

Distance	250.51
Point 1	X:-23.96, Y:111.00, Z:1,596.1
Point 2	X:-274.46, Y:113.00, Z:1,596.
Delta X	250.50
Delta Y	2.01
Delta Z	0.00

All values are in mm

2.4.3 Lock Tool Stations Icon

You can lock the current tooling configuration so that **EsaBend3DM** does not make any changes to it. Do this by clicking the **Lock Tool Stations** icon .

You can assign a predefined tooling setup when you open the part or during the tooling stage; or you may simply want to save the tooling setup you have defined so far.

The tooling setup includes

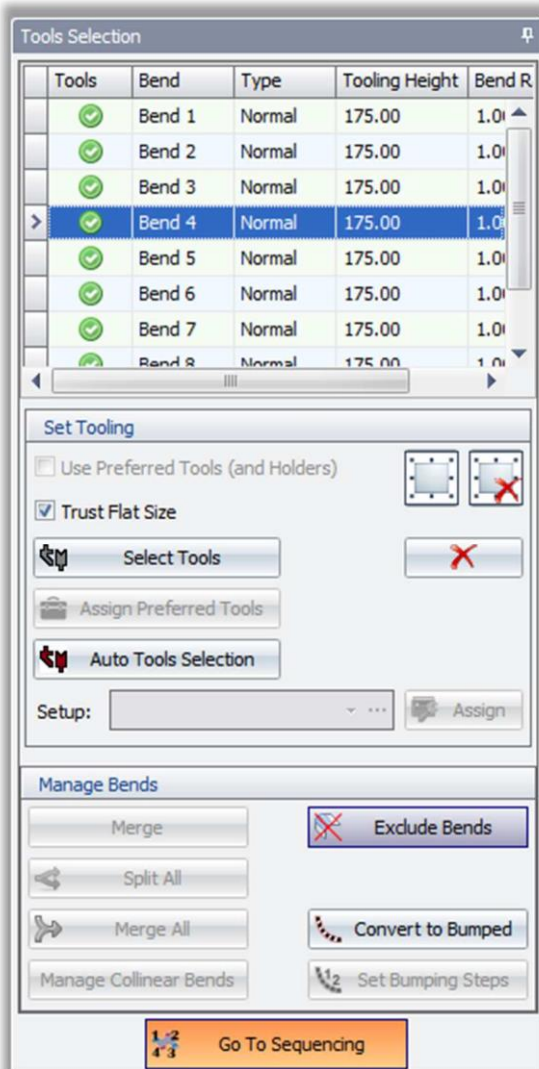
- Position of the tools on the machine
- Segmentation
- Tool rotation

EsaBend3DM automatically places the station in the center of the machine. This means that when you apply the tooling setup to a different machine, the position of the station may change, depending on the length of the machine. When there is more than one station, **EsaBend3DM** does not move them.

2.5 Tooling

This is the first stage of the workflow.

In this stage you set the tooling for the part, define how to handle collinear bends, and exclude bends from the sequence:



You cannot move on to the next stages ([sequencing](#), [finger stops](#), [simulation](#), and [output](#)) until you have selected the tools.

2.5.1 Bend List

This section lists the bends in this part, giving information about each one. You can read about the [types of bends](#).

2.5.1.1 Bend Tooling Icons

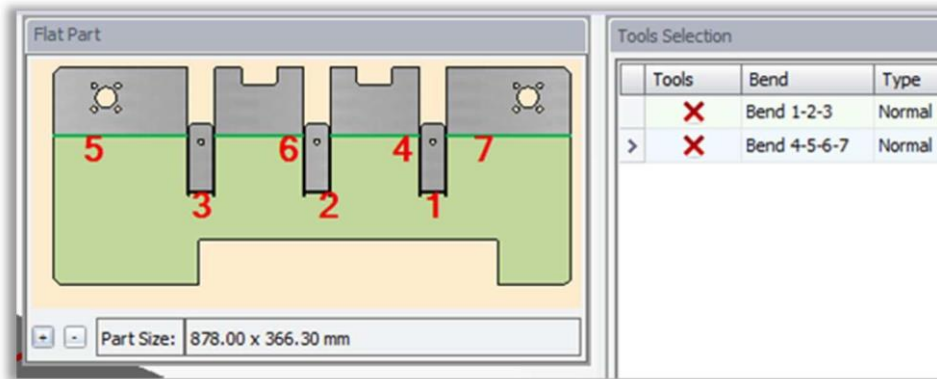
The icons beside each bend may be one of the following:

- – This bend has tooling assigned to it.
- – This bend does not have tooling assigned to it.
- – A [bumping radius](#) bend with tooling.
- – A bumping radius bend without tooling.

-  – This bend is shorter than the [minimum bend length](#). It cannot be assigned tooling and will not be included in any sequence.
-  – An [excluded](#) bend. It will not be visible in the **Sequencing** stage.

2.5.1.2 Bend Concatenation

When bends are named with a sequence of numbers, such as **Bend 1-2-3** or **Bend 4-5-6-7**, it means these are [collinear bends](#):



2.5.1.3 Bend Types

There are several types of bends:

- **Normal** – A standard bend.
- **Hemming** – A [hemming](#) bend, which translates into two distinct hits – prebend and flattening.
- **Bumping** – A [bumping radius](#) bend, made by a series of shallow-angled hits designed to create a smooth result.
- **Excluded** – This bend is not performed on the press brake and is excluded from the hit sequence. Typically, these are
 - Performed beforehand in a turret press.
 - Performed in a different machine setup, either before or after the current one.

2.5.1.4 Tooling Height

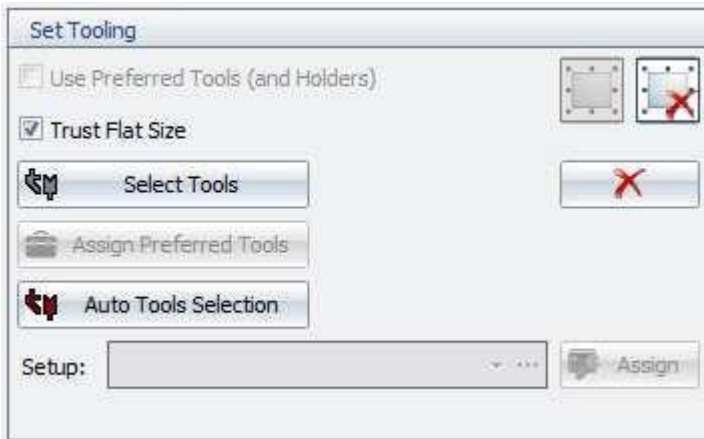
The combined working height of all the tools assigned to this bend.

2.5.1.5 Bend Radius

Read about the [impact of tooling](#).

2.5.2 Set Tooling

Before a bend can be inserted into a sequence, it must be assigned tooling.



This can be done in either of these ways:

- Manually via the **Select Tools** button.
- Automatically via the **Auto Tools Selection** button.

2.5.2.1 Impact of Tooling on the Part's Flat Size

The radius of a bend is ([usually](#)) determined by the width of the die, and this affects the compensation needed to assign to the part's flat in order to achieve the folded dimensions you want.

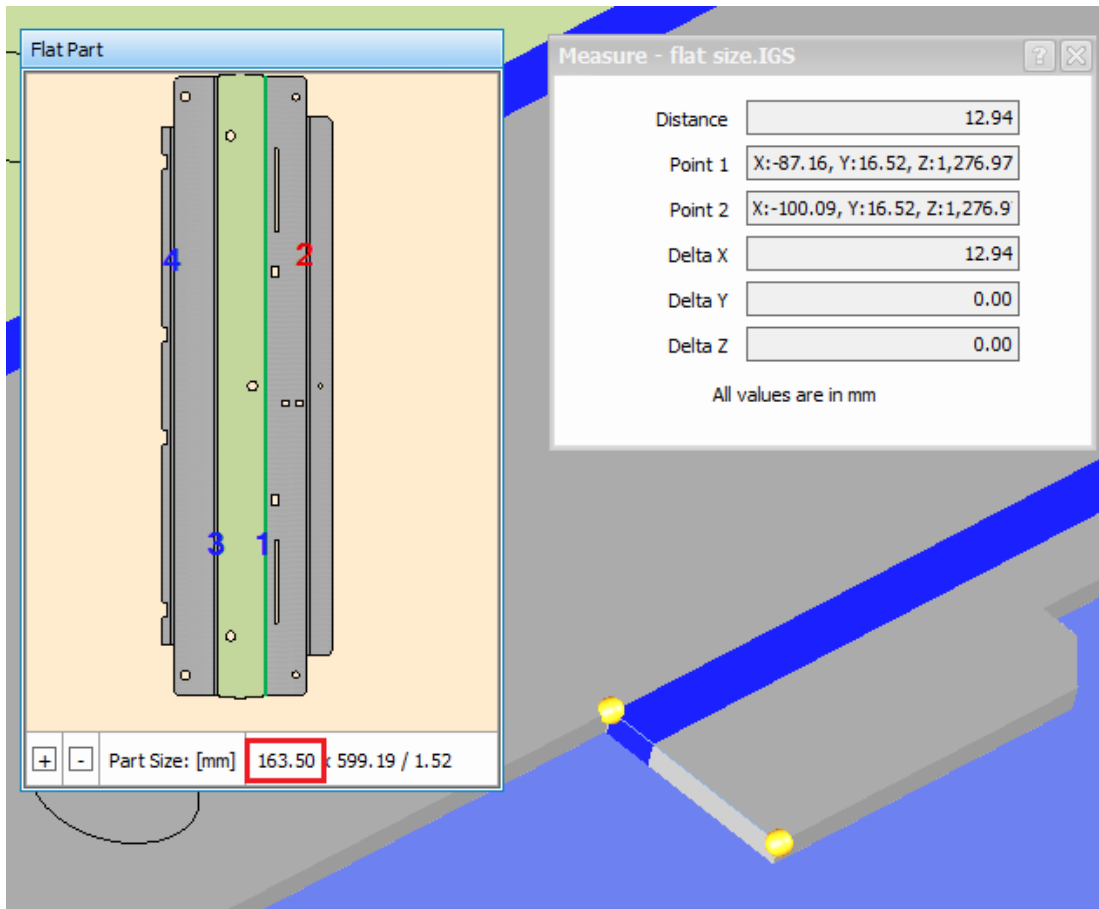
When **EsaBend3DM** imports a part, each bend comes with a specific radius, and the compensation is determined from this radius.

Ideally, the die for the bending gives the same [result radius](#) as the [design radius](#), thus preserving the dimensions of the flat. There is an exception when you use the [Trust Flat Size](#) option.

However:

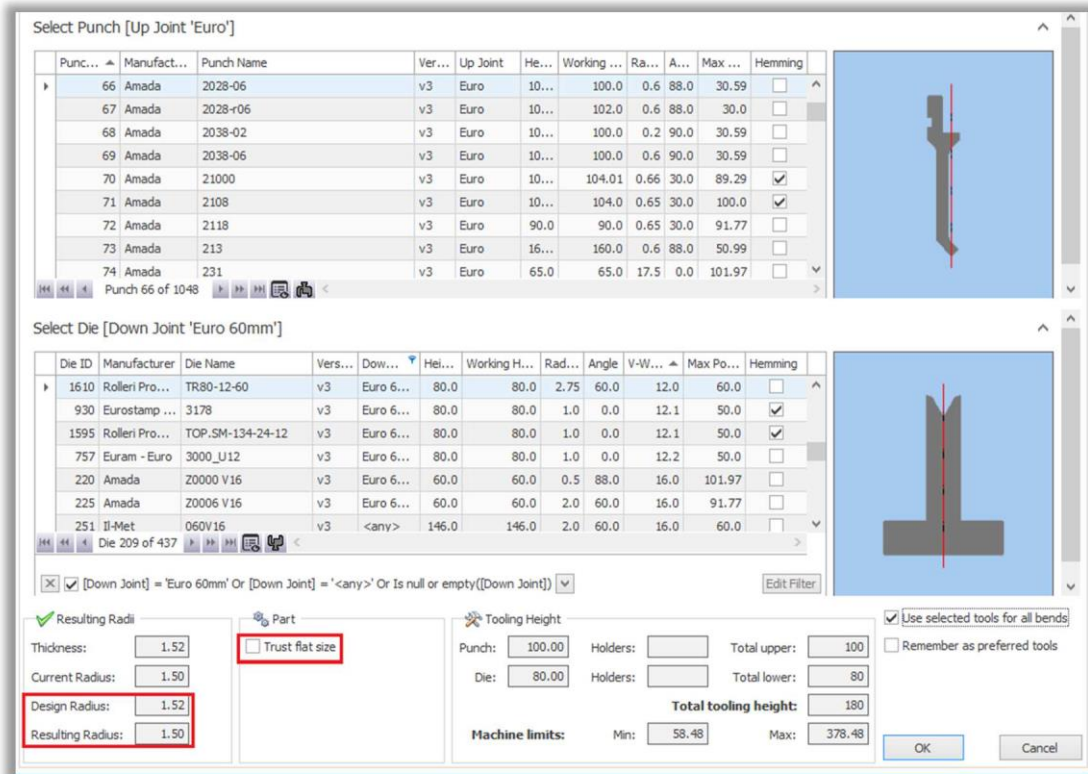
- When the selected die gives a result smaller than the design, **EsaBend3DM** "moves" the flanges away from each other and the flat grows larger.
- When the selected die (or punch) gives a result bigger than the design, **EsaBend3DM** "moves" the flanges towards each other and the flat grows smaller.

For example, this part was imported with a flat width of 163.50 mm:



When you select a die (after clicking the **Select Tools** button in the **Set Tooling** panel) you try to match the result radius as close as possible to the design radius (assuming the part was designed

with a realistic radius). In this example, there is no exact match, but very close (0.02 mm difference between design radius and result radius). **Trust flat size** is not selected:



TIP: If you see a warning symbol , hover over it with your mouse to get information on how to resolve it.

Resulting Radii

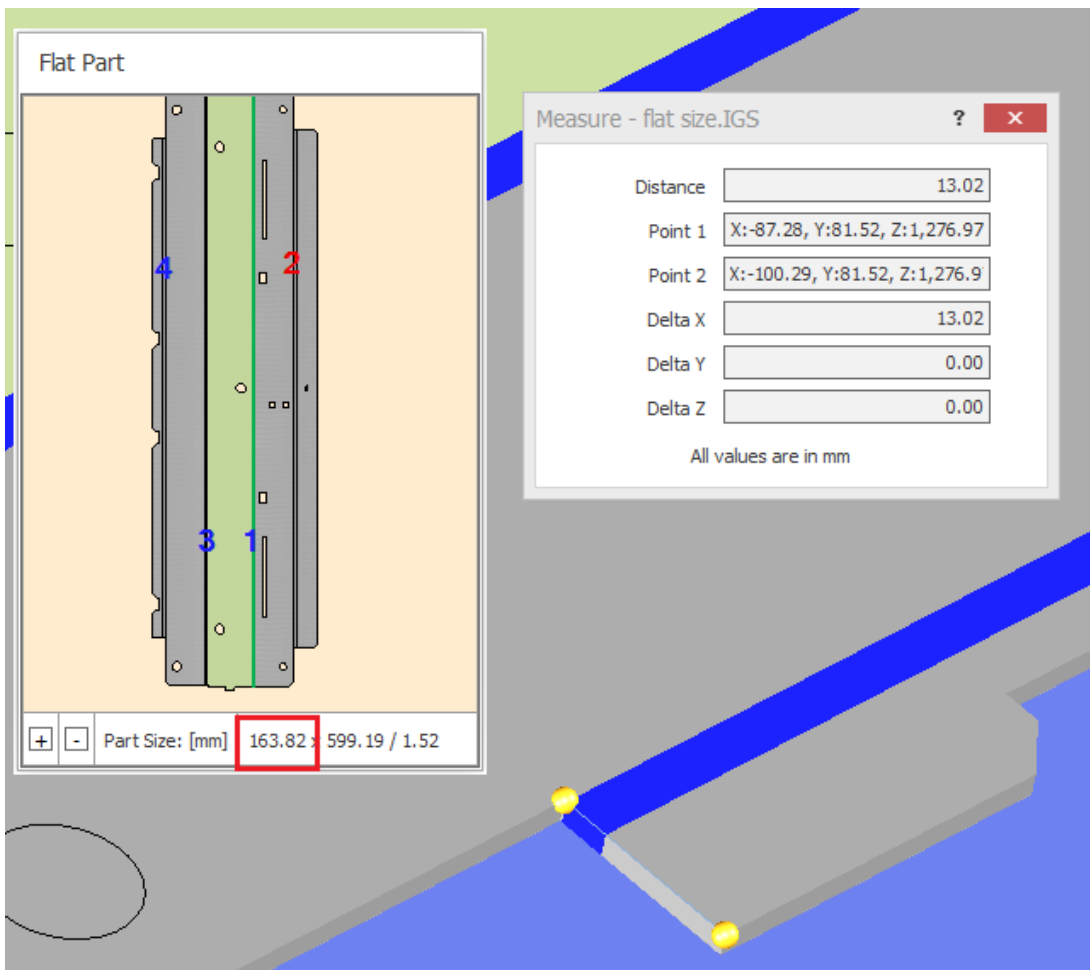
Thickness:

Current Radius:

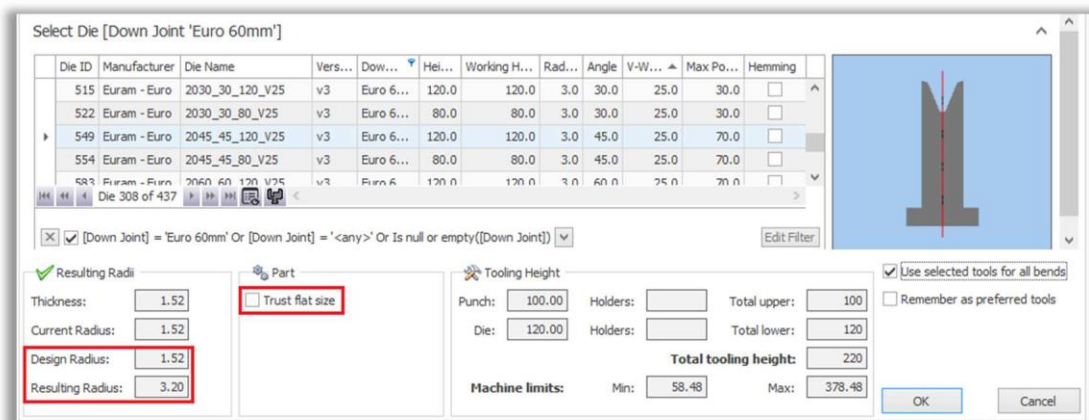
Design Radius:

Resulting Radius: 

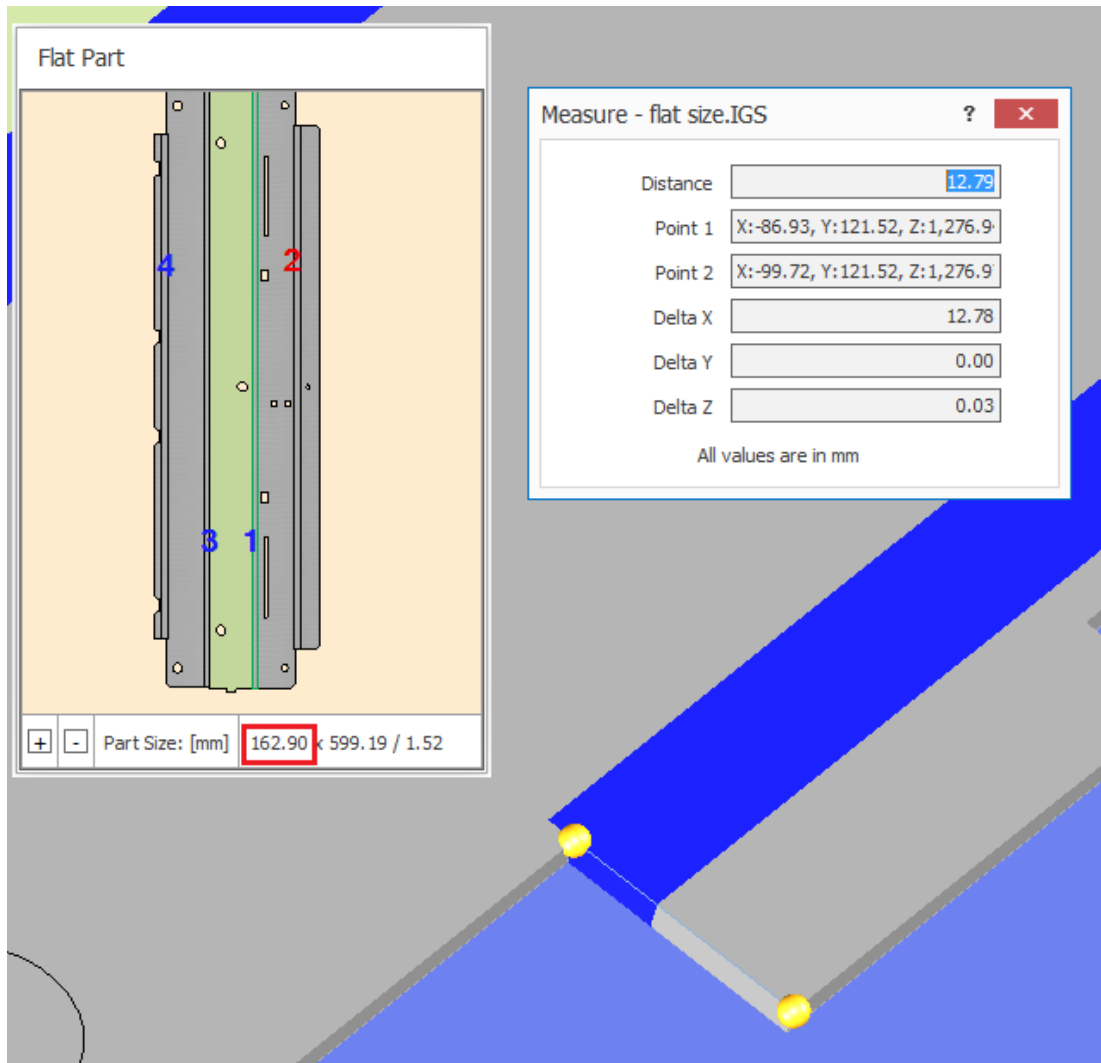
Even this small difference affects the size of the flat – it is now 163.82mm, i.e. 0.32mm larger than before:



This difference is probably still below the production tolerance, but when you select a tool that gives a bigger difference between the result and the design, the changes in the flat are more apparent:



A result that is twice that of the design makes a measurable difference:



Note that because the result is greater than the design, the flanges move towards each other and the flat becomes smaller. (You can only see this change after you click **OK**.)

2.5.2.2 Manual Tool Selection

You can manually set the tools for each bend individually or for a selection of bends.

- 📌 **TIP:** To select bends, use the standard Windows selection tools: Ctrl+A, Ctrl+click, and Shift+click.

2.5.2.2.1 Use Preferred Tools (and Holders)

- 📌 **NOTE:** This option is available only if [Preferred Tools](#) have been assigned for this machine\material\thickness and no tools have been selected for the current bend.

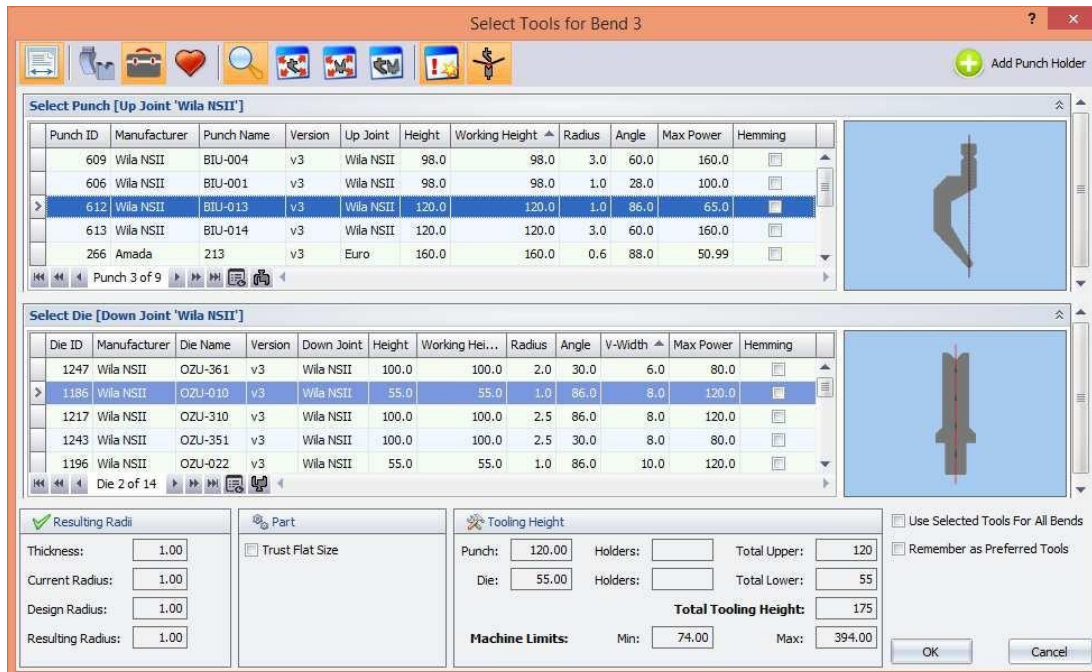
If this option is enabled then when the **Select Tools** dialog box opens, the tools assigned as **Preferred** are selected automatically (tools and holders); if not, then only the default panels (for punch and die) are shown.

2.5.2.2.2 Trust Flat Size

Select this option when you do not want the size of the flat to change as a result of the selected tools. Read the [detailed explanation](#).

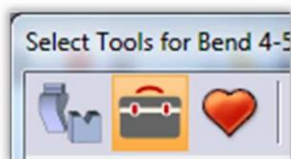
2.5.2.2.3 Select Tools

Clicking this button launches the **Select Tools** dialog box, showing the **Punch** and **Die** selection panels:



2.5.2.2.3.1 Setting the Tools Source

When selecting tools, you can set from which group of tools to make the selection:



-  **All Tools** – select tools from all the tools in the [Tool Library](#).
-  **Assigned Tools** – select only from the [Assigned Tools](#) of the current machine.
-  **Favorite of Assigned Tools** – select only from the current machine's assigned tools, and only from those set as [Favorite](#).

2.5.2.2.3.2 Setting Tools' Window Division

Because you can add holders to both punches and dies, the window may become too small to accommodate all the tool panels, with some being hidden altogether.

You can easily show and hide different parts of the display.

-  Sets the width of the columns.
When selected, **EsaBend3DM** calculates the widths to squeeze all the columns into the visible window. It can widen columns to fill the space or it can make columns narrower (by clipping titles, and displayed texts, etc.) When not selected, **EsaBend3DM** sets the column width to the actual width needed to display the columns. In most cases, when the window is narrow, it scrolls out most of the columns on the right so you have to scroll to see them.
-  Shows or hides a preview picture of the tool.

-  Expands punch and punch holders' panes, hiding the die and die holders.
-  Expands the die and die holders' panes, hiding the punch and punch holders.
-  Balances the punch and die panes, giving them equal space.
-  When there is an error and this option is selected, **EsaBend3DM** opens the error messages dialog so you can read the error messages easily without needing to hover over the error icons.
-  Enables the preview window showing the selected tools, arranged as if they were mounted.

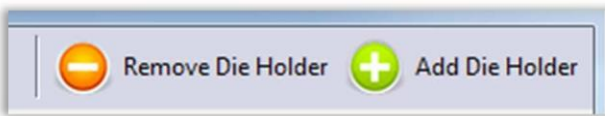
2.5.2.2.3.3 Adding and Removing Holders

To add or remove a holder, click the buttons at the top right of the dialog box.

Click the upper tooling panels to see the **Add\Remove Punch Holder** buttons:

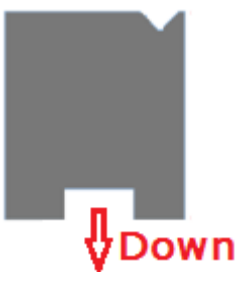


Click the lower tooling panels to see the **Add\Remove Die Holder** buttons:

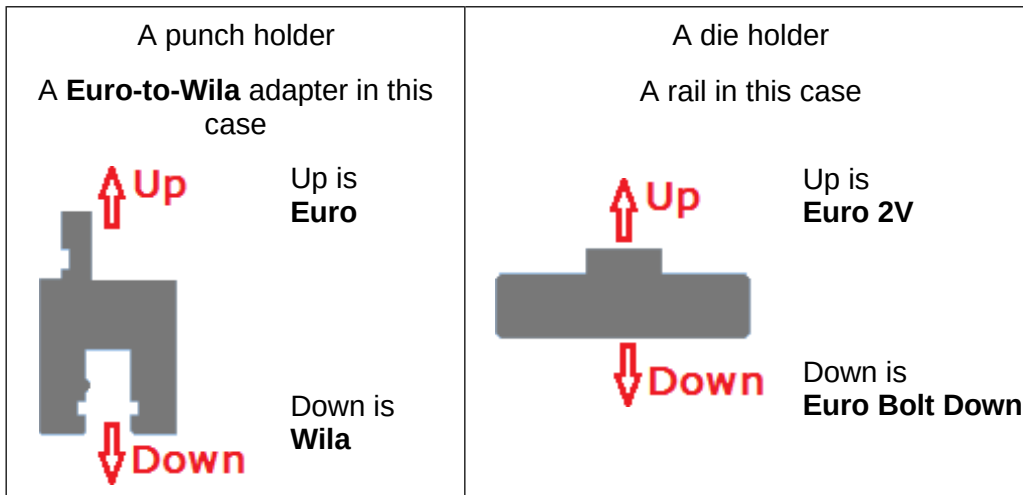


2.5.2.2.3.4 Joint Types and Tool Types

Each tool type has its own joints:

A punch has only an Up Joint  Euro	A die has only a Down Joint  Amada 2V
---	--

Holders have both a **Down Joint** and an **Up Joint**:

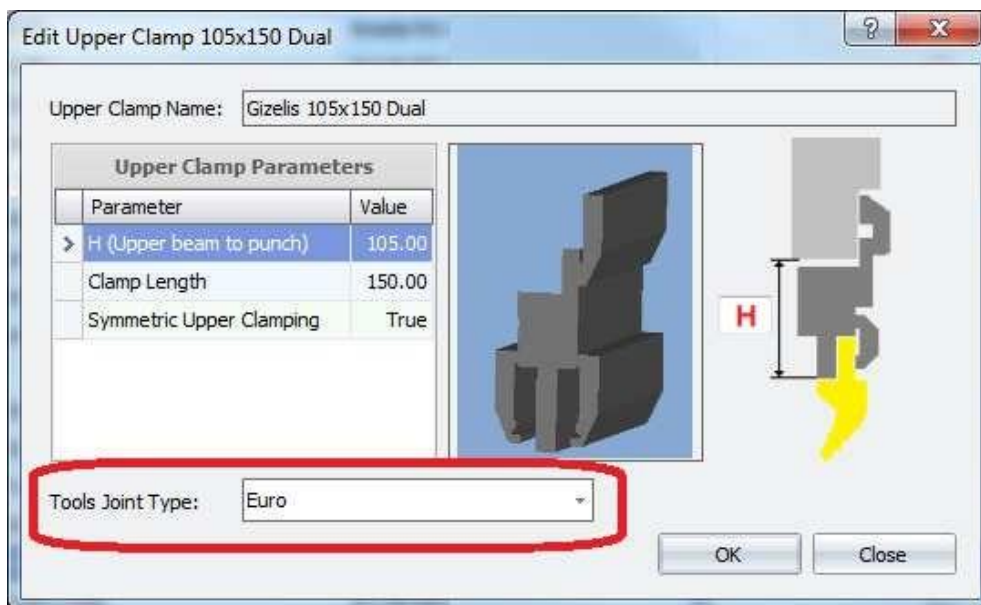


📌 **NOTE:** These are just tool examples; naturally, other tools have their own joint types.

2.5.2.2.3.5 Joint Types and Connecting to the Machine

When you want to select a tool you must consider how it connects to the machine's clamping.

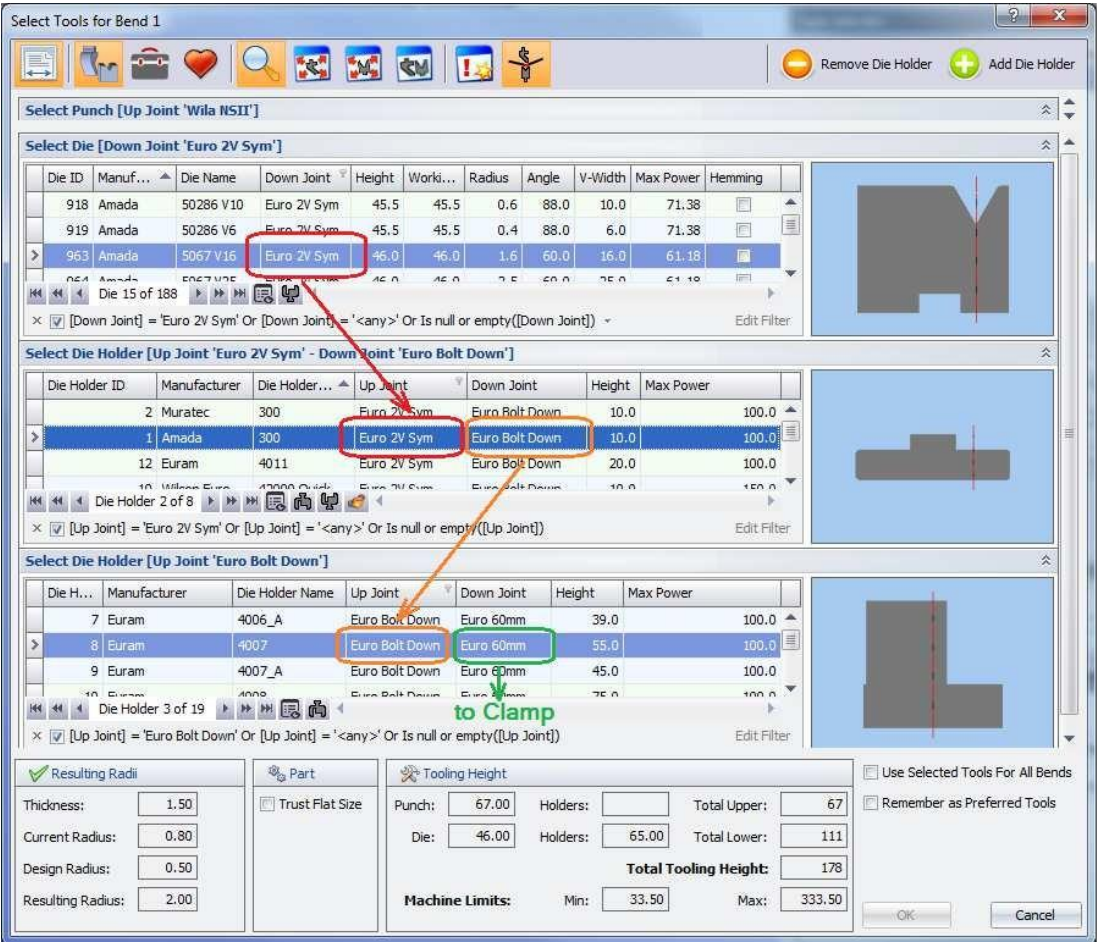
Each clamp (upper or lower) (e.g., via **Home** tab -> **Upper Clamps** -> **Edit** button) has a setting that defines its **Joint Type**:



An upper clamp with a **Euro** joint type, as shown above, only accepts tools (punches and punch holders) with a matching (i.e. **Euro**) **Up Joint** type.

2.5.2.2.3.6 Tool Joint Types Example

If a machine has a lower clamp whose joint type is **Euro 60mm**, the tooling may look like this:

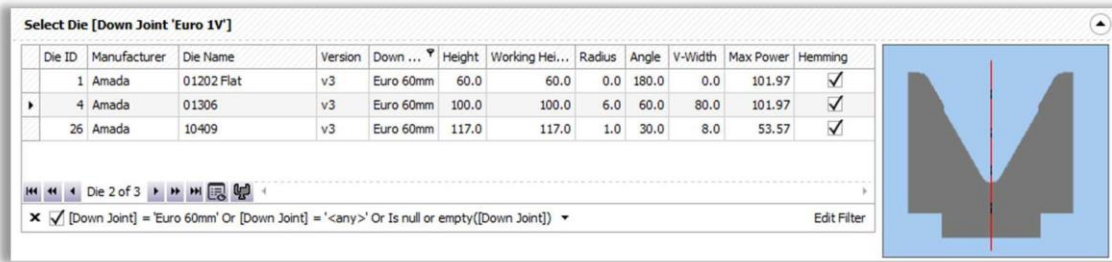


The tool hierarchy is thus:

	Up Joint	Down Joint
Die	none	Euro 2V Sym
Holder (Rail)	Euro 2V Sym	Euro Bolt Down
Holder (Block)	Euro Bolt Down	Euro 60mm
Lower Clamp	Euro 60mm	connected to machine

2.5.2.2.3.7 Tool Lists

To help you select tools, each tool type is listed in a separate panel such as this:



Each panel may hold many tools; you can filter them using [columns](#) or [Joint Type](#).

2.5.2.2.3.7.1 Properties Common to all Tool Types

Each panel lists specific tool types with their properties in columns; some properties are common to all tool types.

2.5.2.2.3.7.1.1 Tool ID

Each tool in the Tools Library has an identification (ID) number.

This ID appears in the tools' lists to help you find them in large lists. It also appears in the **Part Information** panel's [bend properties](#). The IDs are in the square brackets after the tool names:



2.5.2.2.3.7.1.2 Manufacturer

The tool's manufacturer name.

2.5.2.2.3.7.1.3 Tool Name

The tool's name.

2.5.2.2.3.7.1.4 Height and Working Height

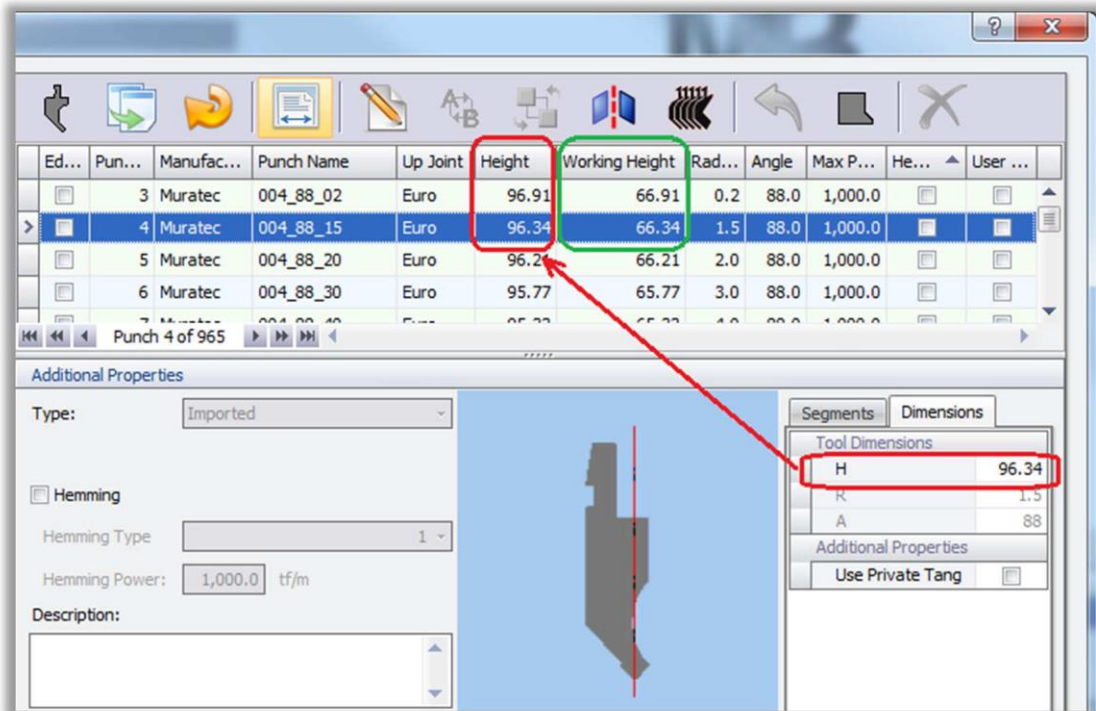
Tools in **EsaBend3DM** can have two origins:

- Parametric creation in the Tool Library
- Import of a DXF geometry

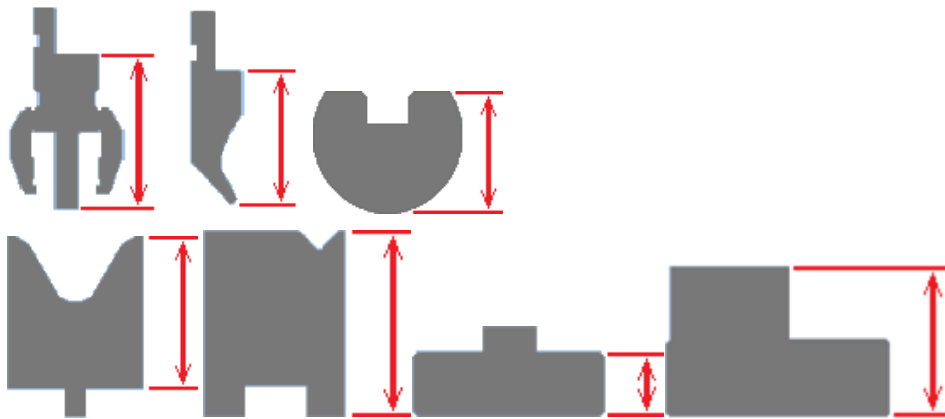
When a tool is imported it may have two distinct height values:

- **Height** – The height of the geometry that was imported
- **Working Height** – The height used by **EsaBend3DM** for processing and calculations

For example, DXF geometry has a **Height** of **96.34**. The tool has a 30mm tang, so the actual **Working Height** is **66.34**:



The **Working Height** for each tool type measures a different attribute of the geometry. In general, the working height is the distance between the surfaces that transfer the force of the machine, so if a tool has a tang, its height is not included:



2.5.2.2.3.7.1.5 Max. Power

The maximum tonnage allowed for this tool.

2.5.2.2.3.7.2 Punches List Panel

This panel shows the punch in the selected [tools source](#):

Select Punch [Up Joint 'Wila NSII']

Punch ID	Manufacturer	Punch Name	Version	Up Joint	Height	Working Height	Radius	Angle	Max Power	Hemm
609	Wila NSII	BIU-004	v3	Wila NSII	98.0	98.0	3.0	60.0	160.0	
606	Wila NSII	BIU-001	v3	Wila NSII	98.0	98.0	1.0	28.0	100.0	
612	Wila NSII	BIU-013	v3	Wila NSII	120.0	120.0	1.0	86.0	65.0	
613	Wila NSII	BIU-014	v3	Wila NSII	120.0	120.0	3.0	60.0	160.0	
618	Wila NSII	BIU-022	v3	Wila NSII	163.0	163.0	1.0	80.0	80.0	
619	Wila NSII	BIU-023	v3	Wila NSII	163.0	163.0	1.0	86.0	65.0	
621	Wila NSII	BIU-025	v3	Wila NSII	163.0	163.0	6.0	80.0	130.0	
624	Wila NSII	BIU-033	v3	Wila NSII	200.0	200.0	1.0	86.0	50.0	

Punch 3 of 8

[Up Joint] = 'Wila NSII' Or [Up Joint] = '<any>' Or Is null or empty([Up Joint])

The list is divided into columns, each of which can be used to [filter](#) the list.

2.5.2.2.3.7.2.1 Up Joint

The joint type for connecting to an upper clamp or to a holder above.

2.5.2.2.3.7.2.2 Radius

The radius of the punch's tip.

2.5.2.2.3.7.2.3 Angle

The angle of the punch's tip.

2.5.2.2.3.7.2.4 Hemming

Specifies whether this tool can be used for hemming.

2.5.2.2.3.7.3 Punch Holders List Panel

This panel shows the punch holders in the selected [tool source](#):

Select Punch Holder [Up Joint 'Euro' - Down Joint 'Euro']

Punc...	Manufacturer	Punch Holder ...	Version	Up Joint	Down Joint	Height	Working Height	Max Power
36	Trumpf	Modufix H80	v3	Wila NSII	Wila NSII	80.0		130.0
37	Bystronic	P10 RF-A H150	v3	Bystronic RF-A	Bystronic Radius	88.0		163.15
38	Bystronic	P10 RF-A H250	v3	Bystronic RF-A	Bystronic Radius	188.0		0.0
39	Roller Wila	Roller_AD11	v3	Wila NSII	Euro	80.0		100.0
40	Roller Promecam	Roller_AD20	v3	Euro	Wila NSII	67.0		100.0

Punch Holder 4 of 48

The list is divided into columns, each of which can be used to [filter](#) the list.

2.5.2.2.3.7.3.1 Up Joint

The joint type for connecting to an upper clamp or to another holder above.

2.5.2.2.3.7.3.2 Down Joint

The joint type for connecting to a punch or to another holder below.

2.5.2.2.3.7.4 Dies List Panel

This panel shows the dies in the selected [tool source](#):

Select Die [Down Joint 'Wila NSII']

Die ID	Manufacturer	Die Name	Version	Down Joint	Height	Working Height	Radius	Angle	V-Width	Max Power
1187	Wila NSII	OZU-011	v3	Wila NSII	55.0	55.0	1.0	86.0	12.0	
1218	Wila NSII	OZU-311	v3	Wila NSII	100.0	100.0	3.0	86.0	12.0	
1244	Wila NSII	OZU-352	v3	Wila NSII	100.0	100.0	3.0	30.0	12.0	
1245	Wila NSII	OZU-353	v3	Wila NSII	100.0	100.0	3.5	30.0	16.0	
1249	Wila NSII	OZU-363	v3	Wila NSII	100.0	100.0	4.0	30.0	20.0	
1189	Wila NSII	OZU-013	v3	Wila NSII	55.0	55.0	2.5	80.0	24.0	
1191	Wila NSII	OZU-015	v3	Wila NSII	55.0	55.0	4.0	80.0	40.0	
665	Amada	37	v3	Euro 60mm	60.0	60.0	4.0	85.0	50.0	

Die 8 of 14

The list is divided into columns, each of which can be used to [filter](#) the list.

2.5.2.2.3.7.4.1 Down Joint

The joint type for connecting to a lower clamp or to a holder below.

2.5.2.2.3.7.4.2 Radius

The radii of the die's shoulders.

2.5.2.2.3.7.4.3 Angle

The angle of the die's V.

2.5.2.2.3.7.4.4 V Width

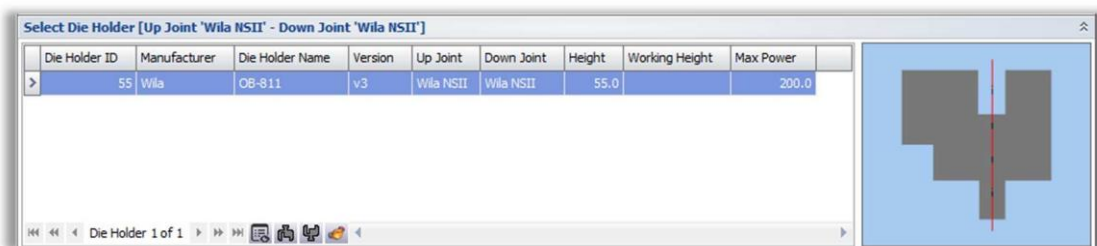
The width of the die's V.

2.5.2.2.3.7.4.5 Hemming

Specifies whether this tool can be used for hemming.

2.5.2.2.3.7.5 Die Holders List Panel

This panel shows the die holders in the selected [tool source](#):



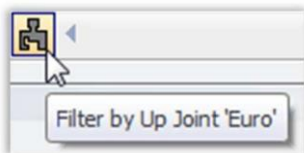
The list is divided into columns, each of which can be used to [filter](#) the list:

- **Up Joint** – The joint type for connecting to a die or to another holder above.
- **Down Joint** – The joint type for connecting to a bottom clamp or to another holder below.
- **Tool Filtering** – You can use various filters to reduce the number of items in the list from which you want to select tools.

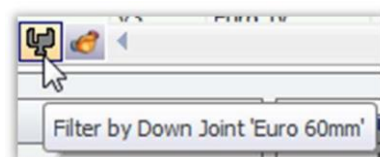
2.5.2.2.3.7.5.1 Filtering Tools by Joint Type

When connecting tools such as a die and a die holder, you need to know which joint type matches your machine's clamping. To help you, use the **Joint Type Filters**, located on the bottom bar of each tooling list:

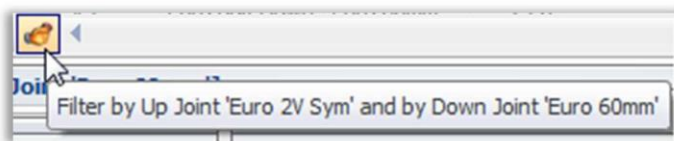
-  Show all – removes all filtering
-  Filters the list according to the tool's **Up Joint**. For example, when filtering punches according to the current machine's upper clamps with a down joint type of **Euro**, the filter only shows suitable tools:



-  Filters according to the tool's **Down Joint**. For example, to select a die to connect to a clamp with an up joint type of **Euro 60mm**, the filter only shows suitable tools:



-  Applies to both filters: **Up Joint** and **Down Joint**:



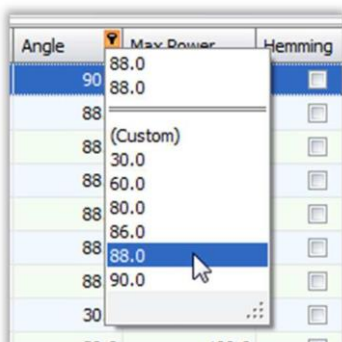
2.5.2.2.3.7.5.2 Filtering Tools by Column

You can display only those tools that have specific properties. Select the value you want in the column headers of the tools lists.

For example, when your punches list contains the following tools:

Punch ID	Manufacturer	Punch Name	Version	Up Joint	Height	Radius	Angle	Max Power	Hemming
231	AmadaV3	2108	v3	Euro	104.0	0.65	30.0	101.97	☐
557	Amada	P_100	v3	Euro	98.98	0.66	30.0	100.0	☒
2	AmadaV3	0038	v3	Euro	65.0	6.0	60.0	101.97	☐
482	Wila NSII	BIU-025	v3	Wila NSII	163.0	6.0	80.0	130.0	☐
195	AmadaV3	150-06	v3	Euro	90.0	0.6	88.0	71.38	☐
124	AmadaV3	1178-02	v3	Euro	67.0	0.2	88.0	20.39	☐
126	AmadaV3	1178-08	v3	Euro	67.0	0.8	88.0	20.39	☐
184	AmadaV3	148-06	v3	Euro	67.0	0.6	88.0	101.97	☐
225	AmadaV3	2028-06	v3	Euro	100.0	0.6	88.0	30.59	☐
271	AmadaV3	50-06	v3	Euro	105.0	0.6	88.0	50.99	☐
427	AmadaV3	52-06	v3	Euro	120.0	0.6	88.0	50.99	☐
96	AmadaV3	106-02	v3	Euro	95.0	0.2	90.0	50.99	☐

You can filter the tools so that only those with an **88°** angle remain:

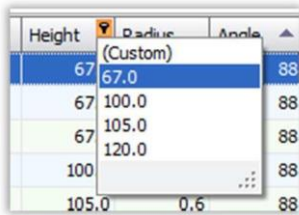


The result shows only those punch tools that match the filter (note the filter's specification at the bottom of the list):

Punch ID	Manufacturer	Punch Name	Version	Up Joint	Height	Radius	Angle	Max Power	Hemming
124	AmadaV3	1178-02	v3	Euro	67.0	0.2	88.0	20.39	☐
126	AmadaV3	1178-08	v3	Euro	67.0	0.8	88.0	20.39	☐
184	AmadaV3	148-06	v3	Euro	67.0	0.6	88.0	101.97	☐
225	AmadaV3	2028-06	v3	Euro	100.0	0.6	88.0	30.59	☐
271	AmadaV3	50-06	v3	Euro	105.0	0.6	88.0	50.99	☐
427	AmadaV3	52-06	v3	Euro	120.0	0.6	88.0	50.99	☐

× ☒ [Angle] = '88.0' Edit Filter

Continue to filter using additional properties, such as keeping only tools with a height of **67**:



The result shows only those punches that match both filters:

Punch ID	Manufacturer	Punch Name	Version	Up Joint	Height	Radius	Angle	Max Power	Hemming
124	AmadaV3	1178-02	v3	Euro	67.0	0.6	88.0	20.39	☐
126	AmadaV3	1178-08	v3	Euro	67.0	0.6	88.0	20.39	☐
184	AmadaV3	148-06	v3	Euro	67.0	0.6	88.0	101.97	☐

☒ [Angle] = '88.0' And [Height] = '67.0'

2.5.2.2.3.8 Resulting Radii Information

The tools you select may have an impact on the size of the part's flat. For example, a larger die means a larger bending radius and thus the bend compensation changes.

To help you select the correct tooling, **EsaBend3DM** calculates the result of the bending action for each punch and die you select in the tool panels, giving you the **Resulting Radius**, as opposed to the **Design Radius**. All this information is displayed in the **Resulting Radii** panel at the bottom of the **Select Tools** dialog box, for example:

✓ **Resulting Radii**

Thickness:

Current Radius:

Design Radius:

Resulting Radius:

2.5.2.2.3.8.1 Current Radius

The inner radius currently loaded into **EsaBend3DM**.

2.5.2.2.3.8.2 Design Radius

This value of the inner radius, taken from the part design.

2.5.2.2.3.8.3 Resulting Radius

The new radius achieved after bending with the selected tools.

A simple example:

✓ **Resulting Radii**

Thickness:

Current Radius:

Design Radius:

Resulting Radius:

This part is 1.5 mm thick and is currently loaded with tools that give 3.2 mm radius. The part was originally designed to have a radius of 1.52 mm. If you now confirm the selected tools, the result is a radius of 1 mm.

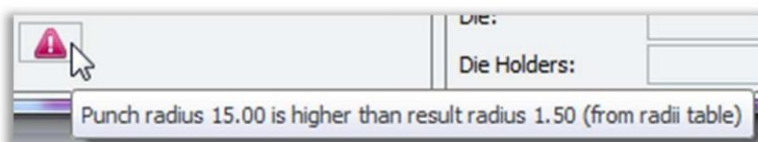
For a more complex example:

- Sheet thickness of 1.5mm
- Punch with tip radius of 15mm
- Die with V width of 12mm

✓ Resulting Radii	
Thickness:	1.50
Current Radius:	1.00
Design Radius:	1.00
Resulting Radius:	15.00 

With an appropriate punch, the die you selected would give a **Resulting Radius** of 1.5mm, but the punch's tip is much too large for this.

The warning icon  signifies that the radius of the result is affected by the radius of the punch's tip:

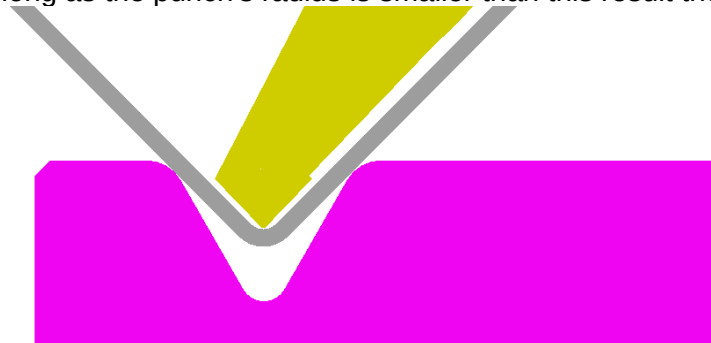


EsaBend3DM issues a warning message when you confirm the tool selection:



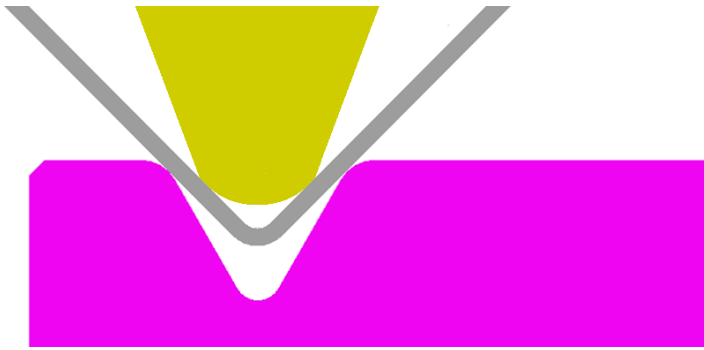
The problem raised by these warnings is that (for air-bending) the resulting radius from the bending action is determined by the width of the die.

As long as the punch's radius is smaller than this result then you get a good bend:

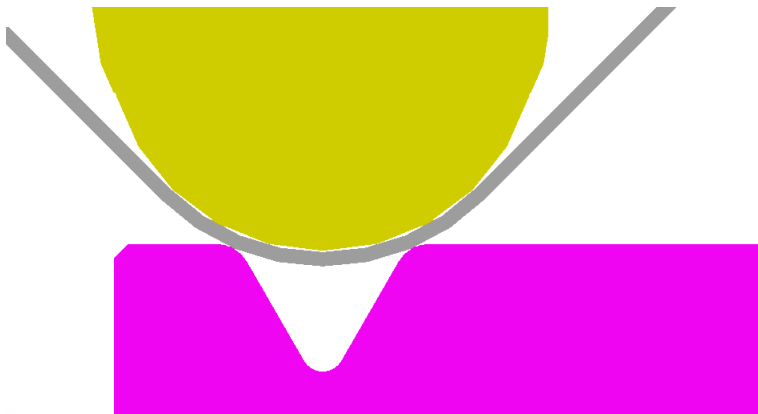


However, when the radius of the punch is larger than the one you would expect to get from the die's width, problems ensue.

For example, if the punch radius is larger than the expected result radius, but smaller than the die, you get a 4-point bend, with the resulting material deformation:



If the punch radius is larger than the die's width, you do not even get the correct angle:



The punch cannot penetrate low enough into the die, and instead of the desired 90° angle, you get an incomplete bend.

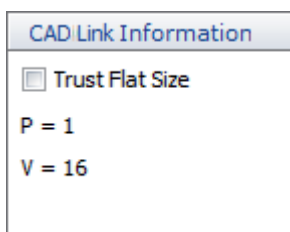
2.5.2.2.3.9 Part Panel

- NOTE: The **Part** panel is visible when the part is not transferred via CAD Link. Otherwise, you can see the [CAD Link panel](#), which shows [Trust Flat Size](#).

2.5.2.2.3.10 CAD Link Information and Filtering

- NOTE: The **CAD Link** panel is only visible when the part is transferred via **CAD Link**. Otherwise, you can see the [Part panel](#).

When you transfer a part from a CAD system via the **CAD Link** interface, you can set the bend compensations using the **EsaBend3DM Compensation Tables**. This information carries over into **EsaBend3DM** together with the part, allowing you to use the same tools for bending as you did for setting the compensation:



To manually select the tools you can use the **P** (punch radius) and **V** (die width), or the [CAD Link Filters](#).

2.5.2.2.3.10.1 CAD Link Filters

These filters (available in the toolbar of the **Select Tools** dialog box) allow you to display only the tools that match those that were set in the 3D CAD system before you exported the part to **EsaBend3DM** using **CAD Link**:

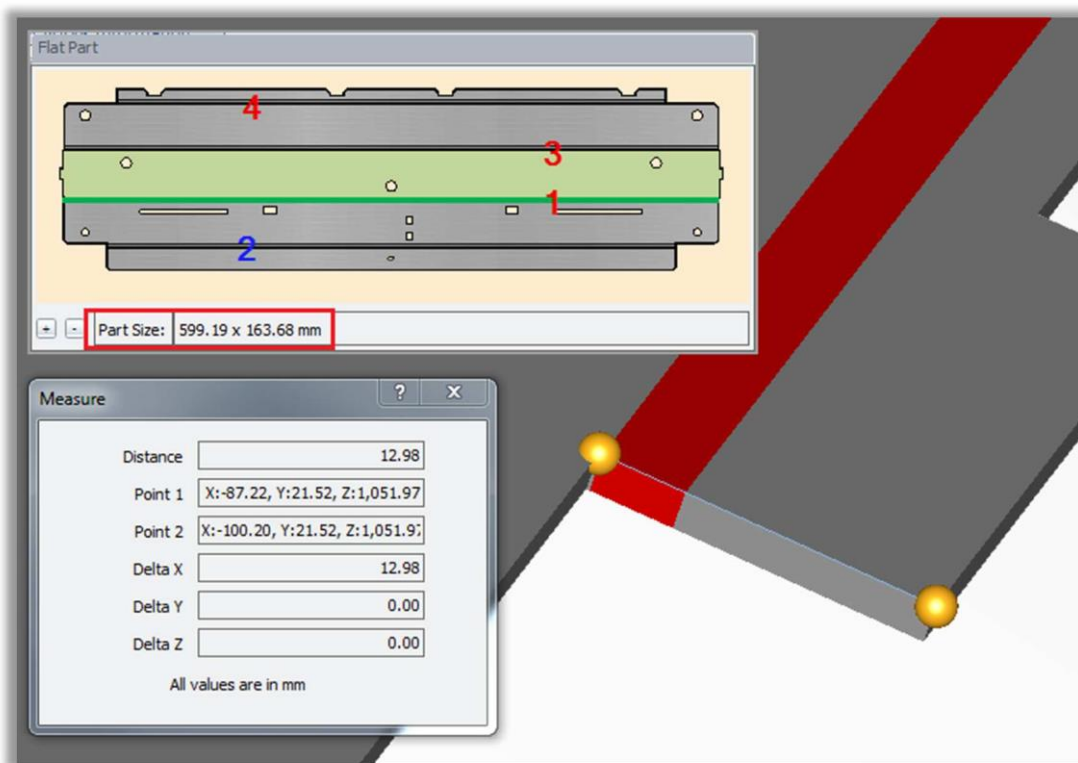
-  **CAD Link Punches** – filters punch tools by the **Punch Radius** received from the **CAD Link** transfer.
-  **CAD Link Dies** – filters die tools by the **Die Width** received from the **CAD Link** transfer.

2.5.2.2.3.10.2 Trust Flat Size

When a part is sent to **EsaBend3DM** via the **CAD Link** interface, it has already been unfolded in the CAD system according to the definitions (such as K-factor, inner radius) determined by the designer. So there is already a flat of the part in the CAD system, and this flat may have already been sent to a cutting machine, using **cncKad** or some other application.

⚠ WARNING: In this case, when you apply the tooling, you must not change the size of the flanges. If you do, the NC or the report you generate after the simulation will not match the stock that was cut to make the part.

This is the size of the part as it is imported into **EsaBend3DM**:



You assigned a die that gives a **Resulting Radius** of more than twice the **Design Radius**, while selecting the **Trust flat size** option:

Select Punch [Up Joint 'Euro']

Punch ID	Manufacturer	Punch Name	Version	Up Joint	Height	Working Height	Radius	Angle	Max Power	Hemming
66	Amada	2028-06	v3	Euro	100.0	100.0	0.6	88.0	30.59	☐
67	Amada	2028-r06	v3	Euro	102.0	102.0	0.6	88.0	30.0	☐
68	Amada	2038-02	v3	Euro	100.0	100.0	0.2	90.0	30.59	☐
69	Amada	2038-06	v3	Euro	100.0	100.0	0.6	90.0	30.59	☐
70	Amada	21000	v3	Euro	104.01	104.01	0.66	30.0	89.29	☒
71	Amada	2108	v3	Euro	104.0	104.0	0.65	30.0	100.0	☒
72	Amada	2118	v3	Euro	90.0	90.0	0.65	30.0	91.77	☐
73	Amada	213	v3	Euro	160.0	160.0	0.6	88.0	50.99	☐
74	Amada	231	v3	Euro	65.0	65.0	17.5	0.0	101.97	☐
75	Amada	4548	v3	Euro	105.0	105.0	0.8	60.0	61.18	☐

Select Die [Down Joint 'Euro 60mm']

Die ID	Manufacturer	Die Name	Version	Down Joint	Height	Working Height	Radius	Angle	V-Width	Max Power	Hemming
805	Eurostamp - Euro	3037 V8	v3	Euro 60mm	100.7	100.7	1.0	35.0	8.0	60.0	☒
809	Eurostamp - Euro	3041	v3	Euro 60mm	110.0	110.0	1.5	30.0	8.0	80.0	☒
810	Eurostamp - Euro	3041a	v3	Euro 60mm	110.0	110.0	1.5	30.0	8.0	80.0	☒
812	Eurostamp - Euro	3043	v3	Euro 60mm	80.0	80.0	0.8	30.0	8.0	35.0	☐
825	Eurostamp - Euro	3051	v3	Euro 60mm	120.0	120.0	0.5	90.0	8.0	100.0	☐
838	Eurostamp - Euro	3060	v3	Euro 60mm	120.0	120.0	0.5	60.0	8.0	60.0	☐
849	Eurostamp - Euro	3067	v3	Euro 60mm	120.0	120.0	0.8	45.0	8.0	50.0	☐
856	Eurostamp - Euro	3074	v3	Euro 60mm	120.0	120.0	0.8	30.0	8.0	35.0	☐

☒ [Down Joint] = 'Euro 60mm' Or [Down Joint] = '<any>' Or Is null or empty([Down Joint])

☒ Resulting Radii

Thickness: 1.52

Current Radius: 3.20

Design Radius: 1.52

Resulting Radius: 1.00

☒ Trust flat size

Tooling Height

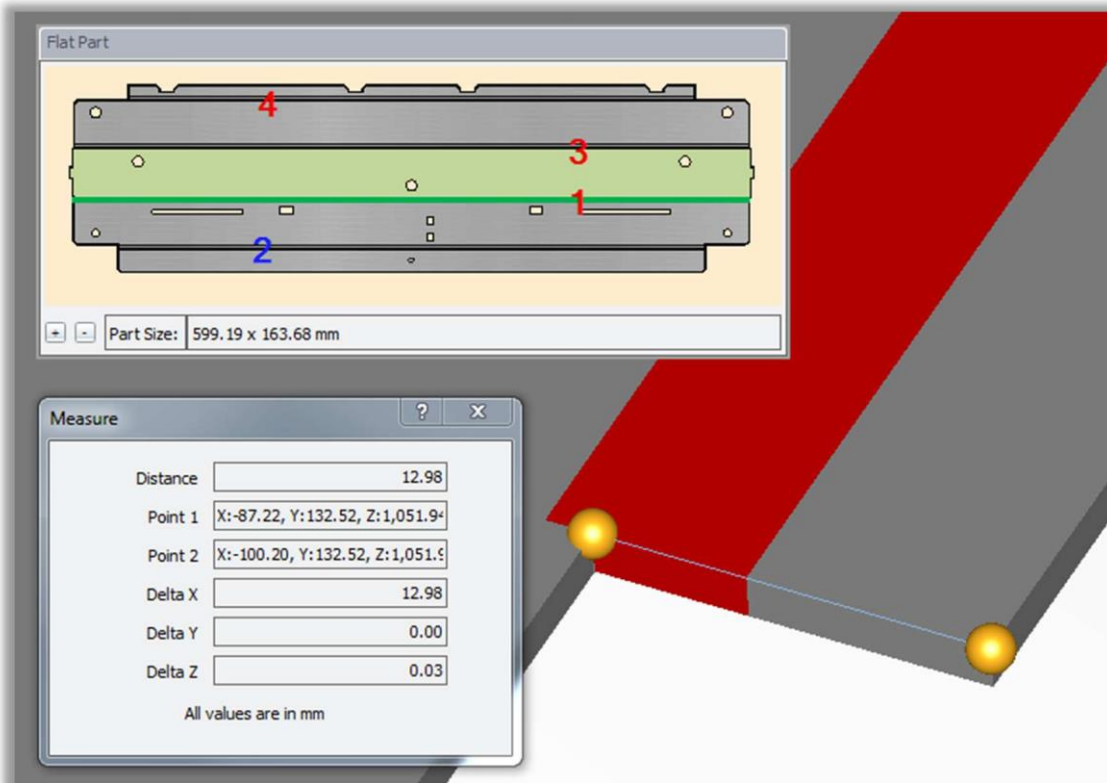
Punch: 100.00 Holders: Total upper: 100

Die: 120.00 Holders: Total lower: 120

Total tooling height: 220

Machine limits: Min: 58.48 Max: 378.48

The die's width creates a larger bend radius than before but the trust flat option forces the overall flat size to remain the same, so the result is that the radius area "bites" into the flanges:



This might cause some part dimensions to diverge slightly from the design. (The example above requires you to add bend relief.)

2.5.2.2.3.11 Tooling Height Information

This section displays the heights of the tools and holders, together with the machine's physical limits:

Tooling Height					
Punch:	120.00	Holders:	67.00	Total Upper:	187
Die:	45.50	Holders:	49.00	Total Lower:	94.5
Total Tooling Height:				281.5	
Machine Limits:		Min:	99.99	Max:	299.99

This information is useful when you select tools, for cases when the [tooling is too high or too low](#). When the combined tool heights exceed the machine's limit, this area displays a warning:

Tooling Height					
Punch:	120.00	Holders:	67.00	Total Upper:	187
Die:	46.00	Holders:	88.00	Total Lower:	134
Total Tooling Height:				321	
Machine Limits:		Min:	99.99	Max:	299.99

Total Upper or Lower sum totals:

- Upper tools: punch + holder(s)
- Lower tools: die + holder(s)

Total Tooling Height is the sum of the tools: punch + die + holders.

Machine Limits are the maximum and minimum heights of tools that can be used on the machine:

- **Max** = [Maximum Opening Height](#) between the upper and lower clamps: the [Total Tooling Height](#) cannot be greater than this.
- **Min** = [Minimum Opening Height](#) between the upper and lower clamps: the Total Tooling Height cannot be smaller than this.

2.5.2.2.3.12 Use Selected Tools for All Bends

When you select this option, **EsaBend3DM** assigns the selected tooling to all the bends of the part, not just the one(s) chosen before you clicked the **Select Tools** button.

2.5.2.2.3.13 Remember as Preferred Tools

Preferred tools are a set of tools that are [saved as the default tooling](#) for a specific combination of machine + material + thickness.

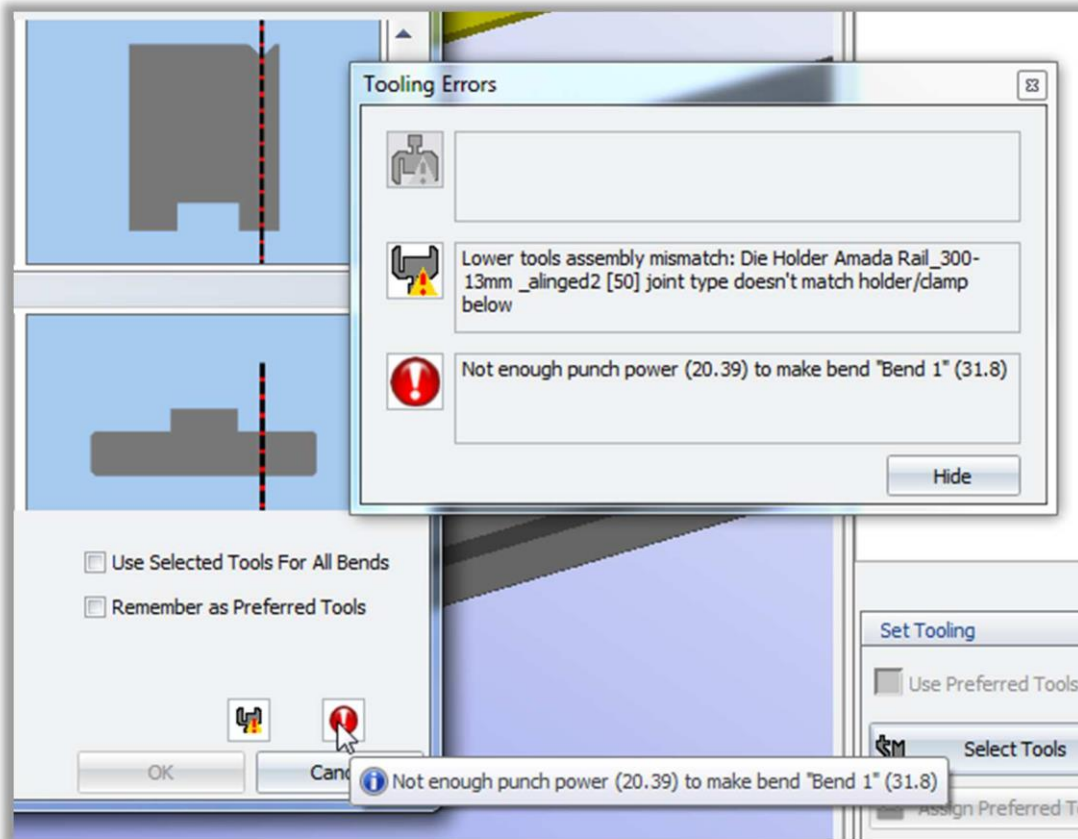
Selecting this option saves the tooling for this combination, and they are assigned by the [Assign Preferred Tools](#) button.

2.5.2.2.3.14 Tooling Warning Messages

The warning messages provide information regarding problems with the selected tools.

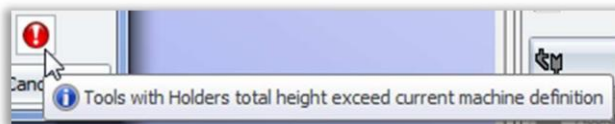
- **NOTE:** When a warning icon message appears it means you must resolve the problem before you can assign the tools to the bend(s). The **OK** button remains inactive until you do.

The warnings are displayed in a pop-up window and as icons at the bottom of the **Select Tools** dialog box:

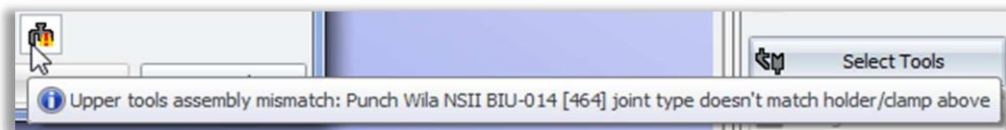


There are three types of warnings:

-  **General** warnings, e.g.:



-  **Upper tool** warnings, e.g.:



-  **Lower tool** warnings, e.g.:



2.5.2.2.4 Assign Preferred Tools

When you open a part with a material type and a thickness for which you have [previously saved](#) the [preferred combination](#) for this machine, you can save time by simply selecting some or all of the bends and assigning them these tools.

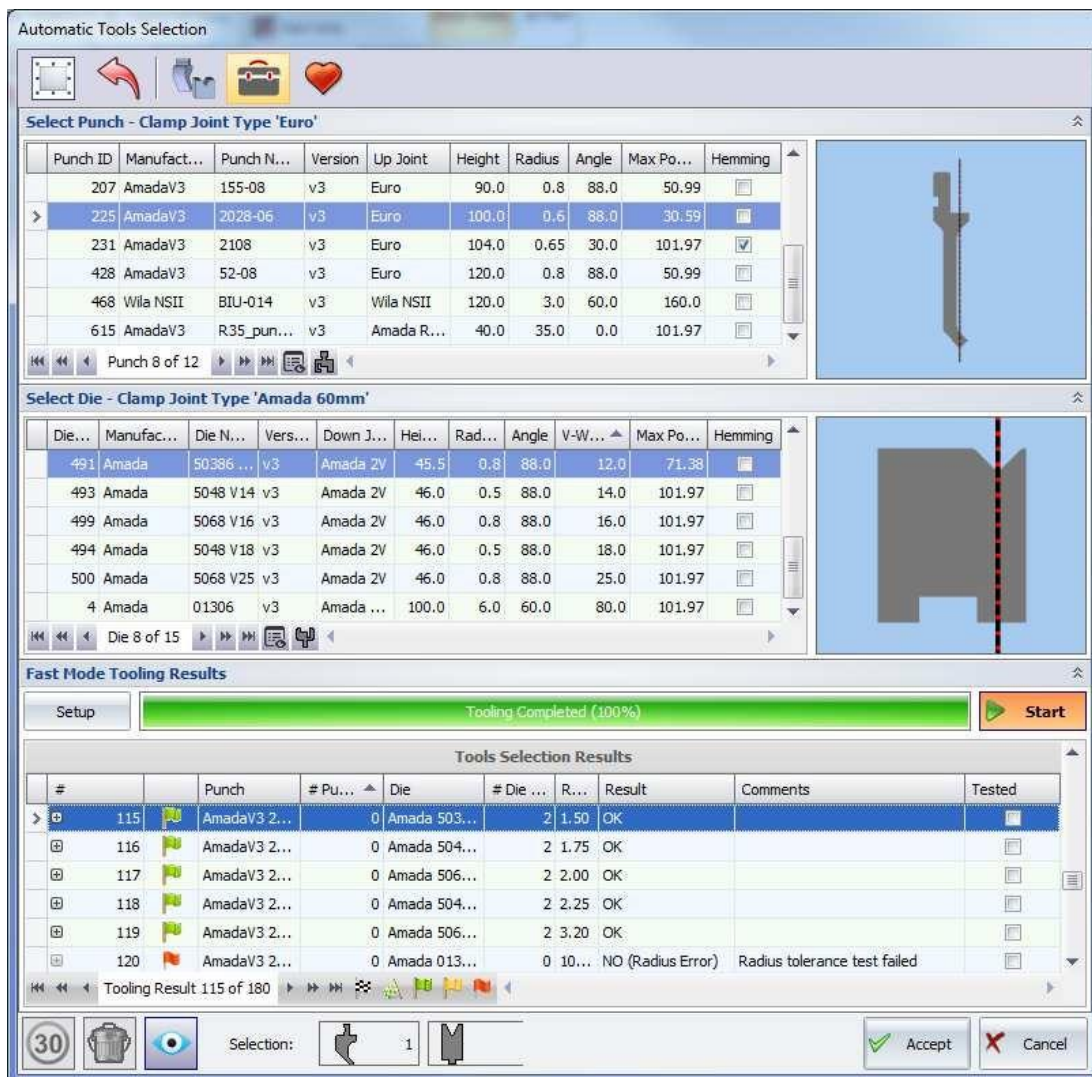
2.5.2.3 Automatic Tools Selection

This option automatically chooses a tooling set for the bends in the part.

In addition, **EsaBend3DM** can check if this set of tools:

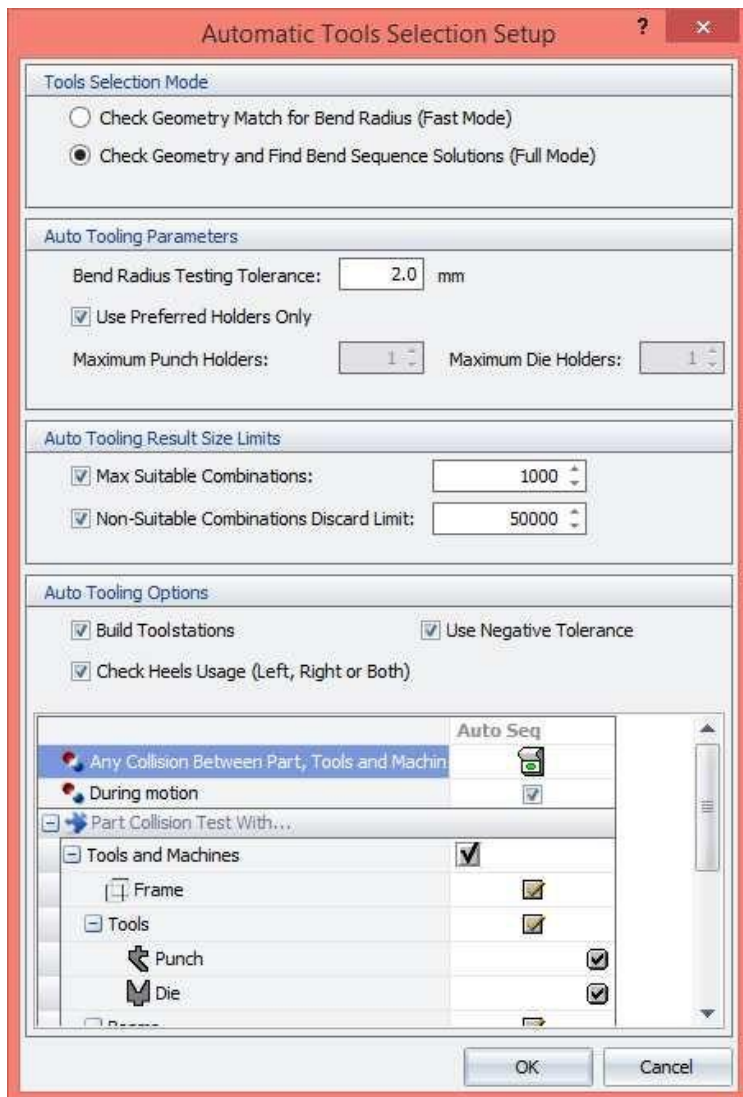
- Yields a viable bend sequence
- Can be used to create the tool stations needed to bend the part

The **Automatic Tools Selection** dialog box has much in common with the [Select Tools](#) dialog box:



2.5.2.3.1 Automatic Tools Selection Setup

This dialog box allows you to define how **EsaBend3DM** tests the tooling solutions:



2.5.2.3.1.1 Tools Selection Mode

EsaBend3DM can make the tool selection in one of two modes:

- **Fast Mode** – Check geometry match for bend radius
- **Full Mode** – Check geometry and find bend sequence solutions

2.5.2.3.1.1.1 Check Geometry Match for Bend Radius (Fast Mode)

This option automatically chooses tooling for the bends in the part based on the following tests:

- Tool tonnage
- The radius that results from the tools, within the [Bend Radius Testing Tolerance](#)
- Tooling height
- The need for holders to connect the tools to the clamps.

2.5.2.3.1.1.2 Check Geometry and Find Bend Sequence Solutions (Full Mode)

This option performs the same checks as the Geometry Only option, but in addition it tries to find a viable bend sequence, based on the [Collision Settings](#).

2.5.2.3.1.2 Auto Tooling Parameters

When **EsaBend3DM** selects the tools automatically, it uses these defined limitations.

2.5.2.3.1.2.1 Bend Rodius Testing Tolerance

EsaBend3DM uses this tolerance to test the result radius of a given set of tools.

This testing parallels the testing for the manual tool selection's [Result Radius](#).

2.5.2.3.1.2.2 Use Preferred Holders Only

 **NOTE:** This option is available only if there are [preferred tools](#) for this material.

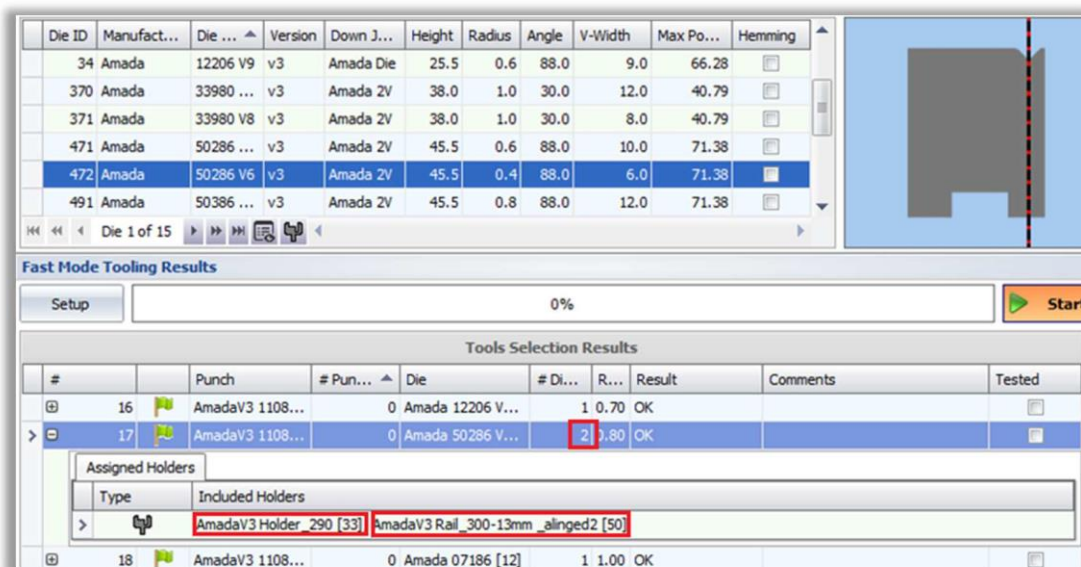
When this option is selected, the automatic tool selection process only uses the holders from the **Preferred** set when testing tools.

2.5.2.3.1.2.3 Moximum Punch ond Die Holders

 **NOTE:** This option is not available when you select the [Use Preferred Holders Only](#) option.

These settings determine how many holders **EsaBend3DM** can use when testing how possible tooling combinations fit on the clamps.

Example of a die with two holders:



The screenshot displays the 'Fast Mode Tooling Results' window. At the top, a table lists various dies with columns for Die ID, Manufacture, Die Name, Version, Down J, Height, Radius, Angle, V-Width, Max Po, and Hemming. Below this, a 'Tools Selection Results' table shows the outcome of tool selection for different punch and die combinations. The table includes columns for #, Punch, # Pun, Die, # Di, R, Result, Comments, and Tested. Two rows are highlighted: row 16 and row 17. Row 17 is selected, and its details are shown in the 'Assigned Holders' section below. This section lists the 'Included Holders' for the selected tooling combination: 'AmadaV3 Holder_290 [33]' and 'AmadaV3 Rail_300-13mm _alinged2 [50]'. The 'Assigned Holders' section also includes a 'Type' column and a 'Tested' checkbox.

Die ID	Manufact...	Die ...	Version	Down J...	Height	Radius	Angle	V-Width	Max Po...	Hemming
34	Amada	12206 V9	v3	Amada Die	25.5	0.6	88.0	9.0	66.28	☐
370	Amada	33980 ...	v3	Amada 2V	38.0	1.0	30.0	12.0	40.79	☐
371	Amada	33980 V8	v3	Amada 2V	38.0	1.0	30.0	8.0	40.79	☐
471	Amada	50286 ...	v3	Amada 2V	45.5	0.6	88.0	10.0	71.38	☐
472	Amada	50286 V6	v3	Amada 2V	45.5	0.4	88.0	6.0	71.38	☐
491	Amada	50386 ...	v3	Amada 2V	45.5	0.8	88.0	12.0	71.38	☐

#	Punch	# Pun...	Die	# Di...	R...	Result	Comments	Tested
16	AmadaV3 1108...	0	Amada 12206 V...	1	0.70	OK		☐
17	AmadaV3 1108...	0	Amada 50286 V...	2	0.80	OK		☐
18	AmadaV3 1108...	0	Amada 07186 [12]	1	1.00	OK		☐

Type	Included Holders
AmadaV3 Holder_290 [33]	AmadaV3 Rail_300-13mm _alinged2 [50]

Example of a die with one holder:

Die ID	Manufact...	Die ...	Version	Down J...	Height	Radius	Angle	V-Width	Max Po...	Hemming
4	Amada	01306	v3	Amada 6...	100.0	6.0	60.0	80.0	101.97	
12	Amada	07186	v3	Amada 1V	59.5	1.5	88.0	8.0	96.87	
26	Amada	10409	v3	Amada 6...	117.0	1.0	30.0	8.0	53.57	
33	Amada	12206 V5	v3	Amada Die	25.5	0.4	88.0	5.0	66.28	
34	Amada	12206 V9	v3	Amada Die	25.5	0.6	88.0	9.0	66.28	
370	Amada	33980 ...	v3	Amada 2V	38.0	1.0	30.0	12.0	40.79	

#	Punch	# Pun...	Die	# Di...	R...	Result	Comments	Tested
16	AmadaV3 1108...	0	Amada 12206 V...	1	0.70	OK		
17	AmadaV3 1108...	0	Amada 50286 V...	2	0.80	OK		
18	AmadaV3 1108...	0	Amada 07186 [12]	1	1.00	OK		

Type	Included Holders
AmadaV3 Holder_8000 [44]	

Example of a punch and die with one holder each:

Punch ID	Manufacturer	Punch Name	Version	Up Joint	Height	Radius	Angle	Max Power	Hemming
207	AmadaV3	155-08	v3	Euro	90.0	0.8	88.0	50.99	
225	AmadaV3	2028-06	v3	Euro	100.0	0.6	88.0	30.59	
231	AmadaV3	2108	v3	Euro	104.0	0.65	30.0	101.97	
428	AmadaV3	52-08	v3	Euro	120.0	0.8	88.0	50.99	
468	Wila NSII	BIU-014	v3	Wila NSII	120.0	3.0	60.0	160.0	
615	AmadaV3	R35_punc...	v3	Amada R...	40.0	35.0	0.0	101.97	

Die ID	Manufact...	Die ...	Version	Down J...	Height	Radius	Angle	V-Width	Max Po...	Hemming
12	Amada	07186	v3	Amada 1V	59.5	1.5	88.0	8.0	96.87	
26	Amada	10409	v3	Amada 6...	117.0	1.0	30.0	8.0	53.57	
33	Amada	12206 V5	v3	Amada Die	25.5	0.4	88.0	5.0	66.28	
34	Amada	12206 V9	v3	Amada Die	25.5	0.6	88.0	9.0	66.28	
370	Amada	33980 ...	v3	Amada 2V	38.0	1.0	30.0	12.0	40.79	
371	Amada	33980 V8	v3	Amada 2V	38.0	1.0	30.0	8.0	40.79	

#	Punch	# Punch...	Die	# Die...	Radius	Result	Comments	Tested
157	Wila NSII BIU-014...	1	Amada 12206 V9 [...]	1	3.00	OK		

Type	Included Holders
Rolleri Rolleri_AD20 [34]	
AmadaV3 Holder_290 [33]	

2.5.2.3.1.3 Auto Tooling Result Size Limits

These limits control how many solutions EsaBend3DM tests before stopping:

- Max. suitable combinations** – When EsaBend3DM has found this number of combinations, it stops searching. When this option is selected and the value is greater than zero, the value becomes visible in the **Automatic Tools Selection** dialog box, when you hover over the



icon at the bottom of the [Automatic Tools Selection](#) dialog box. You cannot set this value to more than 1000.

- **Non-suitable combinations discard limit** – When **EsaBend3DM** has discarded this number of combinations, it stops searching. When this option is selected and the value is greater than zero, the value becomes visible in the **Automatic Tools Selection** dialog box, when you 

hover over the icon at the bottom of the [Automatic Tools Selection](#) dialog box.

- **TIP:** You can also tell **EsaBend3DM** to stop searching by clicking the **Stop** button.

2.5.2.3.1.4 Auto Tooling Options

- **NOTE:** These options are active only when the [Check Geometry and Find Bend Sequence \(Full Mode\)](#) option is selected.

These options cause **EsaBend3DM** to make additional calculations beyond those specified by the [Selection Mode](#) and the [Auto Tooling Parameters](#).

2.5.2.3.1.4.1 Build Tool Stations

When this option is enabled, **EsaBend3DM** checks if the tested tooling set has the segmentation needed to create the tool stations for bending the part.

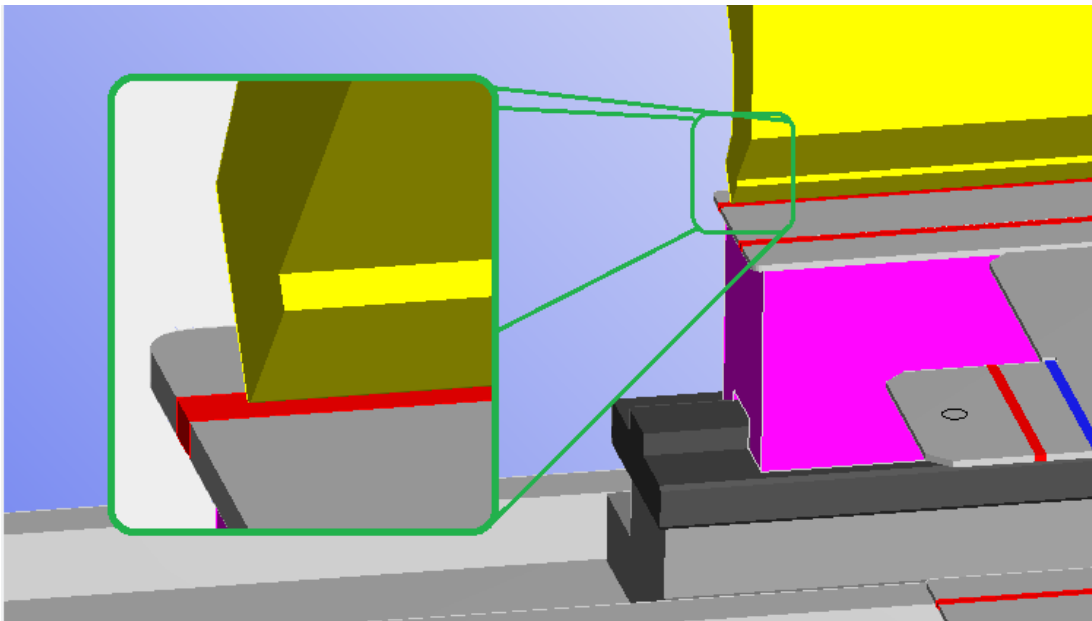
2.5.2.3.1.4.2 Check Heels Usage

When this option is enabled **EsaBend3DM** checks the tested tooling for collisions, and if they are found it performs the same tests but this time using heel segments for the punch.

2.5.2.3.1.4.3 Use Negative Tolerance

When selecting tool segments to fit the length of a hit, **EsaBend3DM** may not find the exact match. The **Negative Tolerance** allows **EsaBend3DM** to select segments that cover less than the hit length, within this tolerance.

For example, a **Negative Tolerance** of 5mm allows **EsaBend3DM** to select a segment of 200mm to fit a hit with a length of 204mm:



The default value is set in the **Tools Configuration** => **General** tab, in [Negative tolerance in tool stations](#).

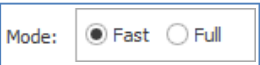
2.5.2.3.1.5 Collision Settings

These options enable and disable the various collision testing options that will be used during the automatic sequencing feature. (You can also define the [collision options for manual sequencing](#)

[and the simulation stage.](#))

2.5.2.3.2 Full Mode Tooling Results

This section contains several options:

-  – Opens the [Automatic Tools Selection Setup](#) dialog box.
-  – Lets you quickly decide between **Fast** and **Full**, without having to open the **Automatic Tools Selection Setup** dialog box.
-  **Select All** icon – Selects all joint types (in all the panes above this icon) so that when you click the **Start** button, the search runs on all the joint types (not just the selected joint types).
-  – Begins the search for compatible tools. Searches only the selected joint types.
-  – Halts the search for compatible tools.

2.5.2.3.3 Tools Selection Results Pane

This pane (towards the bottom of the [Automatic Tools Selection](#) dialog box) shows the results of the automatic calculations:

#		Punch	# Pun...	Die	# ...	Radius	Result	Comments	Tested
2		Wila NSII BIU-...	0	Wila NSII OZU...	0	1.00	OK	Bend 3 Bend 2 Bend 7 ...	
3		Wila NSII BIU-...	0	Wila NSII OZU...	0	1.00	OK	Bend 3 Bend 2 Bend 7 ...	
4		Wila NSII BIU-...	0	Wila NSII OZU...	0	1.00	OK	Bend 3 Bend 2 Bend 7 ...	
5		Wila NSII BIU-...	0	Wila NSII OZU...	0	1.00	OK	Bend 3 Bend 2 Bend 7 ...	
6		Amada 213 [266]	0	Wila NSII OZU...	0	1.00	NO (Not Suitable)	Holder problem	
7		Amada 213 [266]	0	Wila NSII OZU...	0	1.00	NO (Not Suitable)	Holder problem	
8		Amada 213 [266]	0	Wila NSII OZU...	0	1.00	NO (Not Suitable)	Holder problem	
9		Amada 213 [266]	0	Wila NSII OZU...	0	1.30	NO (Radius Error)	Radius tolerance test failed	
10		Amada 213 [266]	0	Wila NSII OZU...	0	1.30	NO (Radius Error)	Radius tolerance test failed	

2.5.2.3.4 Bottom Line of Automatic Tools Selection

At the bottom of the Automatic Tools Selection dialog box are a number of icons and other fields:

-  **Max suitable combinations.** Shows you the limit of suitable combinations. You set this value in the Automatic Tools Selection Setup dialog box => [Auto Tooling Result Size Limits](#) section. Auto tooling searches for no more than this number of tooling combinations. Is only active when this option is selected and greater than zero.
-  **Non-suitable combinations discard limit.** Shows you the limit of non-suitable combinations. You set this value in the Automatic Tools Selection Setup dialog box => [Auto Tooling Result Size Limits](#) section. Auto tooling searches for no more than this number of tooling combinations. Is only active when this option is selected and greater than zero.
-  **Preview sequence on flat image.** Is only active when there is at least one result in the **Tool Selection Results** pane.
-  1048 **Number of selected punches.**
-  1 **Number of selected dies.**

-  1048 **Number of punch/die combinations.**
- **Remember as preferred tools** – This option is the same as in the **Select Tools** dialog box. Click to save the current set of tools as the default for a specific combination of machine + material + thickness. Is only active when there is at least one result in the **Tools Selection Results** pane.
- **Go directly to simulation** -- Click to go directly to the **Simulation** stage (skipping the **Sequencing** and **Fingers** stages). Is only active when in **Full Mode** and there is at least one result in the **Tool Selection Results** pane.
- **Accept** applies the current set of tools and closes the dialog box.
- **Cancel** closes the dialog box without saving.

2.5.2.4 Hemming Tools Assignment

A hemming bend comprises two distinct hits, where the hits may be done with different tools:

- Prebend
- Flattening

Hemming bends receive special treatment in **EsaBend3DM**.

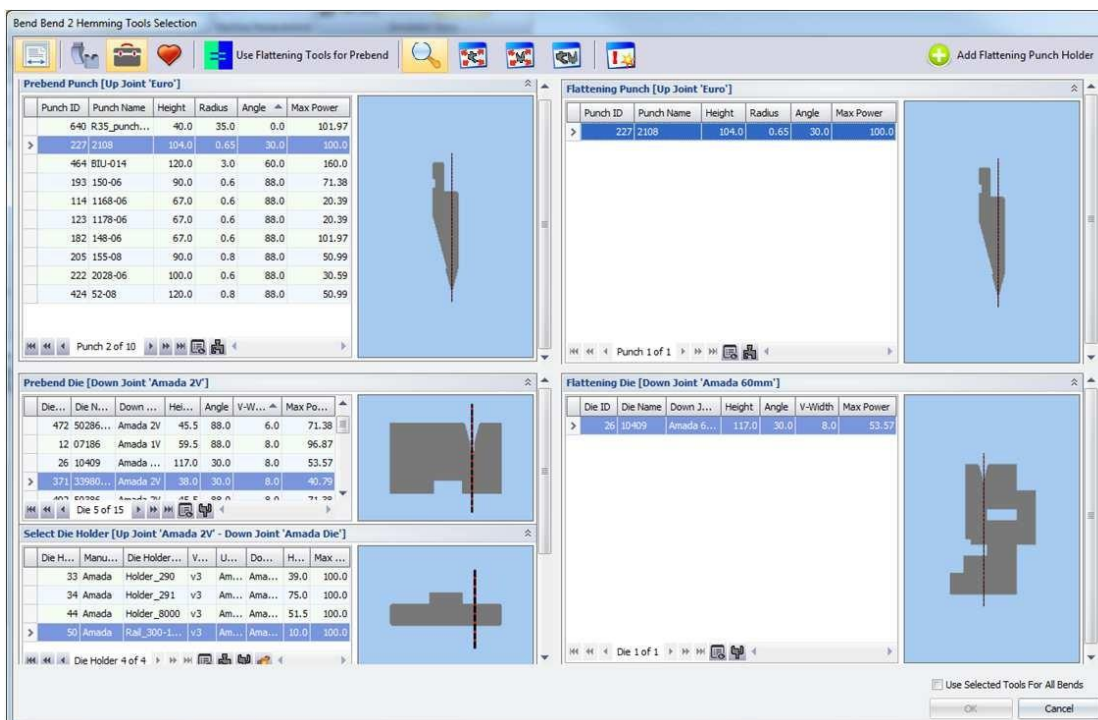
2.5.2.4.1 Automatic Hemming Tools Assignment

When a machine has specific tools assigned in its **Hemming** tab (in the **Tool Configuration** dialog box), they are automatically selected when loading a part.

If a machine does not have specific tools assigned, you can select them manually for a bend.

2.5.2.4.2 Manual Hemming Tools Assignment

When you select a hemming bend and click the **Select Tools** button, the **Bend Hemming Tools Selection** dialog box opens:



In the left pane you see all the tools available in the selected **tools source**, while the right pane shows only those tools that are defined as a **hemming punch or hemming die**.

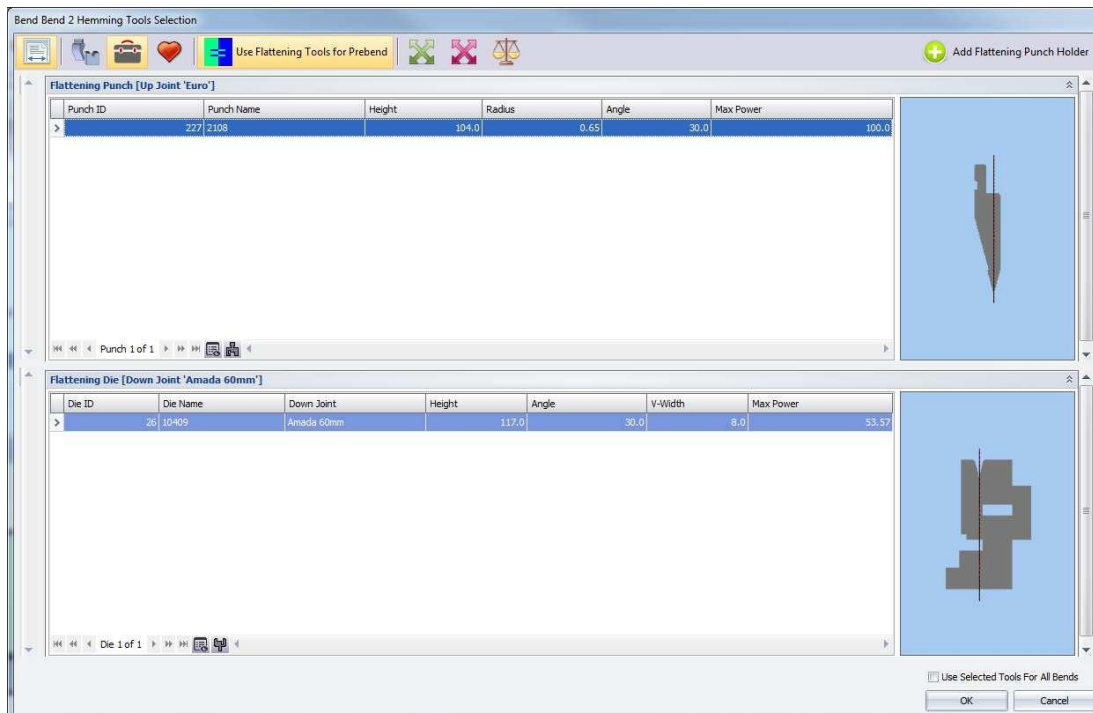
- **NOTE:** Even though this dialog box is very different from the **regular tool selection dialog box**, it shares many common functions such as **setting the tools source**, defining the **window division**, **adding and removing holders**, and **filtering**.

2.5.2.4.2.1 Use Flattening Tools for Prebend

Some hemming tools can be used for both the prebend and flattening hits. To do this, click the



toggle. Only the right pane of the dialog box is displayed for tool selection:



2.5.2.4.2.2 Use Selected Tools for All Bends

When you choose this option, **EsaBend3DM** uses the tools you select here for normal bends as well as hemming.

When the [Use Flattening Tools for Prebend](#) option is not selected, **EsaBend3DM** uses the **Prebend** (left pane) tools for the normal bends.

2.5.2.5 Setup

You can use a previously saved tool setup by selecting it from the dropdown list and clicking **Assign**. Only setups that match the selected machine appear in the list. Once selected, **EsaBend3DM** tries to find a sequence using the setup.

2.5.2.6 Assign

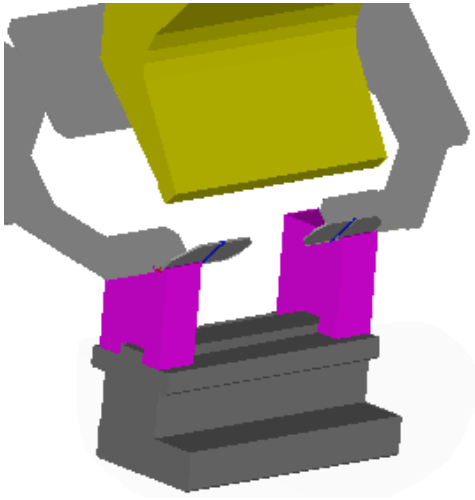
This button assigns the tool station setup. Note that the clamp types must be compatible. For example, if your saved setup is intended for Euro clamps, **EsaBend3DM** does not show it in the Setup list for processing on a Wila machine.

2.5.3 Managing Bends

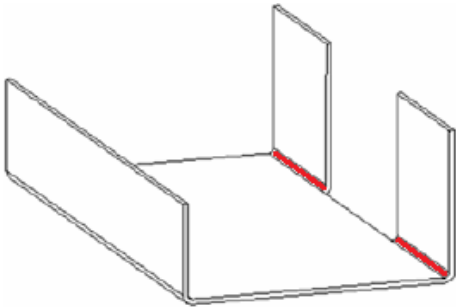
In this section you can split and merge collinear bends and [exclude bends](#) from the processing. There is also a complete explanation of [bumping](#) definitions.

2.5.3.1 Collinear Bends

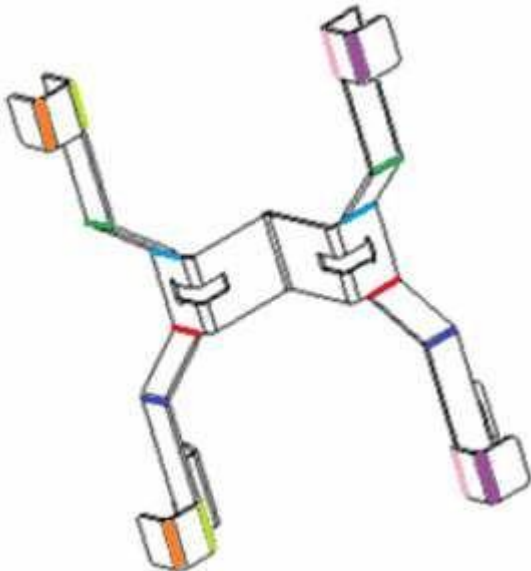
Collinear bends are a group of two or more bends that can be created with a single hit:



Such bends may remain collinear throughout the bending sequence:



Sometimes bends are collinear only during the hit itself, and then consequent hits break up their alignment. The bend colors below have been added to show their collinearity; current or previous:

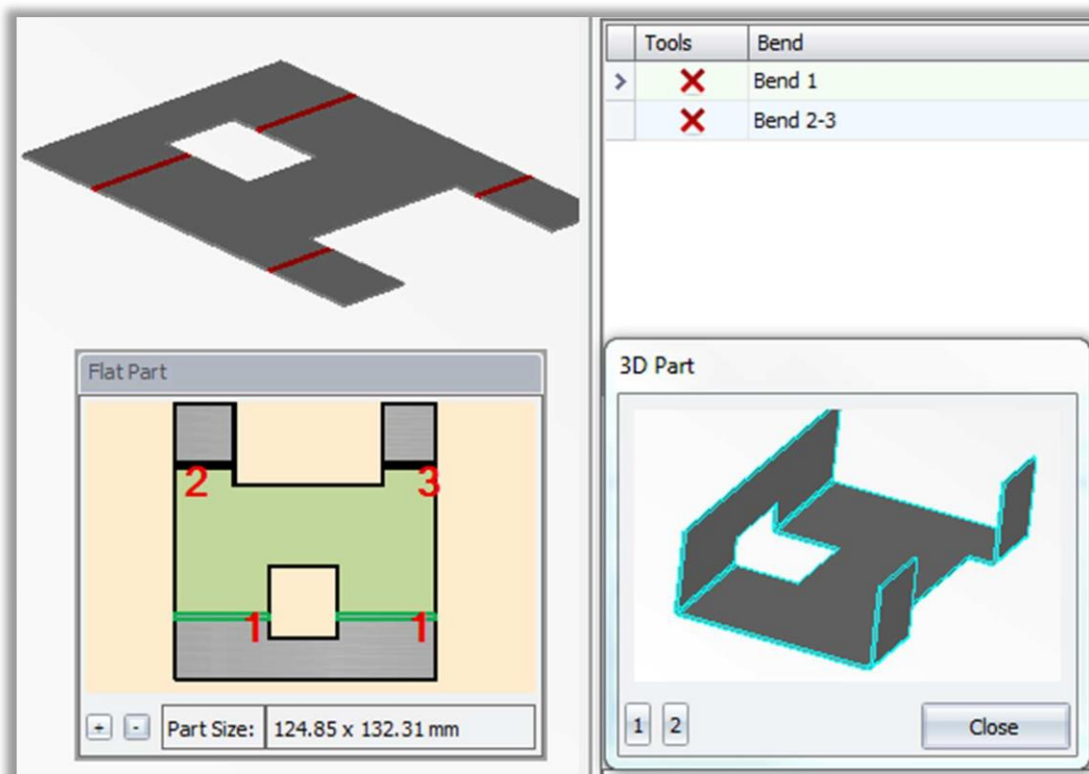


2.5.3.1.1 Collinear Versus Non-Contiguous Bends

Only bends that belong to separate flanges are considered collinear. Bends that belong to the same flange are considered a single non-contiguous bend.

For example, the part below has

- Bend 1 – non-contiguous but connects to the same flange.
- Bend 2-3 – collinear because each individual bend (2 and 3) connects to a separate flange.



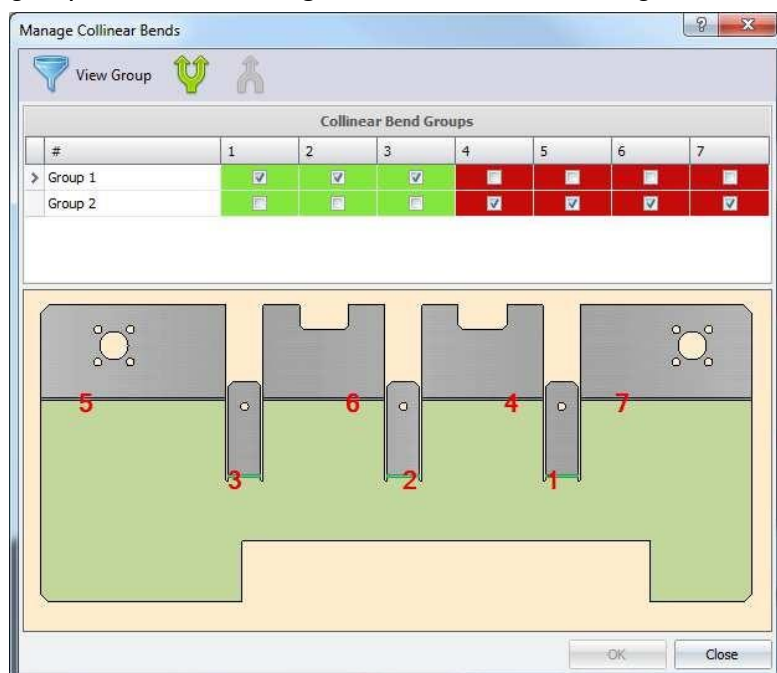
2.5.3.1.2 Split and Merge Collinear Bends

You can use **Split** or **Merge** to separate collinear bends into their individual components or recombine them.

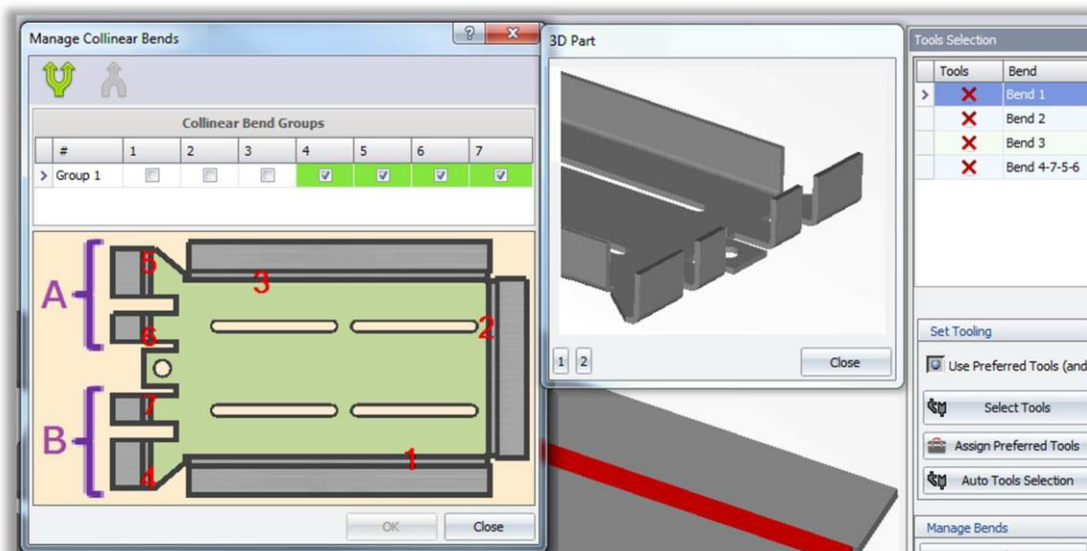
You can use **Split All** or **Merge All** to separate all the collinear bends into their individual components or recombine them.

2.5.3.1.3 Group Collinear Bends

When a collinear bend comprises more than two bends, you can split them into two (or more) groups. Use the **Manage Collinear Bends** dialog box:

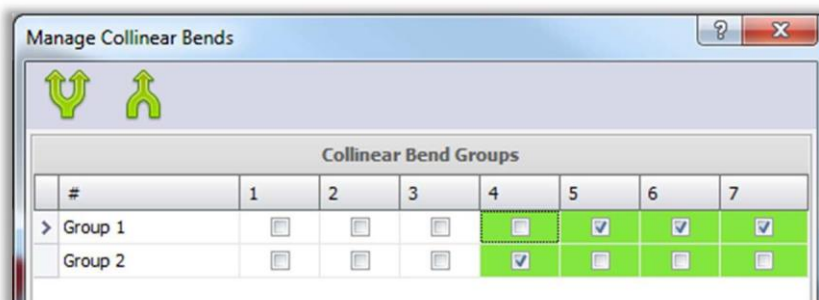


Each group of collinear bends is color-coded to make split groups easy to recognize. For example, see the following part:

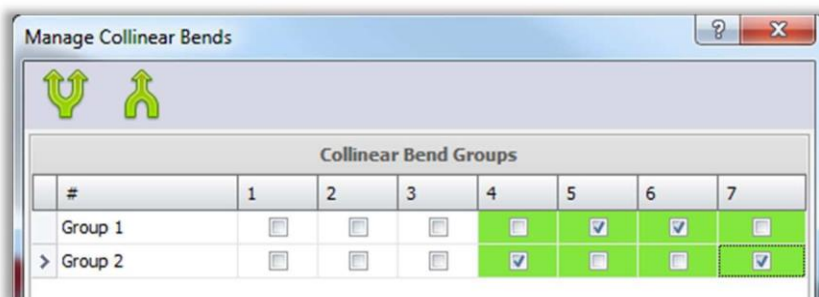


You may want to perform the collinear bends in two hits: one for Bends 5 and 6 (A above) and the other for 4 and 7 (B above).

To do this, uncheck Bend 4 from the group, thereby causing a new line to be opened for it (since it is a new group):



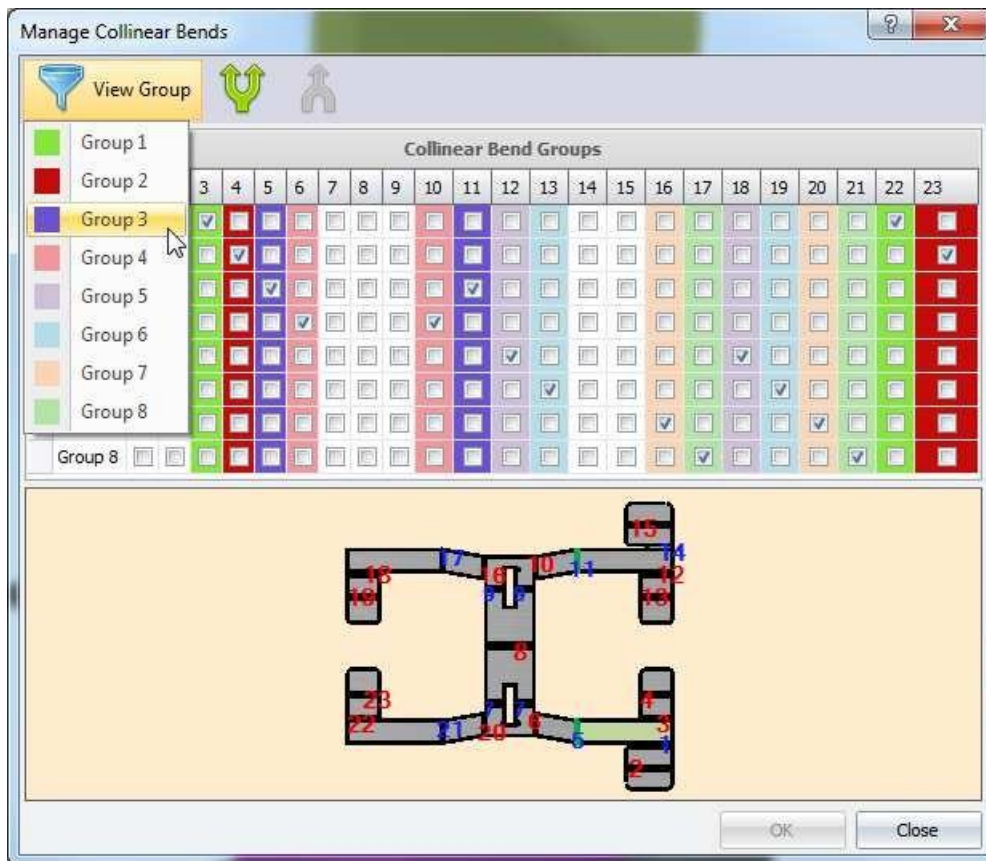
Then check Bend 7 into the new group:



When you click the **OK** button to confirm the change, **EsaBend3DM** rearranges the bends according to the new division:

Tools	Bend
> X	Bend 1
X	Bend 2
X	Bend 3
X	Bend 4-7
X	Bend 5-6

When your part has several groups, you may want to view only one of them. To select one group, click the **View Group** button:



NOTE: The **View Group** button appears only when there is more than one group in the part.

2.5.3.2 Exclude Bends

Excluded bends are not intended to be in the bend sequence.

NOTE: These bends are always placed at the beginning of the sequence, and are not available in the **Hits Sequencing** panel.

They are usually

- For bends that are done before the sequence.
- A different sequence of hits that are done in a separate setup or on a different machine.

An example of an excluded bend is hemming bends, which are sometimes done separately from the rest of the bends in the part due to tooling or machine considerations.

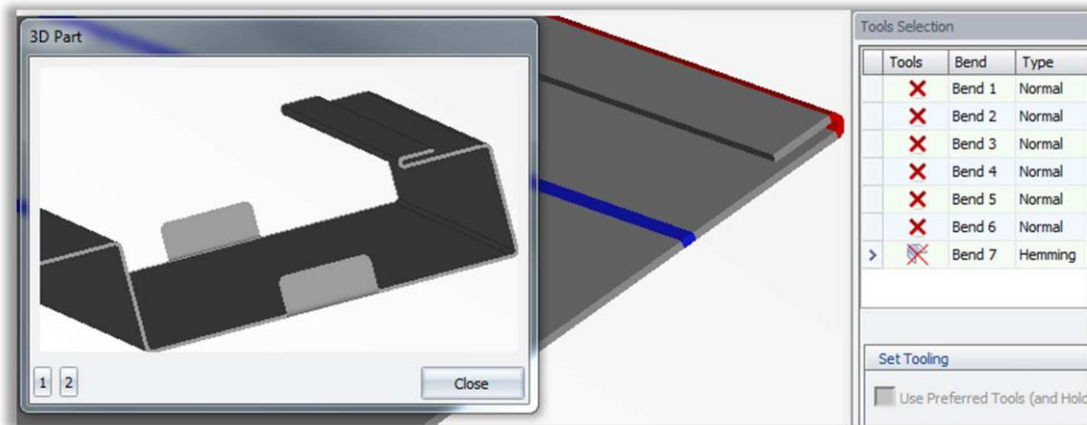
To exclude bends, click the **Exclude Bends** button; you are now in the Exclusion Mode. Any bend on which you click is bent, its tooling is discarded, and it is added to the excluded list.

NOTE: **EsaBend3DM** assumes that excluded bends are bent prior to the **EsaBend3DM** simulation. Note that excluded bends are different from [untooled hits](#), which can be placed before or after the other bends.

To exit this mode, click the **Exclude Bends** button again.

To reverse the exclusion, re-enter the Exclusion Mode and click the bend again.

For example, in the following part, the hemming bend is done on a different machine; therefore, it has been excluded:

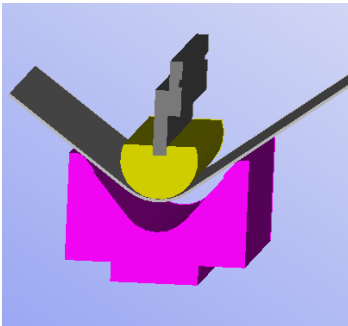


NOTE: It is shown folded, as opposed to the other bends.

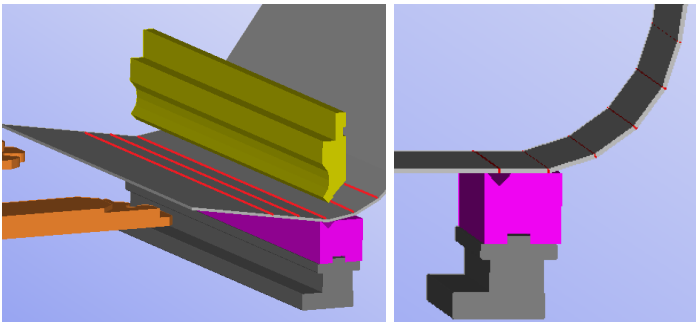
2.5.3.3 Bumping

A bumped radius is a bend, almost exclusively with a [large radius](#), which is made by a series of shallow-angled hits designed to create a smooth result.

Instead of one hit with a very large V die:



Several hits with a smaller V achieve the smooth bend:



2.5.3.3.1 Convert Bumped to Normal

Converting a bumped bend to a normal bend is useful for cases where a large V die and large radius punch are available to perform the bend.

2.5.3.3.2 Convert Normal to Bumped

Converting a normal bend to a bumped bend is useful for cases where a bend is not automatically set as bumped.

When you click this button, the **Bumping Radius Setup** dialog box opens and you can define the bumping steps for the bend.

2.5.3.3.3 Set Bumping Steps

This button opens the **Bumping Radius Setup** dialog box so you can define the bumping steps for the bend:

Bumping Radius Setup: Bend 1

Bend Info:
 Bend Radius: 0.90 Punch:
 Bend Angle: 90 Die:

Radius pitch method
☒ Steps Number: 13
☐ Pitch: 0.11
☐ Tooling: Select Tools

Step angle method
☐ All angles equal
☒ First and last different (50%, 100%...100%, 50%)
☐ First 2 and last 2 different (25%, 75%, 100%...100%, 75%, 25%)

OK Cancel

2.5.3.3.4 Bend Info

This area displays information about the bend: the radius, angle, and tools:

Bend Info:	
Bend Radius:	100 Punch: Amada 148-06
Bend Angle:	90 Die: Amada 5068 V16

2.5.3.3.5 Pitch and Step Settings

Here you can determine the method used to create the bumping.

- NOTE: The [Steps Number](#) and the [Pitch](#) are two sides of the same bumping calculation; when there are more steps (hits), the pitch is smaller. Conversely, when the pitch is bigger, the bend requires fewer steps.

2.5.3.3.5.1 Steps Number

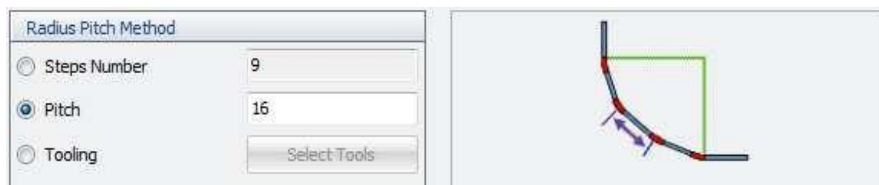
Specify the number of steps (hits) to use in the bumping:

Radius Pitch Method
☒ Steps Number: 13
☐ Pitch: 12.08
☐ Tooling: Select Tools

When there are more steps, the pitch is smaller and the result is smoother.

2.5.3.3.5.2 Pitch

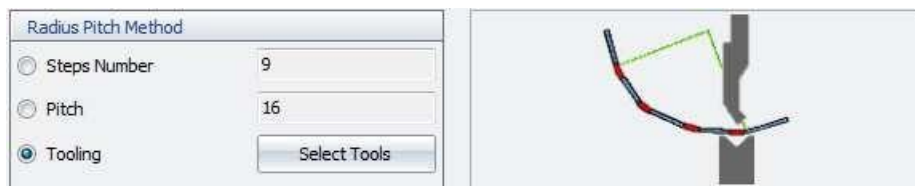
Specify the distance between the hits in the bumping:



When the hits are closer, the result is smoother, but more hits are required to achieve the bend.

2.5.3.3.5.3 Tooling

Specify which tools to use in the bumping:



Use the **Select Tools** button to launch the [dialog box for tool selection](#).

The V width of the die is used to calculate the smallest possible pitch.

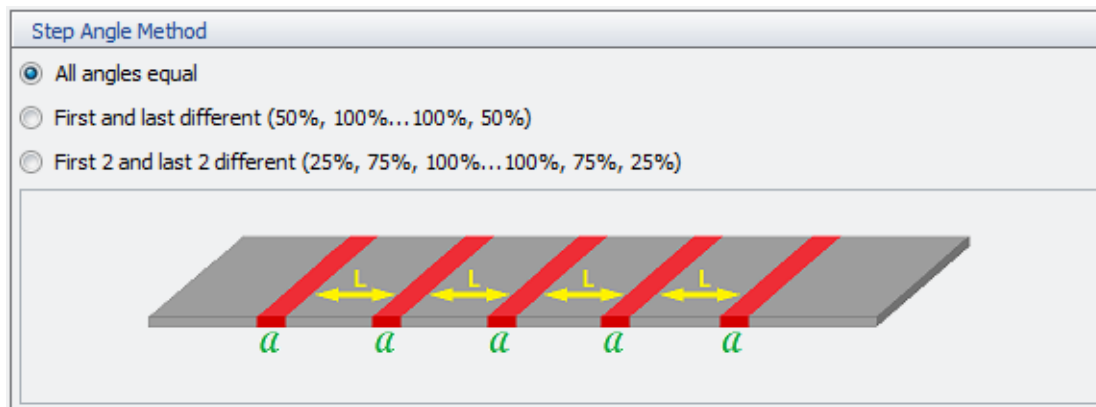
- 💡 **TIP:** After the tool selection you can always [edit the number of steps](#) if this calculation gives too many. This does not remove the tooling definition.

2.5.3.3.6 Step Angle Settings

Here you can set how the defined pitch and the bend angle are distributed along the bend's arc.

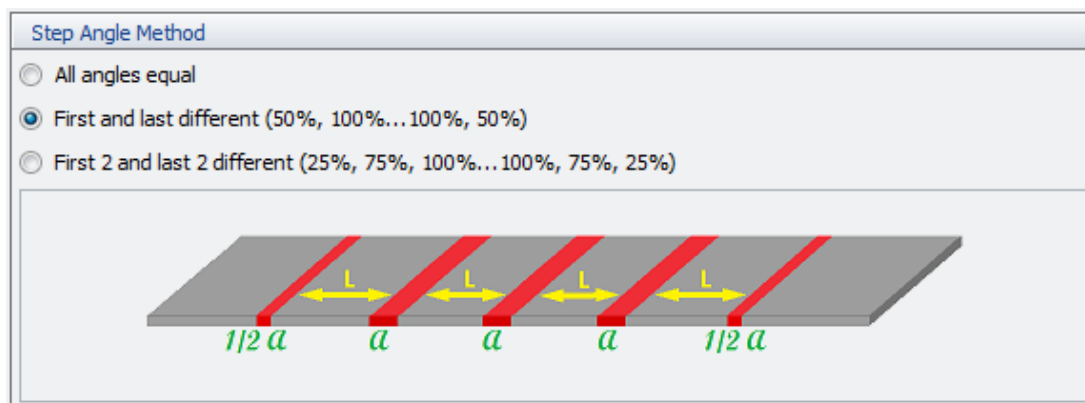
2.5.3.3.6.1 All Angles Equal

All angles and pitches are equal:



2.5.3.3.6.2 First and Last Different

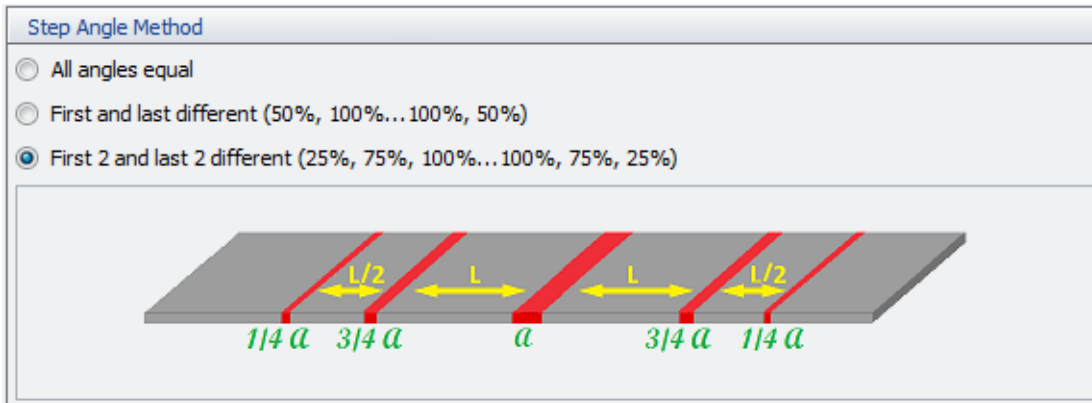
All pitches are equal, but the first and last angles are half of the central ones:



This gives a smoother start and end for the resulting bend.

2.5.3.3.6.3 First Two and Last Two Different

Start and end angles and pitches are different from the central ones:



- The first and last angles are a quarter of the central angles. Their pitches are half of the central angles.
- The second and second-from-last angles have the same pitch. Their angles are three-quarters of the central angles.

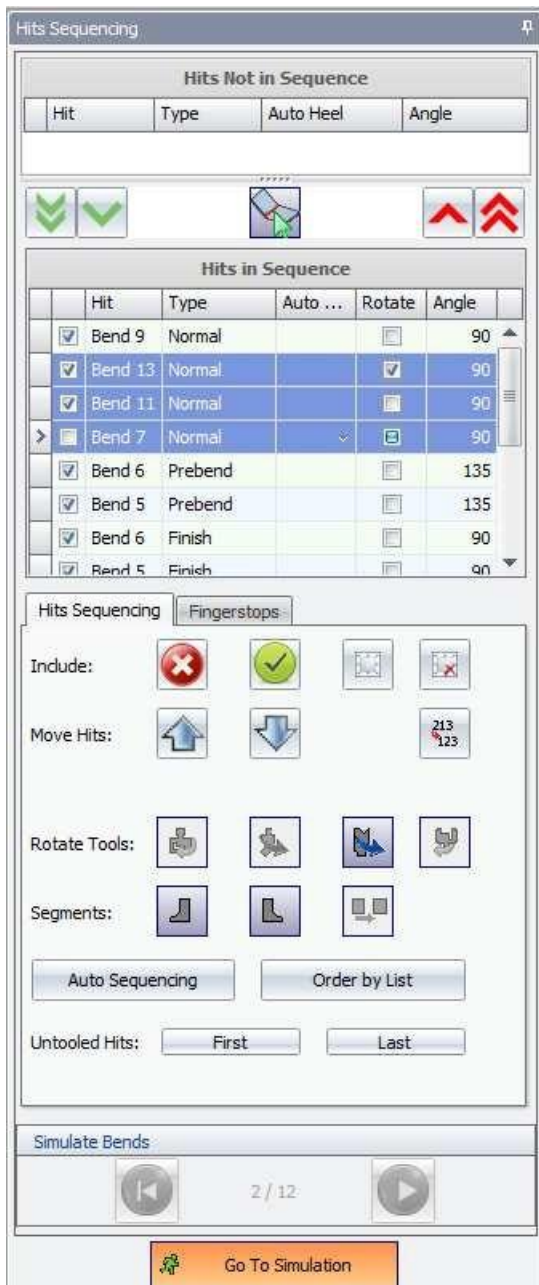
2.6 Sequencing

In this stage you determine the order of the hits that creates the bends and adjust the positions of the finger stops. You can only progress to the sequencing stage once you have determined the tools for each bend in the [tooling stage](#).

Each bend consists of one or more hits. For example, a hemming bend may require a prebend hit and then a flattening hit.

There are several different ways to set the order:

- **Automatic** – EsaBend3DM calculates the most efficient order.
- **Manual** – Each time you make a change to the hit order, EsaBend3DM recalculates the design and redisplay the [Part Display Area](#).
- **Order by Hit** – Opens a dialog box where you can change the order. EsaBend3DM does not recalculate and redisplay until you close the dialog box.
- **Graphic ordering** – EsaBend3DM gives you the opportunity to click the bends in the [Part Display Area](#) in the order you want them done, or unfold them from the finished product.
- You can always reset the sequencing by clicking the [Reset Sequencing Workflow Stage](#) icon  in the **Simulation** tab.



2.6.1 Hits Not in Sequence Section

This section lists the bends that have not yet been sequenced. These are the columns:

- **Hit** – The name that **EsaBend3DM** randomly assigns to each hit.
- **Type** options:
 - **Normal** – a regular hit
 - **Prebend** – the initial hits of a bend.
 - **Flatten** – the last hit of a hemming bend.
 - **Finish** – the last hit of a non-hemming **Split** bend.
- **Auto Heel** – The type of heel that **EsaBend3DM** should use for automatic sequencing. When you choose a heel type, you are limiting **EsaBend3DM** to the sequencing options available for this heel type. This limitation often saves time. Choices: none, right heel, left heel, and heel on both sides.
- **Angle** – The angle that will result from the hit. Initially displays the angle stored with the part information during the design stage. You can change it here.

Click these icons to add the hits to the hit sequence:

-  **Append All in Sequence** – Moves all the hits to the **Hits in Sequence** section.
 -  **Append in Sequence** – Moves the currently selected hit to the end of the **Hits in Sequence** section.
 -  **Sequence Interactively** – Allows you to click bends in the graphical representation of the part, thereby adding them to the hit sequence. If you have already defined a hit sequence, you must first approve its deletion. When you enter this mode, two additional icons become visible:
 -  **Remove last sequence** -- After you click one or more bends to add them to the sequence, allows you to delete the last hit.
 -  **Reverse Sequence** -- Allows you to select the bends from last to first.

To get out of the **Sequence Interactively** mode, click the icon again.
 -  **Remove from Sequence** – Returns the currently selected hit from the **Hits in Sequence** section to the table above.
 -  **Remove All from Sequence** – Returns all the hits from the **Hits in Sequence** section to the table above.
-  **TIP:** You can resize the height of this section by pulling the separator  up and down.
-  **NOTE:** Inclusion/exclusion of hits is reflected in the **Opened Part Information** panel on the left of the screen.

2.6.2 Hits in Sequence Section

The display in this section changes depending on whether you are viewing the **Hits Sequencing** tab or the **Fingers** tab below this section.

2.6.2.1 Hits Sequencing View

If the **Hits Sequencing** tab is visible, this section includes these columns (in addition to the columns in the **Hits Not in Sequence** section):

- Checkboxes at the start of the row – By default, all hits are checked. When a hit is not checked, it will not be executed, and it is called an “[excluded hit](#)”.
-  **NOTE:** You can place excluded hits before or after the other bends. Note that excluded hits are not the same as [excluded bends](#).
- **Rotate** – Indicates whether the part is rotated. You can rotate the part by 180° on the horizontal plane before executing the hit.
-  **NOTE:** The neutral symbol  indicates that rotation is not relevant for this hit because the hit is not checked.

When a hit appears in this section, you can split it into two hits by selecting the hit and clicking the **Split** icon .

You can merge a split hit by selecting the hit and clicking the **Merge** icon .

2.6.2.2 Finger Stops View

If the **Finger Stops** tab is visible, you should see these columns:

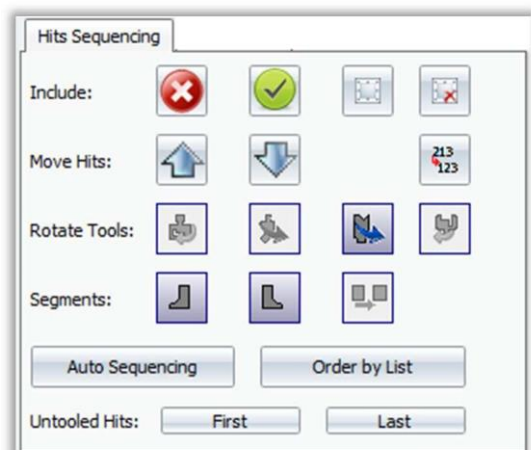
- **Hit** – As explained above.

- **Type** – As explained above.
- **Stop** – The place on the finger that stabilizes the part, e.g., Crab, Support 1. This is one of the ways to snap the finger to a part.
- **Retract** – **EsaBend3DM** moves the fingers backwards before the hit, according to this value. Modes for the selected bend:
 - **M** = **Manual Retract Mode**, i.e., you are manually changing the retraction value.
 - **A** = **Auto Retract Mode**, i.e., the retraction value is automatically set.

2.6.3 Hits Sequencing Tab

In this tab you control the list of the **Hits in Sequence** items.

 **TIP:** To select more than one hit hold down the **Shift** key.



2.6.3.1 Include Hits Icons

-  **Exclude Selected Hits** – Only active when at least one of the currently selected hits in **Hits in Sequence** are checked . Has the same effect as clicking the [checkbox](#) column.
-  **Include Selected Hits** – Only active when at least one of the currently selected hits in **Hits in Sequence** are unchecked . Has the same effect as clicking the [checkbox](#) column.
-  **Select All** – Highlights all hits in **Hits in Sequence**.
-  **Select None** – Removes the highlight from all the hits in **Hits in Sequence**.

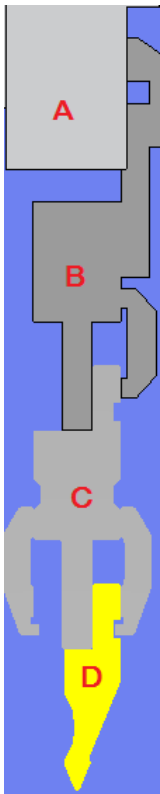
2.6.3.2 Move Hits Icons

-  **Move Up** – Active when only one hit is selected, and that hit is not the first one.
-  **Move Down** – Active when only one hit is selected, and that hit is not the last one.
-  **Rename Hits by Order** – Changes the names of the hits in **Hits in Sequence** to reflect the order in which they are listed.

2.6.3.3 Rotate Tools Icons

- 
Turn Punch Holder(s) and Punch – Turns the punch holder and the punch connected to it 180° on the horizontal plane.
 Only active if the holder's topmost joint is rotatable or if the clamp's joint allows this.
- 
Turn Punch – Turns the punch tool 180° on the horizontal plane. Only active if the punch joint is rotatable or if the clamp's joint allows this (or the holder's if there is one).
- 
Turn Die – Turns the die tool 180° on the horizontal plane. Only active if the die joint is rotatable.
- 
Turn Die Holder(s) and Die – Turns the die and die holder tool 180° on the horizontal plane. Only active if the holder's lowest joint is rotatable

The following example demonstrates how tool rotation behaves.

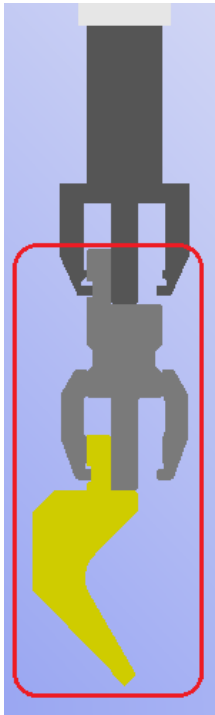


These are objects in the picture:

- A** – The upper beam.
- B** – The upper clamp. The down joint type is Euro and the clamp is non-symmetric.
- C** – A punch holder. The upper joint type is Euro and is not rotatable. The clamp is symmetric.
- D** – The punch. The joint type is Euro and it is not rotatable.

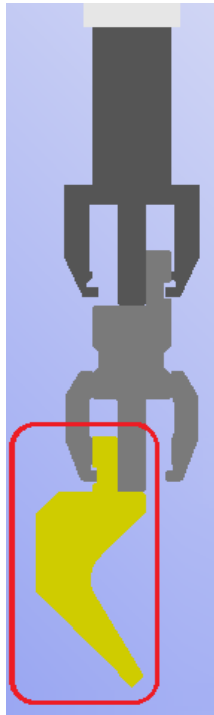
Clicking combinations of the **Turn** icons yields different results. The objects rotated are highlighted:

If you click **Turn Punch Holder**:



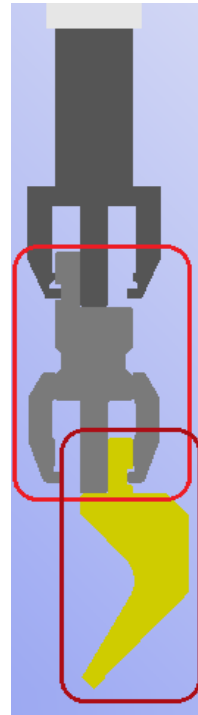
Holder and punch rotated together

If you click **Turn Punch**:



Punch alone rotated

If you click both:



Holder rotated and punch rotated back

2.6.3.4 Segments Icons

These are the icons affecting segments:

-  **Left Heel** – Changes the punch tool to a left heel punch tool. The tool must be long enough to allow a heel.
-  **Right Heel** – Changes the punch tool to a right heel punch tool. The tool must be long enough to allow a heel.
-  **Divide/Unify Tools** – Only active if the bend has collinear bends.

2.6.3.5 Auto Sequencing Button

EsaBend3DM opens the **Auto Hits Sequence Setup** dialog box.

2.6.3.5.1 Setup Button

The **Configure Auto Sequencing** dialog box opens.

2.6.3.5.1.1 Automatic Sequencing Mode Section

When you click [Start](#):

- Fast Search** – This is the recommended mode. **EsaBend3DM** makes educated guesses and suggests combinations.
- Deep Search** – **EsaBend3DM** methodically searches for all possible combinations. There may be many results.

At any stage you can click the [Stop](#) button.

2.6.3.5.1.2 Untooled Hits Mode Section

First – Perform the untooled hits before the tooled hits.

Regular – Perform the untooled hits as defined.

Last – Perform the untooled hits after the tooled hits.

2.6.3.5.1.3 Automatic Sequencing Parameters Section

See [Auto Tooling Options](#).

2.6.3.5.1.4 Collision Options Section

See [explanation of collision options](#).

2.6.3.5.2 Start/Stop Buttons

When you click **Start**, EsaBend3DM calculates the most efficient hit sequence for you. When you see enough alternatives in the [Auto Sequence Selection Table](#), click the **Stop** button.

2.6.3.5.3 Auto Sequence Selection Table

Auto Hits Sequence Setup
?
✖

Setup

Start

Finished (100%)

Stop

Auto Sequence Selection										
#		Hit Sequence	Total Rota...	Largest Gaugi...	Average Gau...	# Diagonal Ga...	# Flips	Tool Statio...	Re...	Tested
▶	1	Bend 8 Bend 6 Bend 7 Bend 5 Bend 4 Bend 2 ...	90.0	2	1	0	5	1 OK		☐
	2	Bend 6 Bend 8 Bend 5 Bend 7 Bend 4 Bend 2 ...	90.0	2	1	0	5	1 OK		☐
	3	Bend 6 Bend 8 Bend 7 Bend 5 Bend 4 Bend 2 ...	90.0	2	1	0	4	1 OK		☐
	4	Bend 8 Bend 6 Bend 5 Bend 7 Bend 4 Bend 2 ...	90.0	2	1	0	4	1 OK		☐

⏮
⏪
◀
Hits sequence result 1 of 4
▶
⏩
⏭
🚩
🚩
🚩
⏮

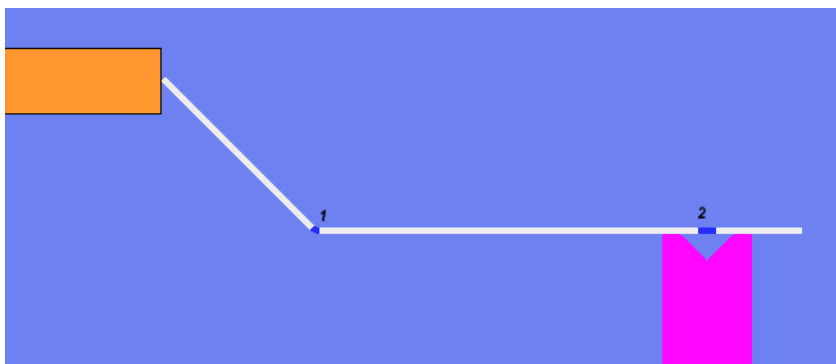
00:00:39

Accept

Cancel

The table shows these columns:

- **#** – The row number.
- **Hit Sequence** – The order of the hits.
- **Total Rotation** – The sum of all part rotations, in degrees.
- **Largest Gauging #** – Gauge # is the number of bent bends between the current hit and the furthestmost point on the X axis, so this column shows the largest gauge number.
- **Average Gauging #** – The average of the gauge numbers of the hits in this alternative.
- **# Diagonal Gauging** – the number of hits that have a diagonal flange adjacent to the finger, as in the following example:



- **# Flips** – Indicates how many times the user has to flip the part.
- **Tool Stations #** – The number of stations required.
- **Result** – Indicates if this alternative is OK or only partially suitable (i.e., contains segment errors).

- **Tested** – When you highlight one of the alternatives and click **Accept**, the **Configure Auto Sequencing** dialog box closes. If you click the **Setup** button again, the **Configure Auto Sequencing** dialog box reopens, and the **Tested** column for the alternative you highlighted is checked, indicating that **EsaBend3DM** has checked it.

2.6.3.5.4 Preview

To see a preview of the sequence on the flat image, click the eye icon  and click a result row.

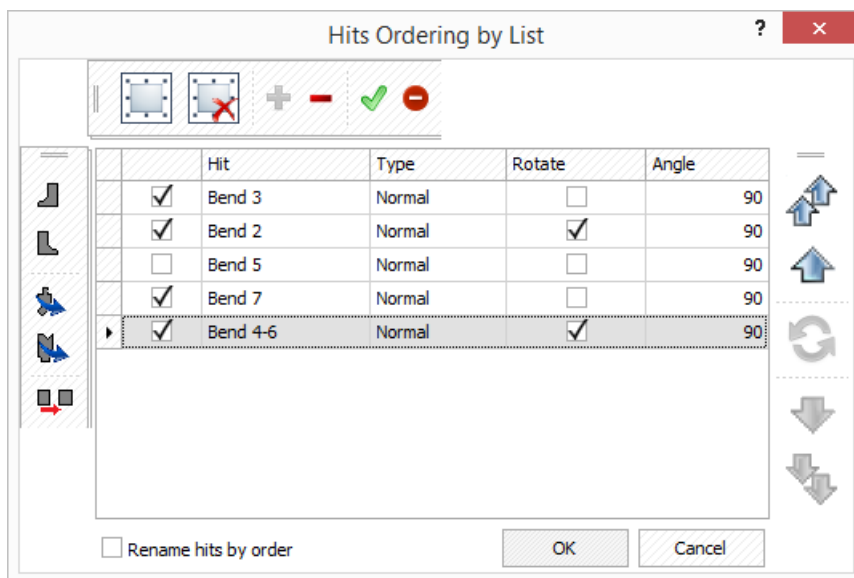
- **TIP:** You can set the resolution of the preview by specifying the height in **Options => Reports => [Auto sequence preview resolution](#)**.

2.6.3.5.5 Time

The clock icon  shows you how long **EsaBend3DM** took to calculate the alternatives.

2.6.3.6 Order by List Button

Opens a dialog box where you can perform all the rotate and move manipulations described in [Hits Sequencing](#). This is a quick manual method, where **EsaBend3DM** does not recalculate and update the graphic display after each change:



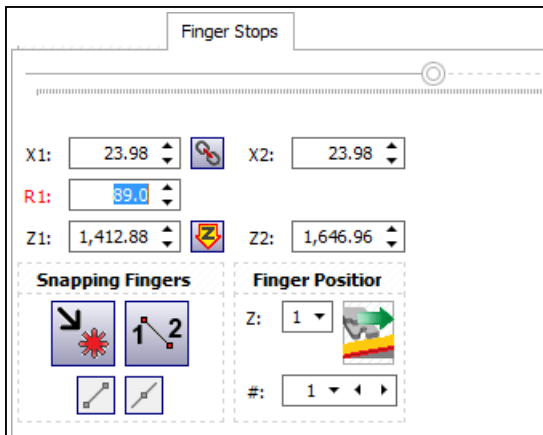
2.6.3.7 Untooled Hits Buttons

Untooled hits can be placed before or after the other bends:

- **First** – Moves unchecked tools listed in the **Hits in Sequence** section to the beginning of the list.
- **Last** – Moves unchecked tools listed in the **Hits in Sequence** section to the end of the list.
- **NOTE:** Untooled hits are not the same as [excluded bends](#), which are assumed bent prior to the **EsaBend3DM** simulation.

2.6.4 Finger Stops Tab

In this tab you control the exact placement of the fingers. **EsaBend3DM** performs calculations for you, and you have the option of changing the results.



The colors of the fingers change, depending on their state:

- **Neutral** – The color depends on the definitions of the machine (e.g., brown).
- **Gray** – You have selected the finger.
- **Very light neutral** – You are moving the finger to a good position (e.g., light yellow).
- **Light neutral** – You are moving the finger to a potentially problematic position (e.g., light brown).
- **Red** – The finger will collide.

2.6.4.1 Finger Axis Manipulation

When you highlight one of the axis positions, the name of the active field changes to red; e.g. **R1**:



You can change the values in this section in a number of ways:

- Highlight one of the values and pull the slider to the right and the left:



- Type a value in the field.
- Position the cursor to the right of the digit you want to change, and click the up and down arrows. Examples:

- Clicking the up arrow once, as shown, gives a value of 403:



- Clicking the up arrow once, as shown, gives 394:



EsaBend3DM allows you to change the finger positions along the X, R, and Z axes.

- **NOTE:** All machines have **Z1** and **Z2** axes, with at least one **R** and one **X** axes. The number of axes and their limitations depend on the machine's configuration.

X axis:

- **X1:** Moves the left finger forwards and back.
-  **Link X1 and X2** – When selected, the two fingers move in tandem back and forth, from the same starting point.
- **X2:** Moves the right finger forwards and back.

R axis:

- **R1:** Moves the finger up and down (or if the machine supports it, moves only the left finger).
-  **Link R1 and R2:** (For machines that support this.) When selected, the two fingers move in tandem up and down from the same starting point.
- **R2:** (For machines that support this.) Moves the right finger up and down.

Z axis:

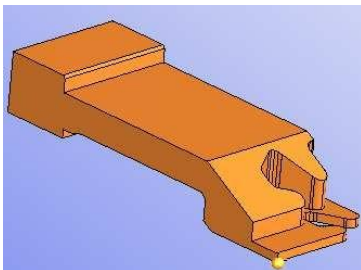
- **Z1:** Moves the left finger sideways, relative to the zero position.
-  **Set current Z position for all next hits** – EsaBend3DM copies the Z position you define here as the finger position for all the subsequent hits.
- **Z2:** Moves the right finger sideways, relative to the zero position.

2.6.4.2 How to Snap Finger Stops

There are several different ways to snap finger stops to the part:

- Via the **Hits in Sequence** section, using the [Stop](#) column.
- [Point-to-point](#) – You indicate which finger stop to snap to which point on the part.
- [Origin-to-point](#) – You indicate to which axis to align the finger's origin.

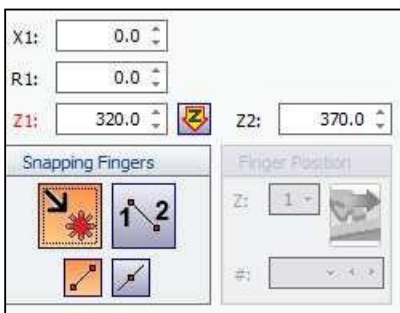
This origin can be seen as a yellow dot when you open the **Home=>Fingers** dialog and **Preview** a finger, e.g.:



- [Get next finger stop](#) position – EsaBend3DM calculates another position for the selected finger.

2.6.4.3 Snapping Fingers Section

The options in this section help you align the connections between the fingers and the part:



-  **Snap Finger Origin to Point along Active Axis** – Make one of the axes active (displayed in red) by clicking it (**X1**, **X2**, **R1**, **R2**, **Z1**, or **Z2**). Click the icon, and click a point

on the part. Use **Snap to End** and **Snap to Middle** as appropriate. In the picture, Z1 is the active finger:

- 
Snap Finger Point to Point – Snaps a point on a finger to a point on the part. Click the icon, click somewhere on a finger stop, and click somewhere on the part. Use **Snap to End** and **Snap to Middle** as appropriate.
 - 
Snap to End – To instruct **EsaBend3DM** to align the fingers with one of the ends of the part, click the icon and then a corner of the part. Only active when one of the snap finger to point icons is active.
 - 
Snap to Middle – Click the part then the icon. **EsaBend3DM** aligns the finger stops with the middle of the part you click. Only active when one of the snap finger to point icons is active.
- 
NOTE: Snapping along a specific axis may move one or more fingers, depending on the axes' definitions. In the above example, snapping **Z1** moves only the left finger, but snapping **X1** moves both (since there is only a single X for this machine).

2.6.4.4 Finger Position Section

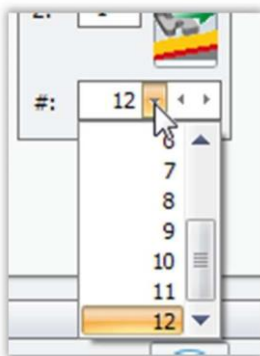
The options in this section are only active when snapping is turned off. (To turn it off, click the [snap finger icons](#).)

- Z:** Select 1 or 2, indicating the first and second fingers.
- 
Get Next Finger Position: **EsaBend3DM** calculates the next position available for the designated finger. When you reach the last position, the message **Finger position not found** is shown at the bottom center of the screen.

When **EsaBend3DM** calculates a new position, it automatically move the finger(s) to it.

EsaBend3DM keeps a list of all calculated positions and you can browse this list by clicking the three arrows:

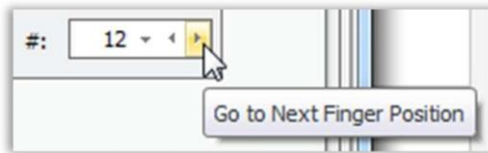
Down arrow – goes to a specific position in the list:



Left arrow – goes to the previous position:



Right arrow – goes to the next position:



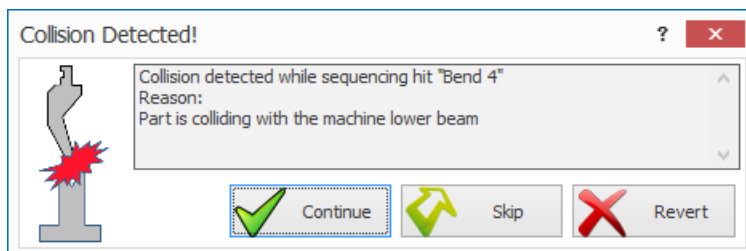
2.6.5 Simulate Bends Section

In this section you can simulate the hits, one at a time.

Only two of these icons are visible at a time, depending on the current hit and what you just played:

-  **Previous hit** – Plays the hit prior to the current one.
 -  **Play current hit forward** – Plays the current hit.
In **Frame+Tooling+Part** mode, it only shows the start and end positions of the hit. In **Tooling+Part** mode, it also shows the part handling.
 -  **Play current hit backward** – Plays the current hit in reverse.
 -  **Next hit** – Plays the next hit.
- 💡 **TIP:** When you select **Frame+Tooling+Part** in the **Simulation Views** toolbar, the simulation is considerably less detailed than if you select **Tooling+Part**.

If **EsaBend3DM** detects a collision, you will see this error message:



- To continue the simulation (with the collision), click **Continue**.
- To avoid this particular step and move on to the next, click **Skip**.
- To stop the simulation just prior to the collision, click **Revert**.

2.7 Simulation

In this stage **EsaBend3DM** assigns tools with specific lengths, called segments, according to your inventory. **EsaBend3DM** sets up the smallest number of stations possible, depending on the shape of the part, your inventory, and the order of the hits.

You can run through all the hits, checking for potential conflicts. When you are satisfied, you can create screenshots to insert into your report, and make video recordings of the hits.

You can only progress to the [output stage](#) once you have played the simulation through to the end in this stage.

- 💡 **TIP:** If you do not want to simulate a specific hit (for example if you have already done so previously) you can skip it using the  icon.



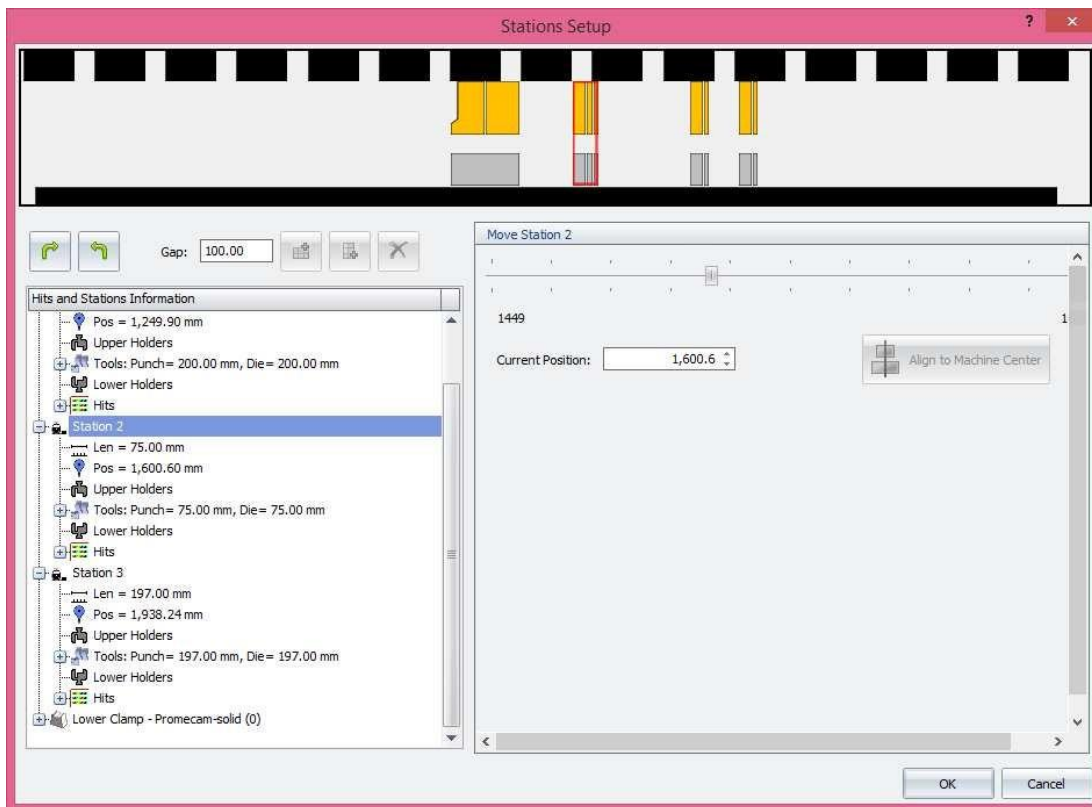
2.7.1 Station Table

This section lists all the stations in your simulation, including this information:

-  – This warning symbol under the collision column header  warns you that the station is longer than the bend, or that there are not enough segments in the inventory to execute the bends.
- Station** – The automatically generated station name.
- Length** – The length of whichever tool (punch and die) is longer.
- Position** – Position of station.

2.7.2 Stations Setup Button

Clicking the **Stations Setup** button opens the **Stations Setup** dialog, where you can see and edit details of the hits and stations.



For each station, in the tree on the left you can see the length, position, upper and lower holders, punch and die tool lengths, and hits. As you click through the items in the tree, **EsaBend3DM** shows the relevant information in the display area on the right. Some of this information is editable.

Example of modifications you can make:

- Slide the stations to the right and the left in the graphic at the top.
- Change the position of the selected station by typing in a new value on the right.
- Switch the length or position of a particular station with the station on the right/left side.
- Change the gap.
- Align parts with punch or die tools.
- Transfer hits from one station to another.
- Exclude a clamp from the upper or lower beam.
- Change the clamp's current position.

2.7.3 Save Setup Button

This button is only active once you have run the simulation through to the end. This ensures that you have seen the simulation and are aware of what will happen, before you can save the tooling setup you have defined.

You must give your setup a name. You can then use this tooling setup on another part. Note that the clamp types must be compatible; for example, if your saved setup is intended for Euro clamps, **EsaBend3DM** probably does not let you apply it to a part for processing on a Wila machine.

2.7.4 Play Bends Simulation Section

In this section you can play and replay the hits in the simulated design using the arrow keys:

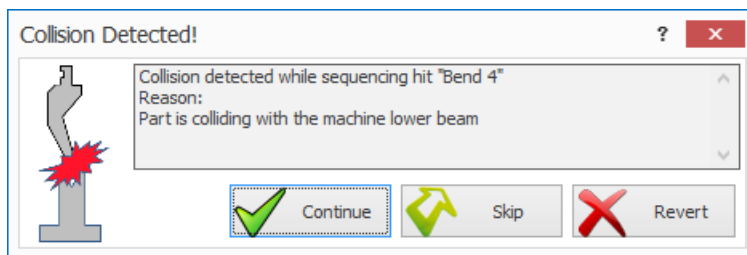
-  **Reset (Jump to First Hit)** – Goes to the start of the simulation.
-  **Previous Hit** – Shows how everything is positioned, prior to the previous hit.
-  **Next Hit** – Shows how everything is positioned, prior to the next hit.
-  **Play Current Hit Forward** – If **Single Play** is selected, shows you the next hit. Otherwise, shows you all the hits remaining in sequence. Once you have played all the hits in this stage, you can move on to the [output](#) stage.
-  **Pause** – Stops the hits being shown.

The area between the arrows tells you where you are in the hit sequence.

Bend 4-6
Station 1
3 / 6

For example, if you press the **Next Hit** icon while **Single Play** is selected, the display will jump from just prior to performing the third hit on the first station (bends 4 and 6) to the next hit in the sequence.

If **EsaBend3DM** detects a collision, you will see this error message:



- To continue the simulation (with the collision), click **Continue**.
- To avoid this particular step and move on to the next, click **Skip**.
- To stop the simulation just prior to the collision, click **Revert**.

2.7.5 Capture Section

In this section you can grab images and record video for use outside **EsaBend3DM**.

Image SnapShot – **EsaBend3DM** grabs a screen shot of the image displayed. If you select **Use Custom Images** in the [output](#) stage, **EsaBend3DM** adds the image to the output report.

Camera View

- **Auto** – If **Single Play** is selected, **EsaBend3DM** takes a screen shot of the next hit. Otherwise, **EsaBend3DM** takes a screen shot of every hit. If you select **Use Auto View Images** in the **Output** stage, **EsaBend3DM** adds these pictures to the output report.
- **Clear** – Deletes any screen shots.

Video Capture:

- **Record** – Records a video of the simulated hits and saves it to file. If in **Options => Reports** you select **Separate Video for Every Hit**, **EsaBend3DM** will create a new video file for each hit. You can set the maximum file size in **Options => Reports**.
- **Video Folder** – Opens the folder where recorded files are saved. To discover where this is, look under **Options => Folders**.

2.8 Output

The output report and NC code are generated at this stage.

2.8.1 General Output Parameters

You can get **EsaBend3DM** to add this information to your output report and NC code:

- **Customer** – A customer name.
- **Order** – An order code (numbers and letters).
- **Reference** – A reference number.
- **Batch** – The batch number.
- **Quantity** – The number of parts to process. The default quantity is 1. Must be a numeric value.
- **Comments** – Any text.

2.8.2 NC Parameters

NC Name – Displays the name that **EsaBend3DM** will give to the NC file:

- The prefix is taken from the definition in the **Machines** dialog box => **Output** tab => **NC Name Template Name**.

- The number following the prefix is a sequential number starting from **1**. If you select **Reuse NC Name** (lower down), the number does not change each time you generate NC; instead, **EsaBend3DM** overwrites the file each time.

The screenshot shows the 'NC Parameters' dialog box. At the top, there are fields for 'Batch', 'Quantity' (set to 1), and 'Comments'. Below these is the 'NC Parameters' section, which includes the 'NC Name' field set to '15071'. The 'NC Generation' section follows, with 'NC files folder' and 'Tool Folder' both set to 'C:\Users\Public\Documents\Metalix\MBend\Output'. Under 'Generate with NC', the 'Report file' checkbox is checked, and the 'Viewer file' checkbox is unchecked. At the bottom, the 'Generate NC' button is highlighted with a red box, and the 'Reuse NC Name' checkbox is also highlighted with a red box. Below these are buttons for 'View/Edit NC' and 'Name-on-control'.

2.8.3 NC Generation

- NOTE:** This option is not available for demo machines or machines with a setting of **Report Only** in their configuration.

The screenshot shows the 'NC Generation' dialog box. It has fields for 'NC Files Folder' and 'Tool Folder', both with browse buttons. Under 'Generate With NC', the 'Report file' and 'Viewer file' checkboxes are unchecked. The 'Generate NC' button is highlighted with a red box, and the 'Reuse NC Name' checkbox is also highlighted with a red box. At the bottom are buttons for 'View/Edit NC' and 'Name-on-Control'.

2.8.3.1 NC Files Folder

When you generate the NC code, the file is saved in the location specified here. You set this default location in the **Options** dialog box => **Folders** tab, but you can change the location by clicking the **Browse** icon

2.8.3.2 Tool Folder

This option is only available for post-processors that support it, such as ESA and Delem.

2.8.3.3 Generate with NC

This option is only available for ESA post-processors. The report or 3D viewer files will be generated and saved in the ESA KVFILE folder. They can be automatically viewed on the control.

2.8.3.4 Reuse NC Name

When selected, **EsaBend3DM** overwrites the NC file each time. Otherwise, **EsaBend3DM** adds a sequential number to the end of the file name, for each file generated if the template ends with one of the index options in the [NC Name Templates Configuration dialog box](#).

2.8.3.5 Generate NC

Click this button when you are ready to generate the NC.

2.8.3.6 View/Edit NC

Click to display and modify the generated code as text. This option is not available for all controls.

2.8.3.7 Name-on-Control

You must assign control names to each of the tools before you can generate the NC.

2.8.4 Report Generation

The report can optionally include one or more snapshots of the simulation. You [capture the snapshot images](#) during the Simulation stage.

2.8.4.1 Show Tools in Report

If selected, **EsaBend3DM** adds visuals of the tools to the generated report.

2.8.4.2 Show Hits by Sequence Order

If selected, **EsaBend3DM** details the hits, according to the order you defined.

2.8.4.3 Use Custom Images

If selected, **EsaBend3DM** includes the screenshots of the hits, which you generated in the **Simulation** stage.

2.8.4.4 Use Auto View Images

If selected, **EsaBend3DM** includes the screenshots generated automatically in the **Simulation** stage.

2.8.4.5 Report Folder

The location for saving the generated reports, as configured in the **Options** dialog box, the **Folders** tab. You can browse to select another folder by clicking the browse icon .

2.8.4.6 <Report Names>

EsaBend3DM provides several pre-formatted templates. Click this field to see the reports corresponding to the [language\(s\) selected in Report Options](#). Any reports developed specially for the user are indicated as such in the **User** column.

Examine the **Report Type** column and choose the template from the dropdown list that best suits your configuration.

Built-in reports are incorporated into the **EsaBend3DM** executable. You cannot change them.

2.8.5 Report Options Button

When you click this button, the **Options** dialog box opens to the [Reports tab](#) and you can make changes that will apply to this part.

2.8.6 Generate Report Button

Click this button when you are ready to create the output report. After a few seconds, the report opens in the format you selected. **EsaBend3DM** displays a message that the report was saved to disk; for example:



2.8.7 View Report Button

This option is only available once you have generated a report. Click it to open the report and browse through it. You can save it to disk.

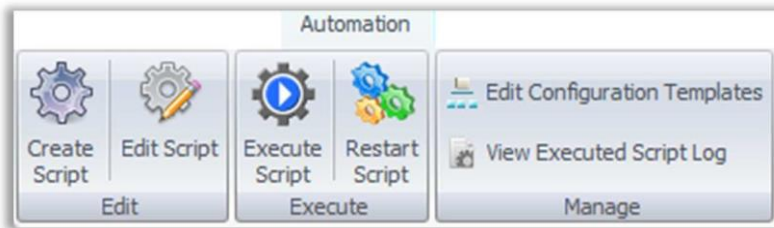
3 Automation

EsaBend3DM Automation is a quick and painless method of creating NC for metal bends.

This section explains the options available when using **EsaBend3DM Automation**, including the automation tab.

3.1 Automation Tab

Click the **Automation** tab. The icons at the top of the **EsaBend3DM** window allow you to access the **EsaBend3DM** automation features:



The explanations in this section are divided into sections according to the name of each toolbar.

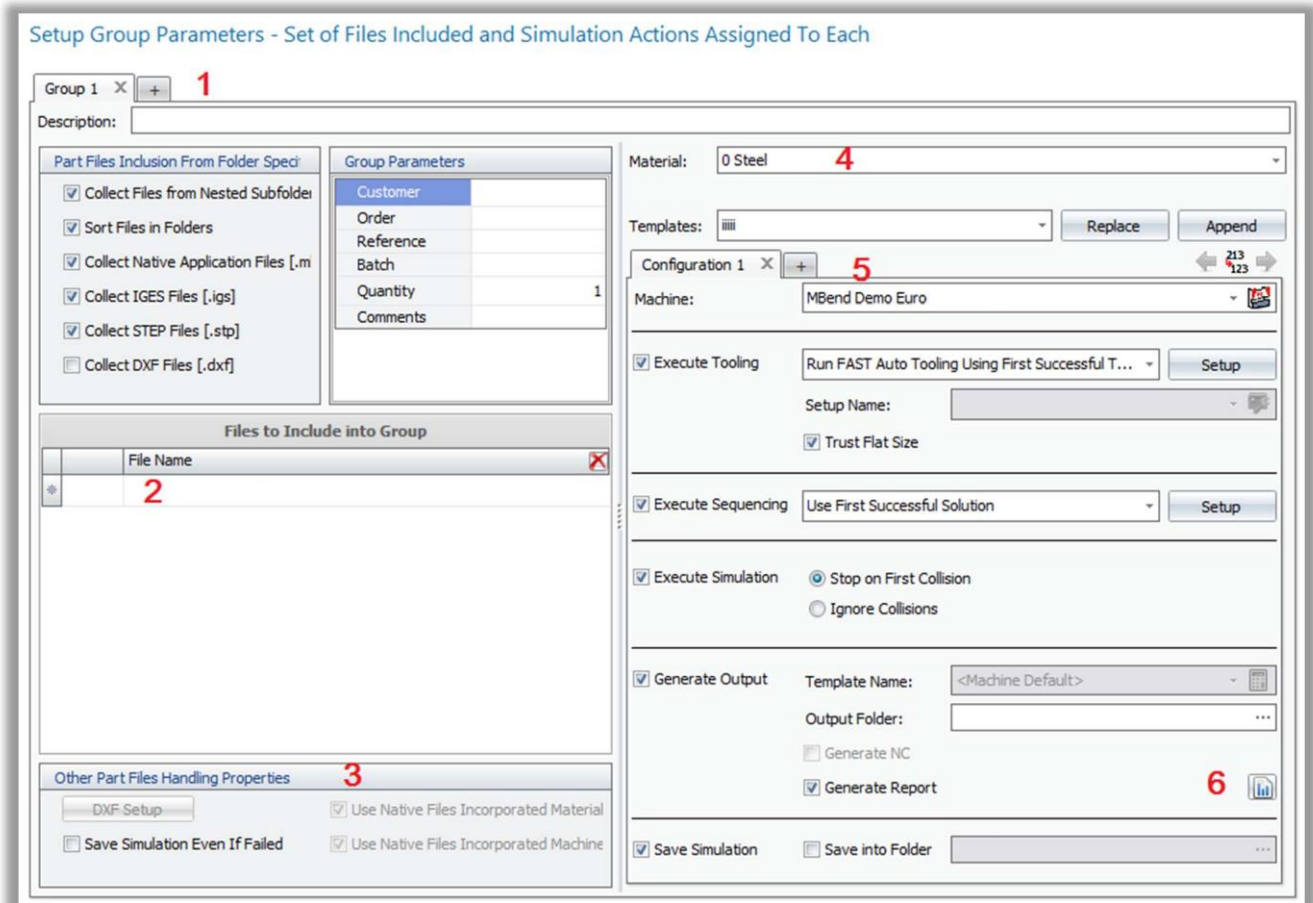
3.1.1 Edit Toolbar

The **Edit** toolbar allows you to create and edit scripts.

3.1.1.1 Create Script Button

 **TIP:** When you click the **Create Script** icon  for the first time, a welcome screen appears. You can prevent this screen from appearing again by checking the option at the bottom of the screen. Click **Next**.

The **Automation Script Editor Wizard** dialog box appears.



This dialog is the heart of the configuration for this feature. Here you select part files and decide how **EsaBend3DM** should process them.

At the top are tabs, one for each group you create. You can define only one type of material for the group. (In addition, MBCAM files can use their material definitions.) The material is shown on the top right of the dialog box.

3.1.1.1.1 Group Name Section

At the top left of the dialog box (1 in the [picture](#)) is the group name area:

- **Group 1** – The name of the first group you define. You cannot change this name.
- **+** – When you click this tab, a new tab opens with the name **Group 2**. You cannot change this name. You can open as many tabs as you need, one for each material.
- **Description** – Type a description of this group.
- **X** – Delete a group by clicking the red **X** shown after its name.

3.1.1.1.2 Part Files Inclusion from Folder Specifications Section

Specify the types of files to include in this group. If you use the [Browse Folders](#) option (by clicking a line and the **Browse Folders** icon ) , all the files in the particular folder (and optionally, subfolders) will be included.

Collect files also from subfolders – If you use the **Browse Folders** option, **EsaBend3DM** will also take files from the subfolders.

Sort files in folders arranges the files in the **Files to Include Into Group** section in alphabetical order. Otherwise, the files appear in the order in which they are selected.

MBCAM, IGS, IGES, STP, STEP, and DXF file types can all be imported.

3.1.1.1.3 Group Parameters Section

You can type information for each parameter. **EsaBend3DM** will include it in the generated NC and reports. It has no effect on the processing.

Group Parameters	
Customer	
Order	
Reference	
Batch	
Quantity	1
Comments	

The default **Quantity** is **1**. All the other fields are free format.

3.1.1.1.4 Files to Include into Group Section

Add files by clicking the first empty line in the table (**2** in the [picture](#)):

- To select one or more files, click the **Browse Files** icon  and click **OK**.
- To select all files in a specific folder that answer the criteria you indicated in the [Part Files Inclusion from Folder Specifications](#) section, click the **Browse Folders** icon  and click **Select Folder**.

To add another file, click the next blank line and click the **Browse Files** icon.

Once one or more files appear in the list:

- To replace a file, highlight it and click the **Browse Files** icon.
- To delete a file, click the red **X** on that line.

The file order is important as it determines the processing order, but it is only relevant if you have not selected [Execute Parallel](#) in **Options** => **Automation**. Move a particular file up or down in the list by clicking the **Move Up** and **Move Down** arrows on each line.

3.1.1.1.5 Other Part Files Handling Properties Section

This section (**3** in the [picture](#)) includes these options:

- DXF Setup** button is only active if you have at least one DXF file in your list. Clicking it opens the **Script File Group DXF Import Parameters Setup** dialog box, which includes parameters for measurement units, radius, angle, and layer use.

Script File Group DXF Import Parameters Setup

Length Unit: ☒ Metric Units ☐ Imperial Units

Radius: ☐ Neutral ☒ Internal ☐ External

Angle Value: ☒ Product Angle ☐ Bend Angle

Contour and Bend Lines Layers Configuration		
Layer Name	Layer Usage	
First Layer	☒ Contour	☐ Bend Lines
> Second Layer	☐ Contour	☒ Bend Lines
*	☐ Contour	☐ Bend Lines

Thickness: mm

OK Cancel

- **Save part [MBCAM] even if failed** – **EsaBend3DM** saves the changes to the file in a file with an MBCAM extension. It saves the changes up to the point where the automation failed, even if it encounters a collision or another error, and even if you do not select [Save Simulation](#).
- **Use native files incorporated material** – This option is only available if there is at least one MBCAM file in the list:
 - For MBCAM files, when selected, **EsaBend3DM** uses the material already defined for this part.
 - For MBCAM files, when not selected, **EsaBend3DM** uses the material defined on the top right of the dialog box.
 - For non-MBCAM files, **EsaBend3DM** always uses the material defined on the top right of the dialog box.
- **Use native files incorporated machine** – This option is only available if there is at least one MBCAM file in the list:
 - For MBCAM files, when selected, **EsaBend3DM** uses the machine already defined for this part.
 - For MBCAM files, when not selected, **EsaBend3DM** uses the machine defined on the top right of the dialog box.
 - For non-MBCAM files, **EsaBend3DM** always uses the machine defined on the right of the dialog box.

3.1.1.1.6 Material

Select the appropriate material (**4** in the [picture](#)) for this group. The material applies to all parts in the group, excluding MBCAM files if you have selected **Use native files incorporated material**.

3.1.1.1.7 Templates

Here, you can select a configuration template. This is only active if you have already saved at least one template of configuration settings.

To replace all the configurations with those imported from the template, click the **Replace** button. Relevant for this group only.

To add configurations from the template to the configurations shown, click the **Append** button. Relevant for this group only.

You can [edit configuration templates](#).

3.1.1.1.8 Configuration Tabs

In this section (**5** in the [picture](#)), you provide the guidelines for executing each of the processing stages. The stages are similar to those when in **Simulation** mode: **Tooling**, **Sequencing**, **Simulation**, and **Output**.

- **NOTE:** **EsaBend3DM** considers more parameters than those you see here. **EsaBend3DM** takes the defaults in each case, some of which you can change via the **Options**. For example, the **Run Fast Auto Tooling** option considers tools from the tool group you defined as the default: **Assigned**, **Favorite**, or **All**.

3.1.1.1.8.1 Configuration Names

The default name for the first configuration is **Configuration 1**. You can change this name (and names of subsequent configurations) by clicking the **Rename** icon .

To delete a configuration, click the red **X** next to the name.

3.1.1.1.8.2 Configuration Order

The order of these tabs is important as it determines the processing order. **EsaBend3DM** tries each file on the different configurations until one succeeds.

For example, if there are two files and two configurations in the one group, this is the order in which they are checked:

14. Try **File A** with **Configuration X**
15. Try **File B** with **Configuration X**
16. If 1 failed, try **File A** with **Configuration Y**
17. If 2 failed, try **File B** with **Configuration Y**

To change the order of the configuration tabs, click the **Move Left**  and **Move Right**  icons.

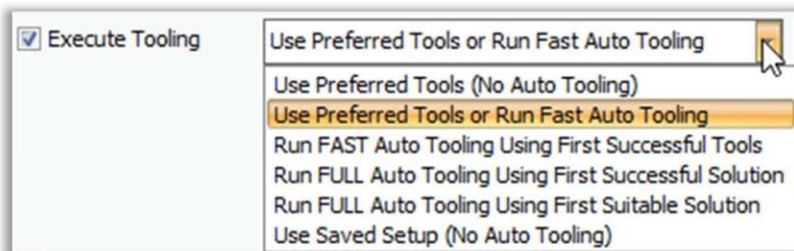
3.1.1.1.8.3 Machine

Select a machine from the dropdown list. To see and edit the machine configuration, click the **Edit Machine** icon . **EsaBend3DM** allocates the machine to all files in this group, except if **Use Native Files Incorporated Machine** is selected. In this case, any included MBCAM files use the machine already assigned.

3.1.1.1.8.4 Execute Tooling

The tooling step is optional.

Select one of the options from the dropdown list:



Some explanations:

- **FAST** vs. **FULL** – In both configurations, **EsaBend3DM** selects tools for the bends based on tool tonnage, radius resulting from the tools, tool height, and the need for holders to connect the tools to the clamps. In full mode, **EsaBend3DM** also tries to find a viable bend sequence based on the [Collision Settings](#).
- **Successful** vs. **Suitable** – In both configurations, everything should work well. A **Suitable** configuration may have missing segments.
- You can only select a [saved tool setup](#) if one was already created and is valid for the selected machine.

Setup – Opens the [Automatic Tools Selection Setup](#) dialog box.

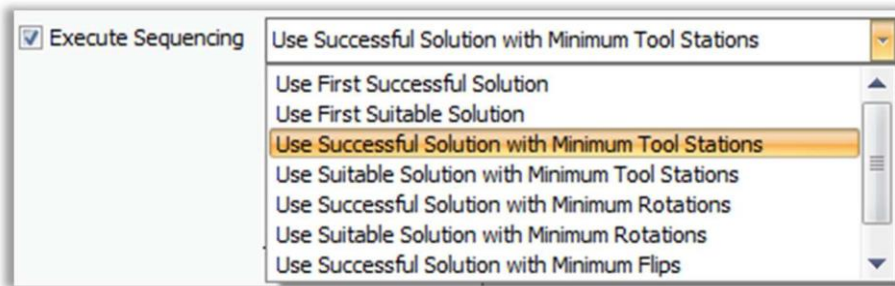
Setup Name – Choose a saved tool setup that is valid for the current machine. This option is only active if you select **Use Saved Setup (No Auto Tooling)**.

Trust Flat Size – Keeps the flat size constant, regardless of tool size.

3.1.1.1.8.5 Execute Sequencing

The sequencing step is optional.

Select one of the options from the dropdown list:



Successful vs. Suitable – In both configurations, everything should work well. A **Suitable** configuration may have missing segments.

Setup – Opens the **Configure Auto Sequencing** dialog box where you can define the [collision settings](#).

3.1.1.1.8.6 Execute Simulation

The simulation step is optional. If you choose not to run the simulation, you cannot generate output.

Stop on First Collision – **EsaBend3DM** stops processing when it encounters a collision.

Ignore Collisions – **EsaBend3DM** does not stop processing, even when it encounters collisions.

3.1.1.1.8.7 Generate Output

The output generation step is optional. These options are only available when **Execute Simulation** and **Generate Output** are selected.

NC name template – Which template to use for the name of the file containing NC. This option is only active if you select [Generate NC](#).

If you do not select an option, **EsaBend3DM** uses the defaults defined in the **Home** tab => [NC Name Templates](#).

To modify the settings for this automation script, click the **Edit NC Name Templates** icon  and make your changes in the **NC Name Templates Configuration** dialog box.

Output Folder – Where to store the NC output. This option is only active when **Generate NC** is selected and is not active for demo machines.

Generate NC – Not active for demo machines.

Generate Report – **EsaBend3DM** generates the report. **EsaBend3DM** only displays the report if you have selected [Show Document During Report Generation](#) in **Options** => **Automation**.

You can view and edit the report settings by clicking the **Report Options** icon  (6 in the [picture](#)). The **Options** => [Reports tab](#) opens.

3.1.1.1.8.8 Save Simulation

The save simulation step is optional. **EsaBend3DM** saves the simulation as one MBCAM file for each [configuration tab](#). Otherwise, **EsaBend3DM** saves only if you select [Save part \[MBCAM\] even if failed](#) (3 in the [picture](#)).

 **NOTE:** **EsaBend3DM** saves the script automatically as an MBSCR file.

Save into folder – When you select this option, you can determine the folder name where the MBCAM file will be stored. Otherwise, **EsaBend3DM** overwrites the existing file in the current folder.

3.1.1.1.9 Next

When you click **Next**, the **Automation Script Parameters Summary** appears, showing you an overview of your configuration. Any error messages are shown at the bottom of the screen, in red.

You can return to the previous screen to review or edit your configuration by clicking the **Edit and Execute Automation Script** icon  at the top of the page.

EsaBend3DM saves all your definitions and configurations, file lists, groups, etc., in a script with an MBSCR extension, so you can use it again. When you click **Next** again, you must type the name of the file where **EsaBend3DM** stores the script (**Define new automatic script name and location**).

You can navigate to a different folder than the one you see by clicking the browse icon .

To run the script, select the **Execute automation script** checkbox. Otherwise, **EsaBend3DM** saves the script and exits Automation mode.

If you saw warnings in the previous step, **EsaBend3DM** asks you what to do: run the script disregarding warnings (select **Execute automation script disregarding warnings**), or exit.

To see the results of the automation, click **Next**.

To close the automation, click **Finish**.

3.1.1.2 Edit Script Icon

To make changes to a saved script, click the **Edit Script** icon  on the **Automation** tab. **EsaBend3DM** opens to the folder where you last saved a script file. Click the down arrow next to **File name** to see the MBSCR files you have saved recently:



Select the file to edit. The [Automation Script Editor Wizard](#) dialog box opens.

3.1.2 Execute Toolbar

This part of the toolbar deals with starting and stopping scripts.

3.1.2.1 Execute Script Icon

To run an existing script, click the **Execute Script** icon  on the **Automation** tab. **EsaBend3DM** opens to the folder where you last saved a script file. Click the down arrow next to **File name** to see the MBSCR files you have saved recently.

Select the file to run. The [Automation Script Parameters Summary](#) will be shown.

3.1.2.2 Resume Script Icon

To restart an existing script from the point where it stopped, the last time you ran it, click the

Resume Script icon  on the **Automation** tab and select the file to run. The file should have an MBSCR extension.

3.1.3 Manage Toolbar

This part of the toolbar lets you edit the configuration templates and view the scripts log.

3.1.3.1 Edit Configuration Templates Icon

To make changes to existing configuration templates, click the **Edit Configuration Templates**

icon . The **Automation Script Configuration Templates Editor** dialog box opens. On the left is a list of all the templates you have saved to date. On the right are the [configuration settings](#) for this template. You can define more than one configuration tab per template.

Possible actions:

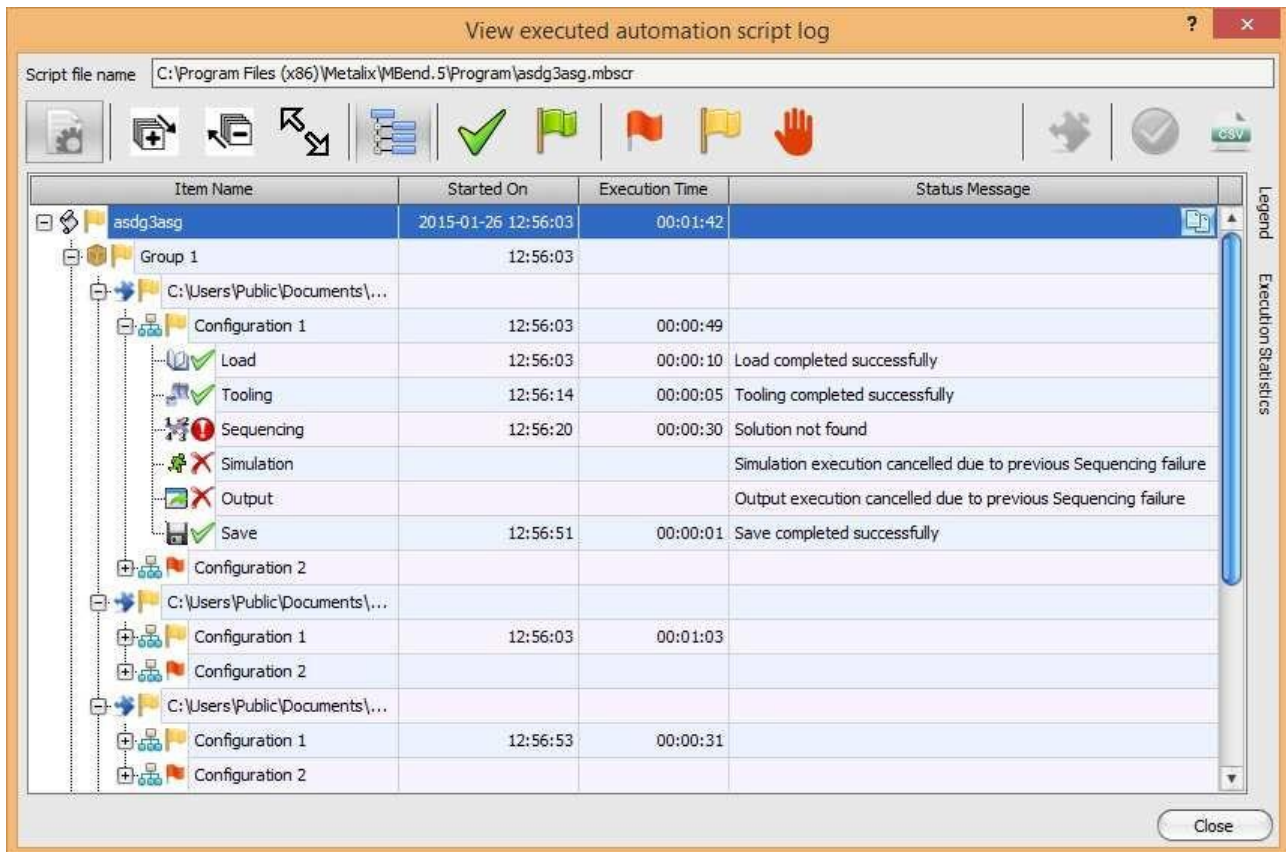
-  Define a new template.

-  Rename an existing template.
-  Use the currently selected template as the default.
-  Delete the currently selected template.

3.1.3.2 View Executed Script Log Icon

You can track the script execution by examining the generated log file. **EsaBend3DM** only creates a log file once it starts to run the script.

Click the **View Executed Script Log** icon  and select the file with an MBSCR extension. The log file opens:



The purpose of most of the icons in the log file view is self-explanatory, enabling you to expand and filter the results to see only the relevant data. In addition:

- To view the part settings and tweak them manually, click the **Open Part**  icon.
- To tell **EsaBend3DM** to ignore some of the script because you have dealt with it manually, click the **Mark File as Completed (Manually)**  icon.



- To copy the script data to an external file, click the **Export to CSV (Comma Separated Values) File**  icon.
- On the right side of the screen are **Legend** and **Execution Statistics** tabs where you can view additional information.

4 Machines

This section explains the machine options available in

EsaBend3DM. There are several ways to access the options:

- Click the **Machines** icon on the **Quick Access** toolbar

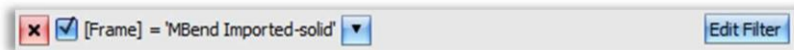


- In the **EsaBend3DM** tab, click the **Machines** tab.
- In the **Home** tab, click the **Machines** icon .
- Ctrl+Shift+M

The **Machines** dialog box opens.

- TIPS:** In **EsaBend3DM**, much of the data is presented in tables. Following are some tips for viewing and editing the tables:

- Sort the rows in the table by clicking any column heading in the table. The sort icon  (looking like a triangle) appears next to that heading. You can click it again to change the direction of the sort (e.g., from lowest on top to highest on top).
- Filter the table so you only see certain rows by clicking the filter icon  (looks like a thumbtack) in one of the table headings and selecting one of the options. You can see the filter query below the bottom line of the table:



- Cancel the filter by deselecting the check mark.
- Hide the filter query line by clicking the **X**.
- View previous queries by clicking the down arrow.
- Define an advanced query by clicking the **Edit Filter** button. The **Filter Editor** dialog box opens, where you can develop complex queries based on conditions.
- Select more than one entry in the table simultaneously by holding down the Shift or Ctrl keys while clicking rows.
- A freeze bar separates the most important, unscrollable information (manufacturer, machine) on the left, from the data on the right, which can be scrolled. The freeze feature only works if you have not selected [automatic column widths](#).

4.1 Machines Toolbar



Add New Machine from Factory DB – opens the **Include factory-defined machine** dialog box.



Add New Machine – leads you through the process of adding a new machine, via a [wizard](#).



Copy – duplicates the data from an existing machine. Highlight the machine to copy, and click this icon. Select a manufacturer from the dropdown list and type a name for the new machine.



Machine Setup Wizard – a [wizard](#) helps you change the current definitions.



Rename – highlight the machine whose name you want to change and click the icon. Type the new name.



Change Manufacturer -- highlight the machine whose manufacturer you want to change and click the icon. Select the manufacturer.



Rename Manufacturer – gives you a list of the manufacturers currently in use in your configuration. Select one and type the new name for the manufacturer.



Export Tools – only active when **EsaBend3DM** supports exporting tools for this postprocessor. Opens the **Export Tools** dialog box. Assigned punches and dies must have **Name-on-control** defined, which is the name of the tool on the control. If the tool is rotatable (e.g., for the ESA post- processor), it must also have **Rotated name-on-control** defined.



Auto Columns Width – reorganizes the columns in the table so they are neatly displayed.



Preview – displays the currently selected machine in a large window. Use your mouse wheel to zoom in and out, and change the orientation. At the bottom of the screen are two options:

- 
Measure the distance between two points -- click the icon and click somewhere on the graphic where you want the measured line to begin. A small light blue circle appears when you hover over it. Click the other end of the line you want to measure. The **Measure – Machine Component Preview** dialog box opens, showing you all the coordinates and measurements for the line:

Measure - Machine Component Pr... ? x

Distance

Point 1

Point 2

Delta X

Delta Y

Delta Z

All values are in mm

- 
Take first snapshot -- used in reports.



Set as Default – you can designate one machine as the default machine. Click this icon or select it in the column with the pin icon .



Delete – removes the highlighted row from the table. **Use with caution!**

4.2 Add/Configure Machine Wizard

These icons start the wizard that helps you add a machine or change the existing definitions:

- 
Add New Machine icon – leads you through the process of adding a new machine.
- 
Machine Setup Wizard icon – leads you through the process of changing the current definitions.

There are three ways to add a new set of definitions:

- Define all the parametric measurements.
- Import an IGES file.
- Import machine and tool parameters from another machine already in

EsaBend3DM. When you start the wizard, you are guided through a set of screens:

18. Select the machine manufacturer or type a name.
19. Type a unique name.

20. Configure the machine definitions.
21. If you are importing tool definitions from a file, after locating the tools folder, select a mode for resolving any conflicts:
 - Keep existing tool – ignores the version you are trying to import
 - Overwrite existing tool – ignores the version you already have
 - Add new tool with suffix – adds an extension to the file name so that both versions are available
22. Optionally use customized colors.
23. Decide which machine components should be configured using imported definitions, existing definitions in **EsaBend3DM**, or manual configuration.
24. Configure the machine properties setup
25. Configure NC and report output definition
26. Configure machine axes: front-to-back, up-down, side-to-side – double click any row to edit it. You must define at least two fingers to be able to continue.

The configurations for each step are described in detail in the sections below.

4.3 User Defined Active Machines Table

In this table you can view machine definitions and change them. The table is always visible when in the **Machines** dialog box:

ID		Manufacturer	Machine	Sample	Frame	Upper Beam	Upper Clamp	Lower Clamp	Lower Beam	Fingers Type	# Fingers
2		MBend	Demo Euro	☒	MBend Importe...	MBend Promeca...	MBend Promeca...	MBend Promeca...	MBend Importe...	Normal	2
3	☐	MBend	Demo Wila	☒	MBend Imported-solid	MBend Wila-solid	MBend NSII	MBend NSII	MBend Imported-solid	Normal	2
1	☐	MBend	Demo Parametric	☒	MBend Parametric	MBend Parametric	MBend Parametric	MBend Parametric	MBend Parametric	Normal	2
4	☐	Trumpf	V-85	☐	Trumpf V85 Frame	Trumpf V-85	Trumpf V-85	Trumpf V-85	Trumpf V-85	Normal	2

When you hover over a row in the table, you can see a small image of the machine. To turn off this preview, deselect [Show machine preview in machine dialog](#) in **Options => General** tab.

Includes these columns:

- **ID** of the machine
-  – when selected, indicates the default machine
- **Manufacturer, Machine**
- **Sample** – this option is checked when the machine is a demo machine.
- **Frame, Upper Beam, Upper Clamp, Lower Clamp, Lower Beam**
- **Fingers Type, # Fingers**

4.4 Status Bar

Errors in the machine settings are displayed on the bottom of the **Machines** dialog box, on the left, in red.

4.5 Model Definition Tab

Model Definition

Bending power: 110.0 tf

Max bend length: 3,060.0 mm

Y safety opening: 4.0 mm

Minimum opening: 10.0 mm

Maximum opening height: 570.0 mm

Minimum opening height: 250.0 mm

☐ Limit punch/die angle difference:

Punch/die angle difference limit: 0.0

In this tab you can configure general machine settings:

- **Bending power** – The maximum load or pressure.
- **Max. bend length** – The maximum length of the bend.
- **Y safety opening** -- The mute position (also called the speed change position) of the die. If not defined for a particular die, this is the default.
- **Minimum opening** – The minimum top dead center (TDC) between bends. When added to the Y safety opening, indicates the actual opening.
- **Maximum opening height** – Between the upper and lower beams.
- **Minimum opening height** – Between the upper and lower beams.
- **Limit punch/die angle difference** – Select this option if your machine restricts the difference in punch/die angles.
- **Punch/die angle difference limit** – The allowed tolerance angle between punch and die. Only available when [Limit punch/die angle difference](#) is selected.

4.6 Axes Definition Tab

These options in this tab define the backgauge behavior and limitations:

Model Definition

Front-Back and Up-Down Movements

X axis movement: X1 + X2 axes (fingers move together) R axis movement: Single R (fingers move independently) R axis reference point: Top of lower clamp system

Label	Min	Max	Max Offset	Default
X1		5.0	630.0	100.0
R1		3.0	300.0	0.00

Side-to-Side Movements and Fingers

Z axis origin: Origin at left of beam

Order	Min	Max	Right offset	Default	dZ Reference	Finger
Z1	300.0	2,640.0	190.0	500.0	0.0	MBend 10-10-20 Crab Claw Left
Z2	420.0	2,760.0		200.0	0.0	MBend 10-10-20 Crab Claw Right

4.6.1 Front-Back and Up-Down Movements Section

This section deals with X, R, and I axis movements.

4.6.1.1 X Axis Movement

This option controls the front and back movement. Select one:

- **Single x (fingers move together)**
- **X1 + X2 axes (fingers move independently)**

- X + X1 axes (X1 moves relatively to X)

4.6.1.2 R Axis Movement

This option controls the up and down movement. Select one:

- Discrete RG axes
- Single R (fingers move together)
- R1 + R2 axes (fingers move independently)

4.6.1.3 R Axis Reference Point

This option defines the origin for the R axis as defined on the machine. Select one:

- Top of lower beam
- Top of lower clamp system
- Top of die

4.6.1.4 I Axis Supported

This option is for machines that can move the lower beam back and forth.

4.6.2 Side-to-Side Movements and Fingers Section

In this section you define the type of fingers and side-to-side movement limits (in the Z axis). The fingers are shown in a table.



Add Finger opens the **Edit Axis** dialog box:

Parameters in this dialog box:

- **Order** -- the name of the finger.
- **Min and Max** -- the limitations of the finger positions on the Z axis, relative to the [Z axis origin](#).
- **Default** -- the default position.
- **dZ Reference** moves the finger reference point by this value on the Z axis.
- **Finger** – select one from the dropdown list.

You also have these options to manipulate the rows in the table:

-  **Copy Finger**
-  **Delete Finger**
-  **Move Up**
-  **Move Down**

Z axis origin: Options: **Origin at left of beam**, or **Origin at center of beam**.

4.7 Clamps Tab

Most of the options in this tab are self-explanatory:

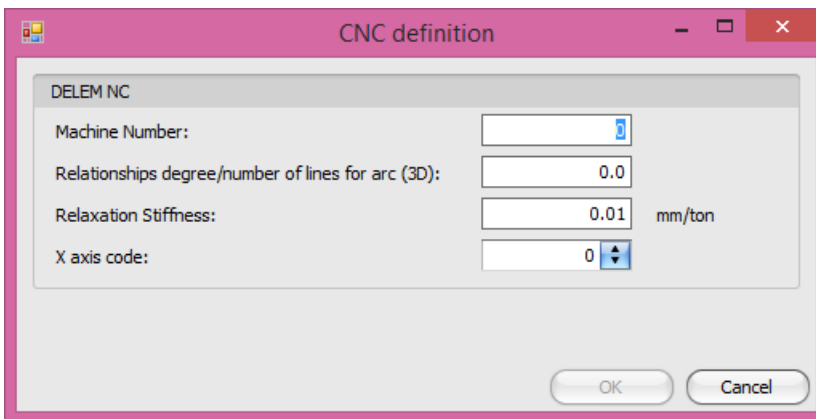
- **Min. tool stations gap** -- The minimum gap between tool stations during the Simulation stage.
- **Upper clamps start offset**
- **Upper clamps end offset**
- **Upper clamps sections** -- Allows defining the number of upper clamps.
- **Number of upper clamps** – Only available when **Upper clamps sections** is checked.
- **Lower clamps start offset**
- **Lower clamps end offset**
- **Lower clamps sections** -- Allows defining the number of lower clamps.
- **Number of lower clamps** – Only available when **Lower clamps sections** is checked.

4.8 Output Tab

The options in this tab define the generation of report and NC files.

CNC code: select the post-processor format according to your machine control. Alternatively, if your machine controller is not on the list, select **Report only (no NC)**, meaning that NC is not produced. Operator reports are produced.

CNC definition -- Only visible for supported machines. Allows you to define the machine number and other things as shown:



Set assigned tools name-on-control -- Only visible for supported machines. Sets the names of assigned tools to name-on-control names.

4.8.1 Output and Folders Tab

NC Name template name -- Define and select a template for the name of the NC file that is generated.

NC files folder – The destination for the generated NC file. Is only active when [Generate NC into](#) is set to **Machine configuration NC folder** in **Options => Folders**. If not specified, **EsaBend3DM** uses **C:\Users\Public\Documents\EsaBend3DM\Output**.

Use relative folder path for NC files – Allows using a relative path.

Relative path levels -- Only available when **Use relative folder path for NC files** is checked. Select an option from the dropdown list. Restricts the number of subfolders to retain when copying the relative path name (counting from the end of the path upwards).

For example, the path name is **C:\Users\Fred\Documents\EsaBend3DM**. You select **2** path levels. **Documents\EsaBend3DM** becomes part of the path.

Relative path root -- Only available when **Use relative folder path for NC files** is checked. You can type or browse for an existing folder.

Default report – Default template to use for the reports.

Use as drawing number in NC – Adds the part name as the drawing number in the NC file. Only visible for supported machines.

4.8.2 Additional Outputs and Folders Section

Output tool files -- Allows exporting tool files when you generate NC.

Tool files folder – Only available when **Output tool files** is checked. The location for the tool files.

Generate reports into NC folder – Saves the reports in the same location as the NC file.

Generated reports folder – Only available when **Generate reports into NC folder** is checked. Is only relevant when **Generate report output into** is set to **Machine configuration report folder** in **Options => Folders**.

Duplicate NC into saved part folder – Copies the NC into the folder where the part is saved.

4.8.3 NC Parameters Tab

These values are not simulated in **EsaBend3DM**; however, they are reflected in the NC.

When you select **Use machine-specific NC parameters (instead of NC type specific defaults)**, you override the general NC-type specific options defined in **Options => Post-processors** tab. You can modify the default values for these parameters, depending on the machine.

4.9 Machine Materials Tab

This tab defines the list of bend technology materials and their corresponding names on the machine. The list comes from the BT Materials table (in the **Materials** dialog box).

BT Material Name	Name on Machine
BT_Steel	
BT_Stainless	
BT_Aluminium	

Name on Machine -- The name on the control.

ID in NC -- The identifier on the control.

4.10 Assigned Punches/Dies/Holders Tabs

The tables in these tabs list the punch and die tools and holders that are actually used on the selected machine. For example:

ID	Manufacturer	Punch Name	Version	Angle	Height	Hemming	Favorite	Name-on-control
121	Wila NSII	BTU-001	v3	28.0	98.0		☒	1
124	Wila NSII	BTU-004	v3	60.0	98.0		☒	2
127	Wila NSII	BTU-013	v3	86.0	120.0		☒	3
133	Wila NSII	BTU-022	v3	80.0	163.0		☒	4
134	Wila NSII	BTU-023	v3	86.0	163.0		☒	5
136	Wila NSII	BTU-025	v3	80.0	163.0		☒	6
140	Wila NSII	BTU-034	v3	60.0	200.0		☒	7
73	Amada	213	v3	88.0	160.0		☒	8
139	Wila NSII	BTU-033	v3	86.0	200.0		☒	9

Only these columns require further explanation:

- **Name-on-control** – Only visible for non-demo machines.
- **Rotated name-on-control** – Only visible if the tool can be rotated (e.g., for the ESA post-processor)

Use these icons to add/remove tools/holders:

-  Assign tools/holders – select from the list.

-  Remove assigned tools/holders
-  Add punch/die holders – Only relevant for **Assigned Punches** and **Assigned Dies** tabs. If you see an error message saying that no holder can be assigned because no holder is configured in the database, go to the **Assigned Punch/Die Holders** tab and assign a holder.
-  Remove punch/die holders – Only relevant in **Assigned Punches** and **Assigned Dies** tabs. Becomes active when you add a punch/die holder and then select it.

If your machine controller does not support tool holders, you can draw your tool with the holder on the controller. In **EsaBend3DM**, you give the corresponding tool + holder combination a name that matches the name on the machine.

For example:

27. In the **Assigned Die Holders** tab, add a die holder by clicking the **Assign** icon  and selecting a holder.

28. In the **Assigned Dies** tab, click the **Add Die Holders** icon  and select the holder. You can stack holders on top of one another by selecting more than one holder. (**Tip:** hold down the Shift key while you highlight more than one holder with your mouse.)

4.11 Hemming Tab

In this tab you select the tools for prebend and flattening operations:



The tools are automatically selected when loading a part.

You can use the same tools for both operations by clicking the **Use Flattening Tools for Prebend** button .

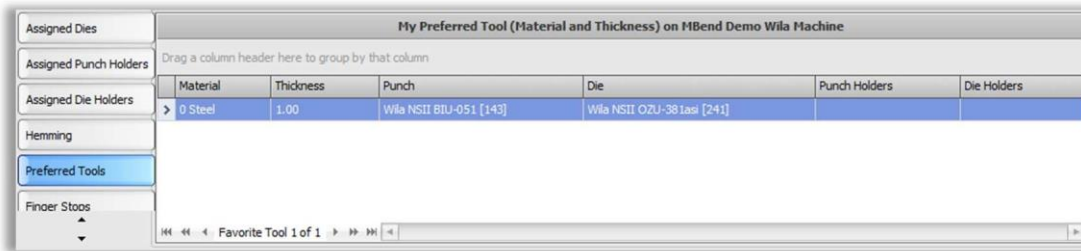
Clicking the **Hemming Tools** button opens the **Hemming Tools Selection** dialog box. You can read a full explanation in the [Simulation](#) document.

Add and remove prebend and flattening tools/holders by clicking the  and  buttons on the top right of the screen.

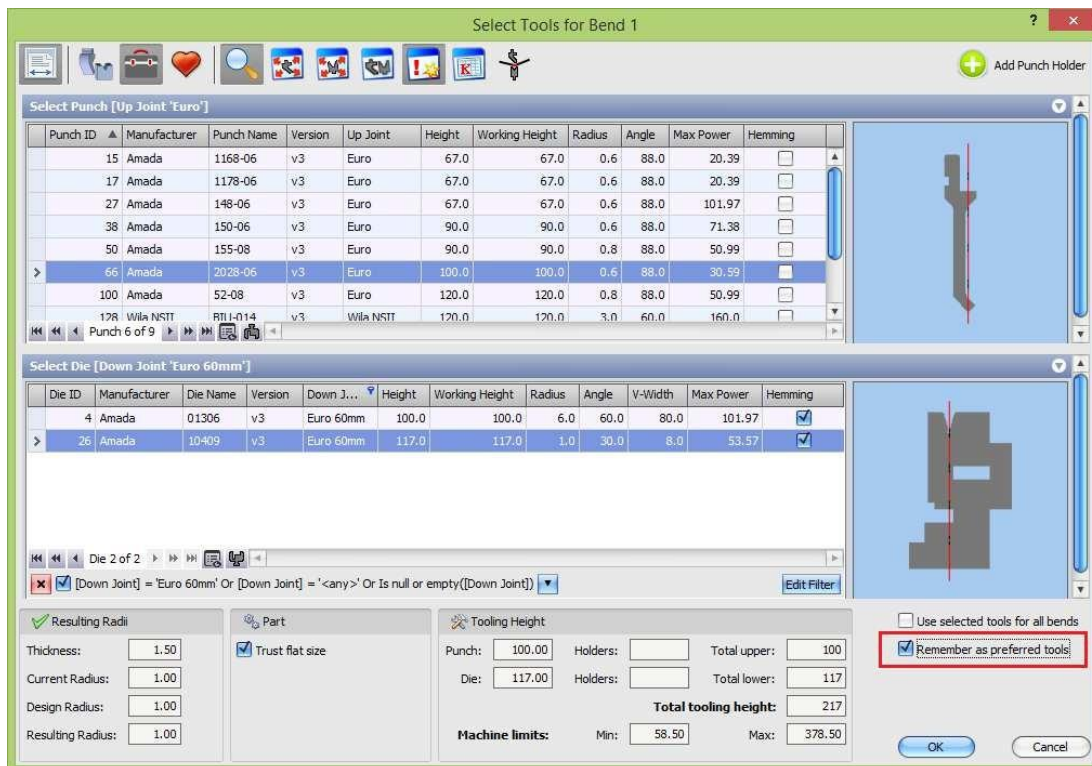
Select the tools you want for hemming and click **OK**. **EsaBend3DM** fills in the **Prebend punch**, **Prebend die**, **Flattening punch**, and **Flattening die** fields.

4.12 Preferred Tools Tab

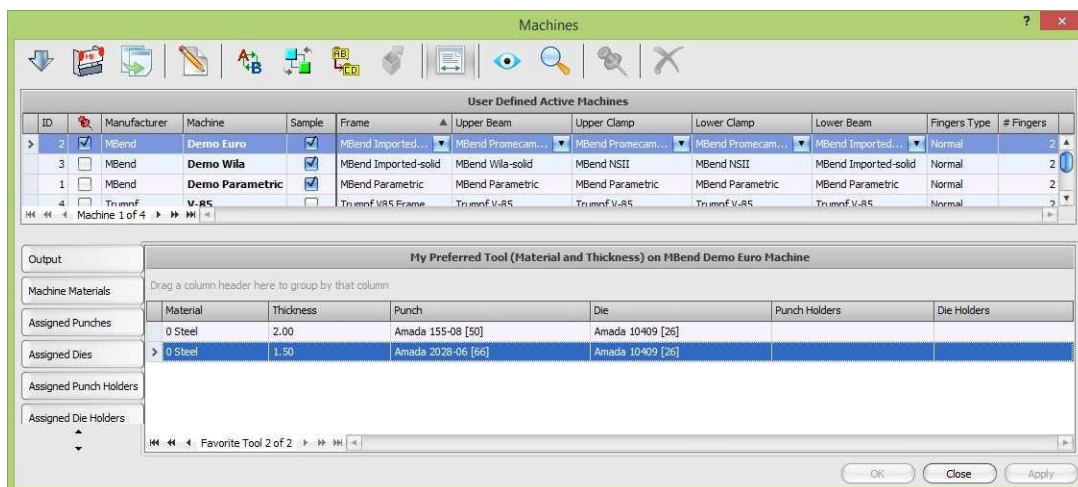
In this tab you can view which tools you prefer for each material and thickness on the specified machine. For example:



You can define a tool as preferred by opening a part with a defined material and thickness. In **Select Tools**, check the [Remember as preferred tools](#) checkbox:

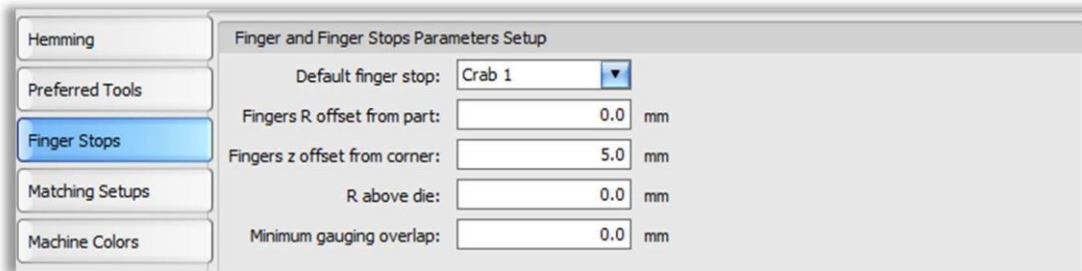


All tools you have defined as preferred then appear in the **Preferred Tools** tab:



4.13 Finger Stops Tab

This tab allows you to configure the finger stops.



Default finger stop – Select a stop from the dropdown list. **EsaBend3DM** uses this stop as the default when trying to gauge the part.

Fingers R offset from part – Sets a constant value to the R offset.

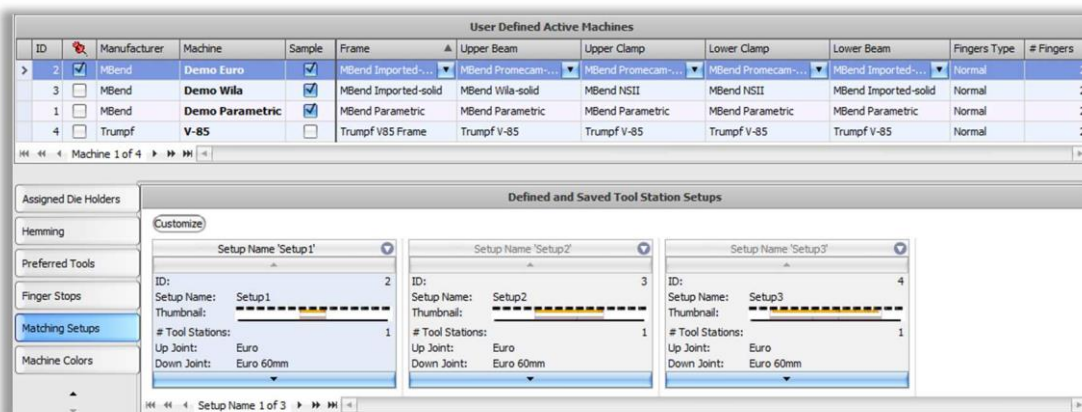
Fingers z offset from corner – Sets a constant value to the Z offset from the corner.

R above die – When the finger is above the die, use this offset for R.

Minimum gauging overlap – The minimum acceptable overlap between the finger and the part.

4.14 Matching Setups Tab

To view and edit the saved tool station setups, click the **Customize** button.

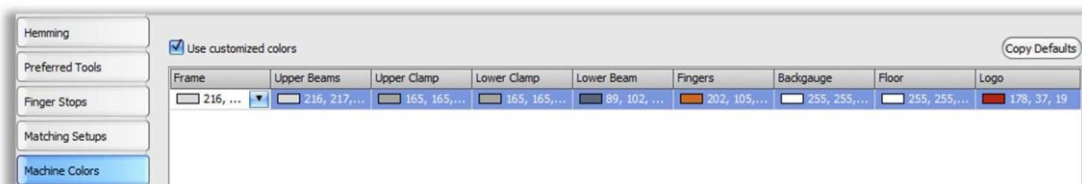


The **User Defined Active Machines** dialog box displays the setups that are relevant to the currently selected machine.

You can define these setups in the Simulation step.

To use a saved setup, assign it in the **Set Tooling** section, in the **Tooling** stage.

4.15 Machine Colors Tab



You can define customized colors for the different parts of the display:

29. Check **Use Customized Colors**.

30. Click each part in turn and select the color you want.

To return to the default settings, click the **Copy Defaults** button.

5 Tools

This section explains the tool options available in **EsaBend3DM**. There are several ways to access the options:

- Click the **Tools** icon on the **Quick Access** toolbar

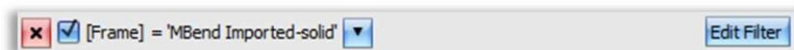


- In the **EsaBend3DM** tab, click the **Tools** tab.
- In the **Home** tab, click the **Tools** icon .
- Ctrl+Shift+T

The **Tools Configuration** dialog box opens.

- In **EsaBend3DM**, much of the data is presented in tables. Following are some tips for viewing and editing the tables:

- Sort the rows in the table by clicking any column heading in the table. The sort icon  (looking like a triangle) appears next to that heading. You can click it again to change the direction of the sort (e.g., from lowest on top to highest on top).
- Filter the table so you only see certain rows by clicking the filter icon  (looks like a thumbtack) in one of the table headings and selecting one of the options. You can see the filter query below the bottom line of the table:



Cancel the filter by deselecting the check mark.

Hide the filter query line by clicking the **X**.

View previous queries by clicking the down arrow.

- Define an advanced query by clicking the **Edit Filter** button. The **Filter Editor** dialogbox opens, where you can develop complex queries based on conditions.
- Select more than one entry in the table simultaneously by holding down the Shift or Ctrl keys while clicking rows.
- A freeze bar separates the most important, unscrollable information (manufacturer, machine) on the left, from the data on the right, which can be scrolled.

5.1 General Tab

In this tab you can set some of the defaults, including these:

- Which group of tools to display
- Hemming and split bend angles
- Values for tool station configurations

5.1.1 General Section

In this section you determine the default tool group and other-general purpose options.

5.1.1.1 Default Tool Selection

EsaBend3DM offers three groups of tools:

- **All tools** is the library of all available tools.
- **Assigned tools** is a list of tools that can work with a particular machine (a subset of the tool library). You can select them in the **Machines** dialog box in the four tool tabs

(Assigned Punches, Assigned Dies, Assigned Punch Holders, and Assigned Die Holders).

- **Favorite of assigned tools** are defined per machine and are a subset of the assigned tools. You can define tools as favorites in the **Machines** dialog box in the four tool tabs (**Assigned Punches**, **Assigned Dies**, **Assigned Punch Holders**, and **Assigned Die Holders**).

When selecting tools for specific bends, you can set the default as one of the above options. This is the group you will see, for example, whenever you open the **Tool Selection** dialog box (via **Auto Tools Selection**).

To set the default:

31. Click the **Tools** icon  on the Quick Access Toolbar.
32. In the **Tools Configuration** dialog box => **General** tab, check one of the options:



33. Click **Close**.

5.1.1.2 Use Configured Tool Segments Only

When selected, this option is relevant during the Simulation stage. It tells **EsaBend3DM** to use only tools that are in the inventory. When segments are missing, **EsaBend3DM** shows a warning and asks whether to continue.

5.1.1.3 Automatically Divide Collinear Bend Tool

When selected, different tools are used for collinear bends.

5.1.1.4 Use Segment Names

Not currently in use.

5.1.1.5 Surround Smaller Segments with Bigger Ones

When **EsaBend3DM** creates tool stations, it places the smaller tools segments in the middle.

5.1.1.6 Use CAD Link Tool Filter

When you use CAD Link to import files from Solid applications such as SolidWorks, you can select a filter so that **EsaBend3DM** initially only shows the filtered tools in the [Select Tools](#) dialog box. You can filter for punch, die, or both.

5.1.1.7 Holders True Length Display

When selected, prior to simulation, **EsaBend3DM** takes the true length of the part and uses it to calculate collisions. When not selected, the length is always the same size of the bend.

As a consequence, **EsaBend3DM** uses the true length data already in the Sequencing stage to check for collisions.

5.1.1.8 Allow Tool Stations out of Machine Limits

When selected, the tool stations can extend beyond the boundaries of the machine.

5.1.2 Hemming and Split Bend Section

In this section you define defaults for hemming and split bends.

5.1.2.1 Prebend Angle

This is the default for prebending a split bend. It is the angle of the product after the first bend. From **EsaBend3DM V6**, you can split prebends into two.

5.1.2.2 Hemming Angle Tolerance

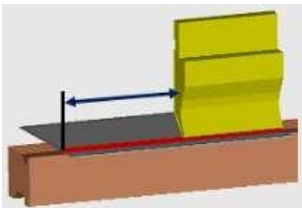
This is the maximum permitted deviation angle for a hemming bend.

5.1.3 Tool Stations Configuration Values Section

In this section you define default configuration for tool stations.

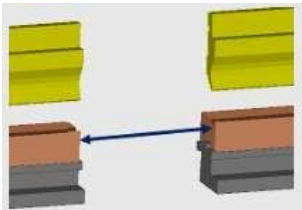
5.1.3.1 Negative Tolerance in Tool Stations

When selecting tool segments to fit the length of a hit, **EsaBend3DM** may not find the exact match. The **Negative Tolerance** allows **EsaBend3DM** to select segments that cover less than the hit length, within this tolerance:



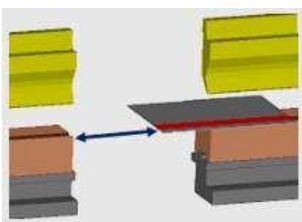
5.1.3.2 Minimum Distance between Tool Stations

This distance helps avoid collisions between tool stations:



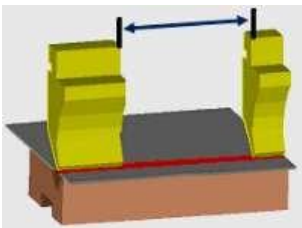
5.1.3.3 Tool Station Offset

This distance is measured from the tool station to the part:



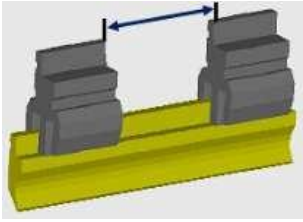
5.1.3.4 Allowable Gap between Segments to Achieve Hit Length

This is the maximum distance permitted between segments:



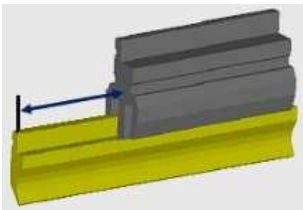
5.1.3.5 Max Distance between Holder Segments

This is the maximum distance permitted between holder segments:



5.1.3.6 Max Holder Segments Start/End Offset

This distance is the offset from the start (or end) to the closest holder segment:



5.1.3.7 Maximum Allowed Part Overhang

This is how much the part overhangs the machine on each side:



5.1.3.8 Automatically Center Single Station

When selected, if there is only one station, EsaBend3DM centers the station on the machine.

5.2 Radii Tab

This tab displays values from the bend technology table.

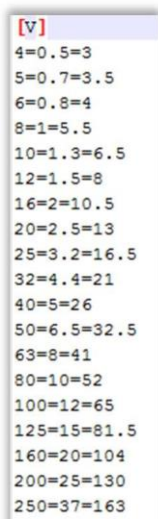
5.2.1 Radii Chart Section

In this section you can change the settings for the radii chart.

5.2.1.1 Export/Import Radii

You can import and export radii values from the bend technology table as TXT files. Perform these operations using the **Import**  and **Export**  buttons.

The data in the table might resemble this example:



[V]
4=0.5=3
5=0.7=3.5
6=0.8=4
8=1=5.5
10=1.3=6.5
12=1.5=8
16=2=10.5
20=2.5=13
25=3.2=16.5
32=4.4=21
40=5=26
50=6.5=32.5
63=8=41
80=10=52
100=12=65
125=15=81.5
160=20=104
200=25=130
250=37=163

5.2.1.2 Ignore Security Flange Length Calculation

When selected, **EsaBend3DM** does not consider the minimum flange length required for secure bending (the calculation based upon $V/2$ + radius allowance + thickness). Instead, **EsaBend3DM** uses the **B Relative** values. (See the pictures in the dialog box.)

5.2.2 Radii Values Table

The table shows the calculations from the bend technology table, multiplied by the correction factor for each material as defined in the [Bend Technology Table](#).

B Relative is the same as the **Flange length security calculation**, as shown in the figure on the right of the screen.

The values in this table are based on material of type 1 (steel).

5.3 Joint Types Tab

This tab allows you to view and edit joint types.

5.3.1 Joint Types Section

You can customize the joint types:

- To add the name of a new joint type, click **New Joint Type** icon .
- To change the name of any joint type in the table, click the **Rename Joint Type** icon .
- To delete a joint type that you created, click the **Delete** icon . This option is only active when you have defined at least one joint type.

5.3.2 Configured Joint Types Table

The table shows you all the joints types, including ones you have defined.

You can see the name of each joint type, whether it is suitable for upper or lower beams, if it is rotatable, and (optionally) a description.

When you click **Apply**, **EsaBend3DM** assigns the joint type a numeric ID.

5.4 Punches Tab

This tab shows all the punch data.

5.4.1 Punches Table

This table shows the basic data for all the punch tools. The table includes these columns:

- If any of the data has changed in a particular row, the **Edited** column is checked .
- You can see the **Punch ID**, **Manufacturer**, **Punch Name**, and **Up Joint**.
- **Height** includes the tang. If the values for **Height** and **Working Height** are identical, **Height** may be displaying the working height by mistake. This may be an indication that the tables are not up to date.
- **Radius** is the radius of the punch tool tip.
- **Angle** is the angle of the punch tool tip.
- **Max. Power** is the force that each can be applied for each length. (The length unit is defined in the **Options** => **Units** tab.)
- **Hemming** – when selected, this tool can be used for hemming operations.

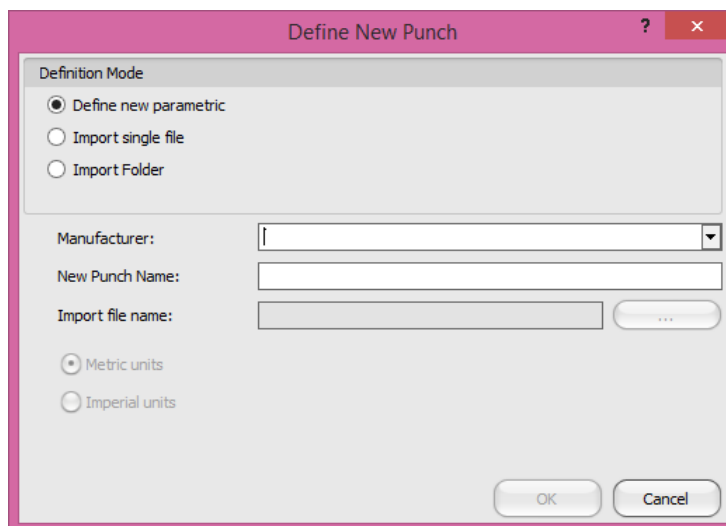
You can only change the parameters if they are user defined. The one exception is the **Height**. You can change the height of any tool because the tip of the tool may have worn down and then been filed down further by the customer and so the height changes.

You can copy (duplicate) a row to a new row. Now it is user defined (there is a check in the **User defined** column) so you can change (edit) the details in this row.



The toolbar allows you to perform a number of operations:

- Create a punch tool parametrically or import one from a DXF file (**New Punch** ). When you click the **New Punch** icon , the following dialog box opens:

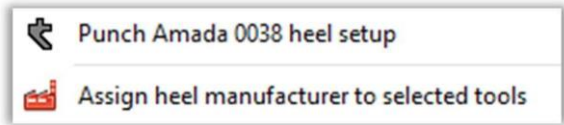


You can select a manufacturer and type the name of the new punch tool. When importing a DXF file, make sure to select the correct unit (metric or imperial).

When defining the tool parametrically, type the values into the **Tools Configuration** table. In the **Dimensions** tab, type values for W1, W2, R, A, and H, and click **Apply**.

- Make a copy of an existing tool (**Duplicate** icon ).

- Reload a tool from DXF or from the factory database by clicking the **Reload Tool** icon . A dialog box opens with a comparison of the two tools. Click the **Update** or **Keep Current** button.
- Adjust the width of the columns so all the data is visible by clicking the **Auto Columns Width** icon .
- Change the data for more than one tool at once using the **Edit** icon . Select more than one tool using the Shift and Ctrl keys.
- Change the name of a tool using the **Rename** icon .
- Modify the manufacturer for the tool using the **Change Manufacturer** icon .
- If the imported DXF file shows the tool back-to-front (reversed), click the **Mirror Tool around Power Line** icon .
- Change the name that appears on the control with the **Name-on-control** icon .
- Assign default segments to the current tool according to the manufacturer's defaults (configurable in the **Tool Manufacturers** tab) using the **Assign Default Segments** icon . Restores values if you have changed them.
- Assign a heel design to the selected punch using the **Heel** icon . Two options appear, for example:



 - Define a customized heel by clicking the first option and typing the heel measurements in the **Define Punch** dialog box.
 - Select a predefined type by clicking the first option and selecting a type in the **Define Punch** dialog box.
 - Choose the tool manufacturer's defaults by clicking the second option (**Assign heel manufacturer to selected tools**).
- Reverse a change by clicking the **Undo Changes** icon .
- Delete a tool by clicking the **Delete** icon .

5.4.2 Additional Properties Section

The options in this section are only active when you create a tool.

Type – Displays the tool template used as the base for the created parametric tool. If the tool is imported, displays **Imported**.

Hemming – If this tool can be used for hemming, check this option, then define the type and power.

- **Hemming Type** – Select from the dropdown list:
 - 1 – For two-stage hemming.
 - 2 – Relevant only for die tools. Indicates a spring die.
- **Hemming Power**

Description – Optional description of the new/imported tool.

5.4.3 Tabs Section

This table has several tabs.

5.4.3.1 Segments Tab

The table in this tab lets you edit the quantity of actual segments, with no heels, or with left or right heels, for different size segments.

If you created the tool, you need to define the measurements and quantities in this tab.

5.4.3.2 Dimensions Tab

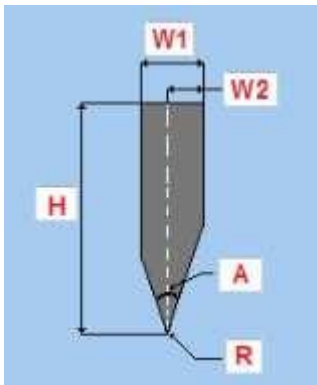
This tab displays the settings for the tool measurements.

5.4.3.2.1 Tool Dimensions Section

If the selected punch tool is defined parametrically, you can edit the dimensions, as explained in the graphics.

If the selected punch tool is imported, **EsaBend3DM** infers the dimensions from the DXF file and displays them. You cannot edit them.

For example:



5.4.3.2.2 Additional Properties, Use Customized Tang

If you want to use a tang measurement that differs from the default, check **Use customized tang** and type the height into **Tang height**.

5.4.3.3 Legend Tab

This tab is only visible when the tool is defined as a hemming tool. Here you can see a graphic representation of the measurements for width flattening (**WF**), width punch (**WP**), and height flattening (**HF**).

5.5 Dies Tab

The explanations for this tab are very similar to the explanations for the [Punches tab](#). These are the exceptions.

5.5.1 Dies Table

There is no **Heel** icon.

The **Up Joint** column is replaced by the **Down Joint** column.

There is a **V-Width** column.

The **Radius** refers to the measurement at the shoulder of the die.

5.5.2 Additional Properties Section

This section also contains these options:

- **Holder height** – Legacy option; not in use.
- **Dead zone** – Legacy option; not in use.
- **Mute position** – The height at which the beam slows its downward movement and increases its upward movement.
- **Hemming Types** (for die tools only):
 - **1** – Two-stage hemming
 - **2** – Indicates a spring die

Both of these options allow you to define additional parameters in the [Dimensions tab](#).

5.5.3 Tabs Section

This section includes the segments and dimensions tabs.

There is no **Legend** tab.

5.5.3.1 Segments Tab

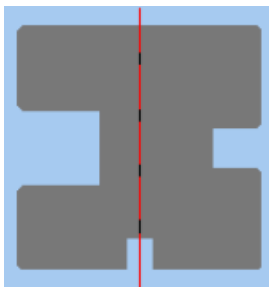
In this table you can edit the quantity of actual segments, with no heels, or with left or right heels, for different size segments.

If you created the tool, you need to define the measurements and quantities in this tab.

5.5.3.2 Dimensions Tab

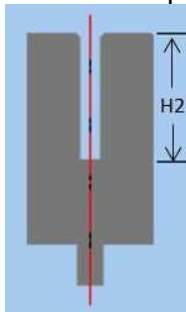
This tab displays the settings for the die tool measurements.

The following picture shows an example of the power vector for a die tool.



When the **Hemming Type** is **1**, you can define these parameters:

- **H2** – The depth of the die as shown:

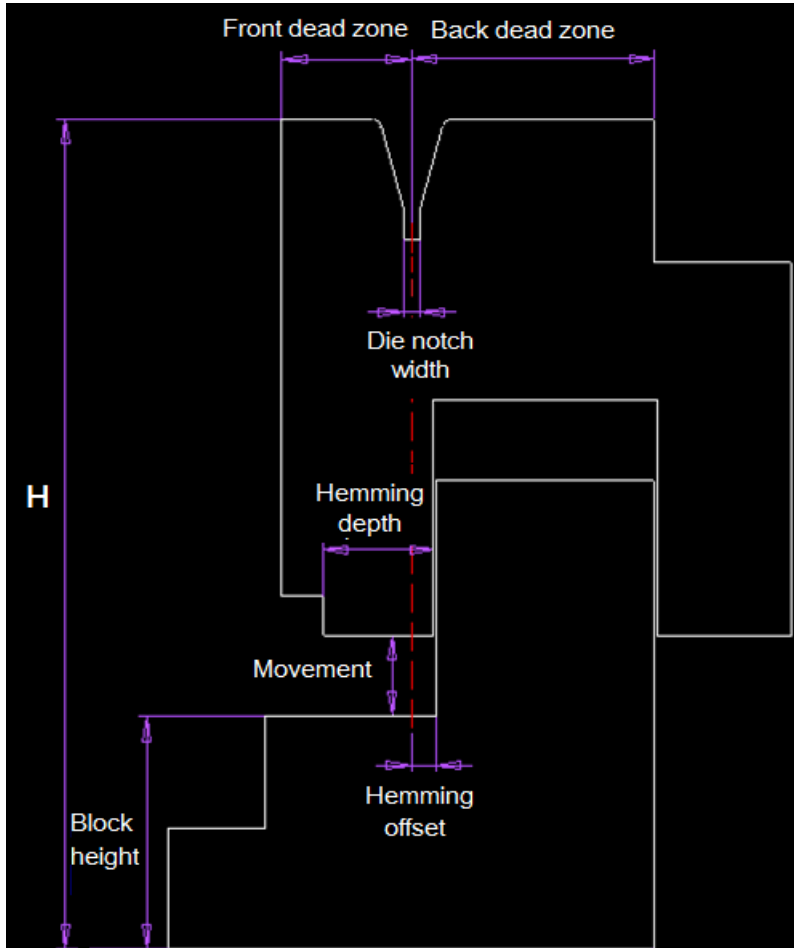


- **XOffset** – The power offset from the center for the hemming bend.

When the **Hemming Type** is **2**, you can define these moving hemming die parameters, as shown in the picture below:

- **Back Dead Zone**
- **Front Dead Zone**

- **Block Height**
- **Movement**
- **Hemming Offset**
- **Die Notch Width**
- **Hemming Depth**



5.6 Punch Holders Tab

The explanations for this tab are very similar to the explanations for the [Punches tab](#). These are the exceptions.

5.6.1 Punch Holders Table

When creating a punch holder tool, there is no option for defining a tool parametrically. You can only import tool definitions from DXF files.

The DXF file indicates the origin for the power vector. **EsaBend3DM** shows the power vector based on the origin.

There are columns for both **Up Joint** and **Down Joint**.

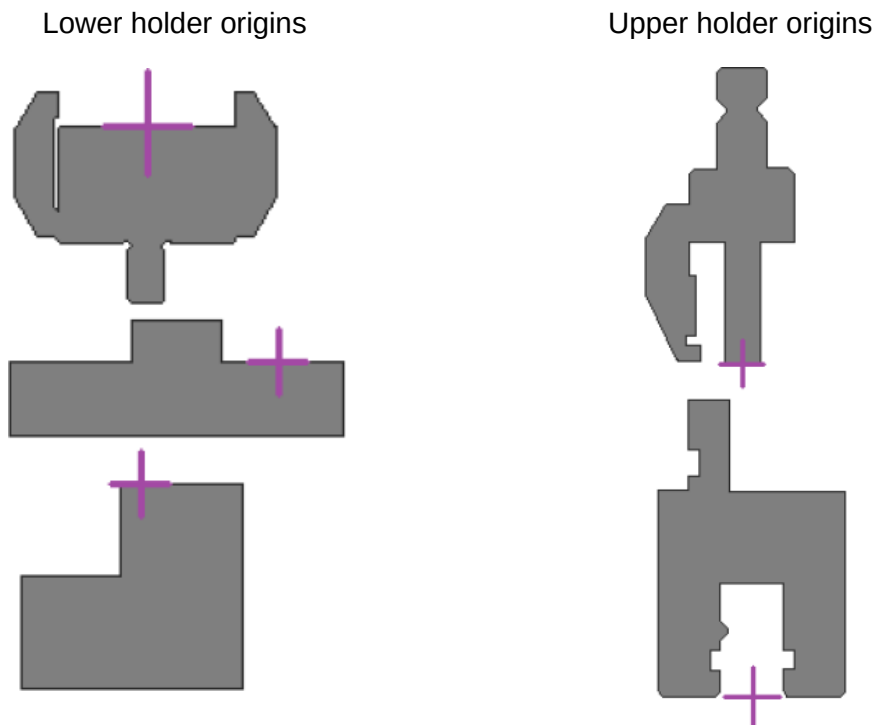
There are no **Radius**, **Angle**, or **Hemming** columns.

5.6.2 DXF Geometry Creation

The origin (0,0) points are positioned thus:

- Vertically – In-line with the force vector

- Horizontally – Where the tool connects.



5.7 Die Holders Tab

The explanations for this tab are very similar to the explanations for the [Punches tab](#).

When creating a die holder tool, there is no option for defining a tool parametrically. You can only import tool definitions from DXF files.

5.8 Segments Names Tab

The **Defined Segment Names** table contains columns for **Segment Length**, **Metric Name**, and **Imperial Name**, to make it easy to refer to a particular length. For example, segment length is called ½” in **Imperial**.

5.9 Tool Manufacturers Tab

The table at the top shows default segments per punch manufacturer.

The table at the bottom shows default segments per die manufacturer.

Select a manufacturer for punch and die from the list on the left.

5.9.1 Default Segments Tab

This tab shows the number of default segments for each measurement.

For punch tool manufacturers, the table also shows the number of default left and right heels.

Add a new segment by clicking the empty line at the bottom of the table.

5.9.2 Heel Setup Tab

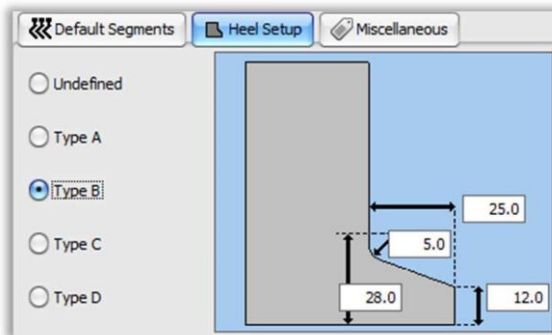
- Relevant for punch only.

Heels are defined differently for each tool manufacturer.

You have these options:

- Assign a heel manufacturer to selected tools.

- Change a default length or normal/left heel/right/heel position by clicking the field and typing the new value.
- For a punch tool, define which type of heel setup to use by clicking the **Heel Setup** tab and selecting one of the options:



The graphic on the left shows you the measurements based on the heel type.

- Edit the displayed values.

5.9.3 Miscellaneous Tab

To change the name of the punch/die manufacturer, type the name into **Manufacturer name**.

To set the tang height, type the value in **Tang height**.

5.10 My Preferred Tools Tab

This tab contains configuration options for preferred tools.

You can indicate that specific tools are preferred in Simulation mode, by clicking the **Remember as preferred tools** button:

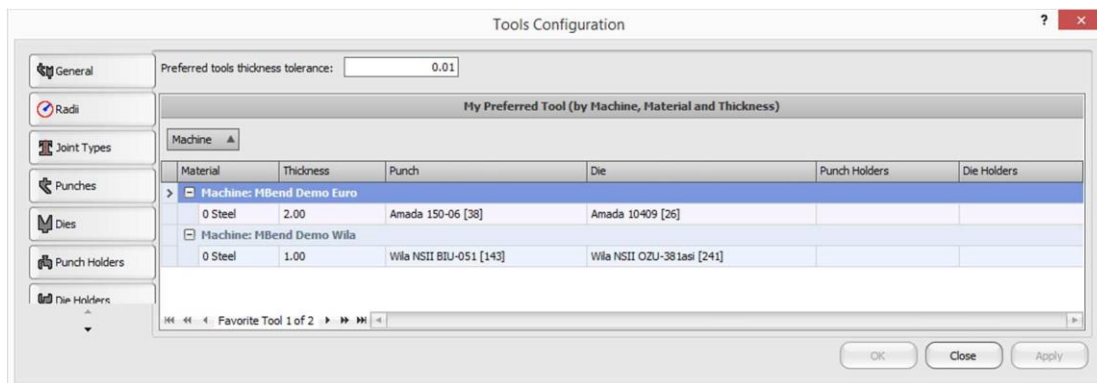
- In the **Select Tools** dialog box
- In the **Automatic Tools Selection** dialog box

5.10.1 Preferred Tools Thickness Tolerance

This value is the allowed deviation in thickness for preferred tools.

5.10.2 My Preferred Tool Table

The preferred tools you [checked in the Select Tools dialog box](#) for a particular material/thickness combination, sorted by machine. For example:



To change the order of the machines displayed in the table, click the **Machine** button.

6 Options

This section explains the options available when using **EsaBend3DM**. There are several ways to access the options:

- Click the **Options** icon on the **Quick Access** toolbar



- In the **EsaBend3DM** tab, click the **Options** tab.
- In the **Home** tab, click the **Options** icon .
- Ctrl+Shift+O

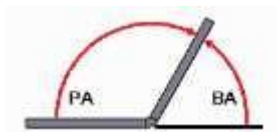
6.1 General Tab

The **General** tab contains some global **EsaBend3DM** settings.

6.1.1 Angle Display Mode Section

There are two ways to display angles:

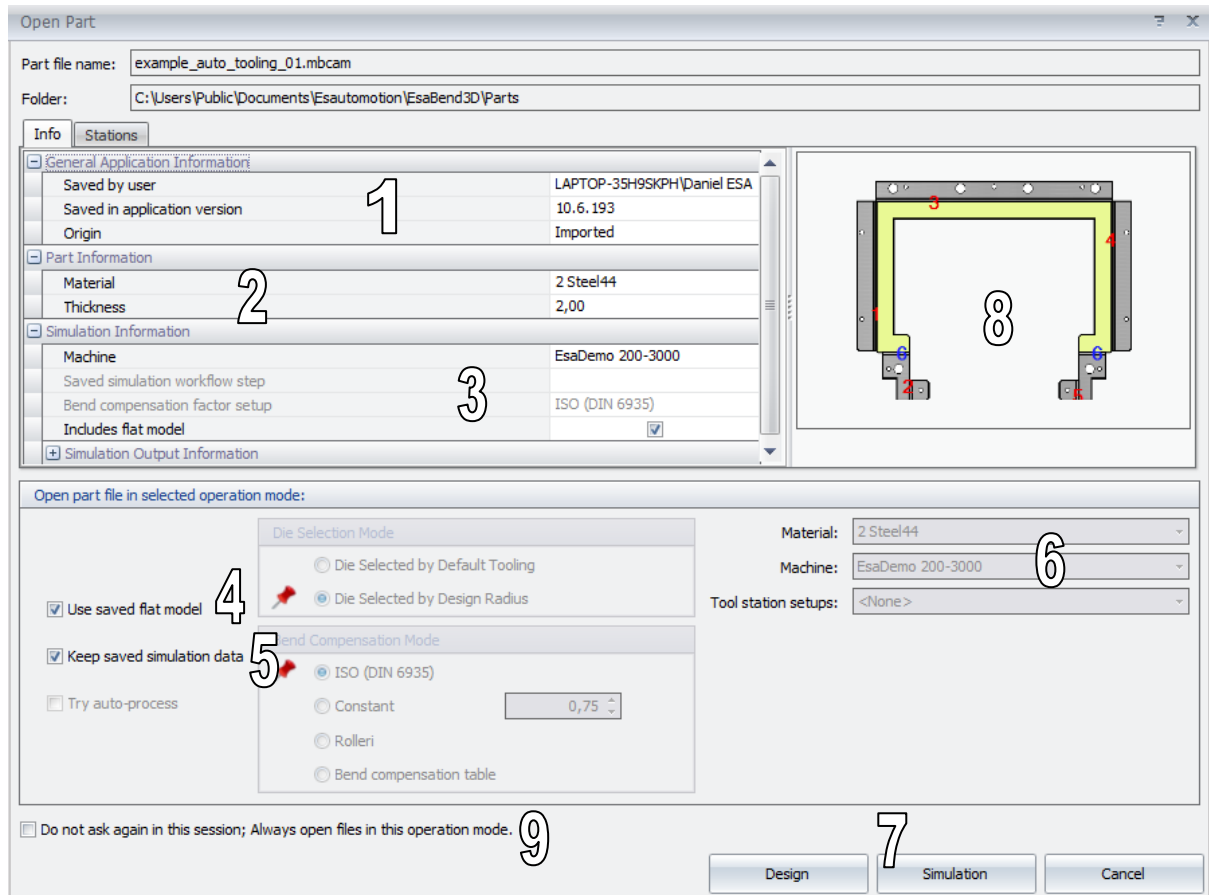
- BA** – The bend angle; how much **EsaBend3DM** bends the part from the flat.
- PA** – The angle of the finished product.



BA and PA added together equal 180°.

6.1.2 Part Open Mode Section

How do you want **EsaBend3DM** to open part files? If you have a preferred mode, you can set it here:



- **Ask Part Open Mode** – (default mode) **EsaBend3DM** asks you whether to open parts in [native](#) mode, [design](#) mode, or [simulation](#) mode (7 in the picture). The **Operation Mode** dialog box opens:
EsaBend3DM shows you
 - The part's saved properties and preview image (1, 2, and 8 in the picture).
 - The origin (1): **Imported** e.g., IGES part files, **CAD Link**, **DXF**, **Designed in EsaBend3DM**.
 - Errors (if any), in red, e.g., **Saved Simulation Machine Missing – Simulation Data Reset** (3).
 - Whether the flat model is included in the simulation (3).

You can open the part with its saved simulation data (5) when in Simulation mode. If you do not check this option, **EsaBend3DM** disregards the saved simulation data and starts the simulation at [the first workflow step](#).

Depending on the file type and the **EsaBend3DM** mode (Design or Simulation), you can change some of the properties:

- Open the part with the saved flat model (4). This option is relevant for Simulation mode. If you do not check this option, **EsaBend3DM** calculates the flat model again from the 3D definition.
- Select a different machine (6), only available if you do not keep the saved simulation data (5).
- **Native** – If the file contains simulation data, open it in Simulation mode; otherwise, in Design mode.
- **Design** – Open the part in Design mode, even if it contains simulation data. The saved simulation data will be available when you switch to Simulation mode. You cannot open

these files in design mode:

- MBCAM files generated by CAD Link
- DXF files imported into **EsaBend3DM**
- **Simulation** – Open the part in Simulation mode, even if it does not contain simulation data.

You can also set the default file opening mode at the bottom of the **Operation Mode** dialog box (9).

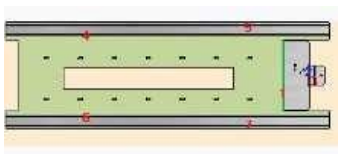
6.1.3 Part Save Parameters Section

This section contains options for previews, automatic part saving, and more.

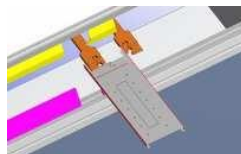
6.1.3.1 Preview Image Type

You can determine what type of preview image to save with the part:

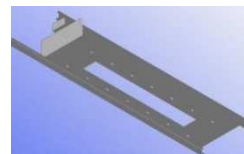
Flat



As last simulated



Three dimensions



You can see this preview image in Windows Explorer, or when opening a part from within **EsaBend3DM**, in the [Operation Mode](#) dialog box.

To ensure that the preview of a part appears the way you want it, you must open the part in Simulation mode, ensure you have the correct option selected in **Options**, and then save the part.

6.1.3.2 Changed Part Auto-Save Mode

Choose between saving automatically into the part file or a backup file, or not saving automatically, with or without a notification.

6.1.3.3 Notify Unsaved Changes After

When you choose automatic saving or notification, you can specify how frequently the saving/notification happens.

6.1.4 Various Settings Section

This section contains options for the home page, machine preview, license expiration, and more.

6.1.4.1 Show Home Page on Startup

When you select not to show the defined home page, **EsaBend3DM** opens to a blank view, with no files open.

6.1.4.2 Home Page

When you select to start **EsaBend3DM** at the home page, you can decide whether to start on the **Help** tab or the **Recent Documents** tab.

6.1.4.3 Show Machine Preview in Machine Dialog

When selected, **EsaBend3DM** displays a small picture of the machines when you hover over the rows in the **Machines** dialog box.

6.1.4.4 Recent List Maximum Size

This is the number of file names and folders that **EsaBend3DM** shows you in the [Recent](#) tab.

6.1.4.5 Notify Due License Expiration at Startup

When you start the program, **EsaBend3DM** may show you a warning message that indicates how much time is left on your current license.

6.1.4.6 Due License Expiration Notification Period

You can decide how much advance warning to get before your license expires. Select the number of days or weeks.

6.2 Workspace Tab

This tab contains options for the workspace.

6.2.1 Workspace Defaults Section

This section contains options for the default selected machine and material.

6.2.1.1 Selected Machine

You can select which machine is used by default. This machine is used by default when you design a part and go to Simulation mode or when you import a part.

6.2.1.2 Selected Material

You can select which material is used by default. This material is used by default when you design a part and go to Simulation mode or when you import a part.

6.2.2 System Defaults Section

This section contains options for bend length and radius, retraction, holes management in simulation, etc.

6.2.2.1 Minimum Bend Length

EsaBend3DM does not flatten any bends shorter than this value for the flat pattern.

EsaBend3DM assumes these bends were bent previously.

When you select this option, **EsaBend3DM** shows you a picture of how the length is calculated.

6.2.2.2 Use Negative Tolerance in Sequence Stage

When selected, **EsaBend3DM** uses tools that are shorter than the bend lines by the value that appears here (half on either side of the tool). You can [change this value in the tools configuration](#).

6.2.2.3 Minimal Bumping Radius

EsaBend3DM automatically treats a bend with a radius larger than the value shown here as a bumping bend. You can change the bumping bend to a regular bend in the tooling stage.

6.2.2.4 Fingers Retract Security Distance

EsaBend3DM retracts the fingers this additional distance when it calculates the automatic retraction required to avoid a collision.

6.2.2.5 Use Minimum Retraction Value

After a bend is executed, before the part moves, the fingers may retract to avoid collisions. When you select this option, the distance indicated here is the minimum retraction of the fingers.

6.2.2.6 Show Holes in Simulation

You can hide the holes during simulation. It is recommended to use [Mark Holes](#) for faster performance.

6.2.2.7 Holes in Simulation Minimum Size

When you show holes, you can decide that **EsaBend3DM** should only show holes larger than the size set here.

6.2.2.8 Change Collinearity Tolerance

By default, **EsaBend3DM** always allows some tolerance for collinear bends that are not exactly aligned. When you select this option, you override the default and can set a new value.

⚠ WARNING! A change to this value may cause collisions when non-aligned bends are bent in a single hit.

6.2.3 Export to DXF Section

When you export a file from **EsaBend3DM** to DXF, you can include bend lines by selecting the **Draw Bend Lines** option.

6.2.4 Simulation Section

You can determine the default speed for displaying simulations by setting the **Movement Speed**. This option is only visible when the tooling stage is complete and only has an effect when one of the items in the **Simulation** tab => **Animation** group is selected.

Drag the indicator right and left. The speed you choose is displayed in square brackets (a range between 1 and 10).



6.2.5 Transparency Section

You can change the transparency of the component that you select (in the **Simulation** tab).

6.3 Folders Tab

This tab contains options for where to save different types of files by default.

6.3.1 Public Folders Setup

Here you can determine the default destinations for saving part, output, NC, report, and auto-save files.

If necessary, you can return to the default destinations by clicking the **Reset to Defaults** button.

💡 TIP: You can change the destination for log files in the [Debug tab](#).

6.3.2 Folders Usage Rules Setup

You can change the rules by which **EsaBend3DM** determines where to save, open, and generate files for different purposes. In each field, click the down button and select the option you prefer.

If necessary, you can return to the default destinations by clicking the **Reset to Defaults** button.

6.4 Collisions Tab

In the **Collisions** tab, you can determine which collision checks **EsaBend3DM** performs.

The first column indicates what is checked. The other columns indicate at which stages the checks take place:

- **Auto Seq** – During automatic sequencing in Simulation mode, and in Automation mode.
- **Man Seq + Fin** – During manual sequencing and finger stop stages in Simulation mode.
- **Simulation** – During the simulation stage.

	Auto Seq	Man Seq + Fin...	Simulation
Any Collision Between Part, Tools and Machine...			
During motion			
Part Collision Test With...			
Tools and Machines			
Frame			
Fingers			
Tools			
Punch			
Die			
Beams			
Upper Beam			
Lower Beam			
Clamps			
Upper Clamp			
Lower Clamp			
Holders			
Upper Holders			
Lower Holders			
Fingers Collision Test With...			
Tools and Machines			
Tools			
Punch			
Die			
Beams			
Upper Beam			
Lower Beam			
Clamps			
Upper Clamp			
Lower Clamp			
Holders			
Upper Holders			
Lower Holders			

6.4.1 Any Collision Between Part, Tools and Machine

This row turns on and off all the options for the corresponding column. You may see these icons:



– Inactive. **EsaBend3DM** does not perform any of the checks listed in this column.



– Active, without motion checks. You see this icon when you deselect [During Motion](#), immediately below. **EsaBend3DM** performs the collision checks marked with a checkmark (or) , before and after hits.



– Active. **EsaBend3DM** performs the collision checks marked with a checkmark (or) , before and after hits, and when the machine is in motion.

6.4.2 During Motion

When selected, **EsaBend3DM** checks for collisions while the machine is in motion, in addition to collision checks before and after the hits.

When not selected, **EsaBend3DM** checks for collisions when the punch hits the part and when the part is bent with springback.

6.4.3 Part Collision Test With...

EsaBend3DM checks for collisions with the part.

The checks in each column are organized in a tree format.

When you click the leftmost checkmark ☒, **EsaBend3DM** understands that you want to select all the options in the section, and marks them accordingly.

6.4.4 Fingers Collision Test With...

EsaBend3DM checks for collisions with the fingers.

It is not possible for fingers to be involved in a collision during automatic sequencing, so there are no entries to edit in this part of the table.

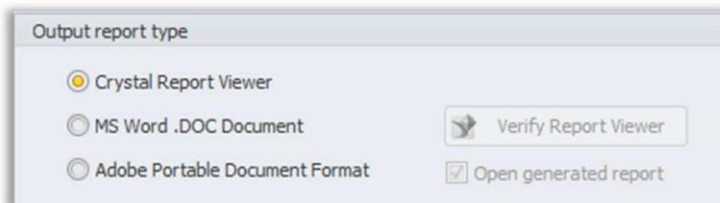
The checks in each column are organized in a tree format.

When you click the leftmost checkmark ☒, **EsaBend3DM** understands that you want to select all the options in the section and marks them accordingly.

6.5 Reports Tab

You can change these settings that concern report generation and format.

6.5.1 Output Report Type Section



Generated documents can be created in a format suitable for Crystal, Microsoft Word (DOC), or Adobe PDF.

6.5.1.1 Verify Report Viewer Button

When you have selected Microsoft Word or Adobe PDF as the output report type, check that you are able to open DOC or PDF files on this computer by clicking this button and navigating to a file of this type.

6.5.1.2 Open Generated Report

When you select this option, the report that you generated when in [Simulation mode](#) opens automatically.

6.5.2 Reports Setup Section

This section contains options for logos, capture sizes, resolution, holes management, and more.

6.5.2.1 Report Logo

Add the logo of your choice to reports, or use the default logo.

6.5.2.2 Still Capture Size

Set the resolution of screen captures that are displayed in reports. The default is 400 x 400 pixels.

6.5.2.3 Video Capture Size

Set the width resolution for videos, in pixels.

6.5.2.4 Separate Video for Every Hit

EsaBend3DM can capture all the hits into one video or separate each hit into its own video.

6.5.2.5 Auto Sequence Preview Resolution

This is the resolution of previews shown during [auto sequencing](#), when you hover over the rows in the **Results** pane. It refers to the height of the displayed preview images, in pixels.

6.5.2.6 Use User Reports Only

Not supported.

6.5.2.7 Use Alternative (Basic Window Means) Capturing

You can use the Windows built-in capturing tool for report screenshots. Use this method only if the default method supplies black screenshots.

6.5.2.8 Show Holes in Report

You can tell EsaBend3DM to hide or show holes in reports. For faster performance, do not show holes.

6.5.2.9 Show Down-Bends as Negative in Report

When selected, the report shows down-bends with a negative value:

Hits info Summary							
No	ANGLE	LENGTH	Retract	X	R	Z1	Z2
1	-90.00	186.25		23.97	195.00	320.00	370.00
2	90.00	276.50	10.00	58.97	195.00	1,532.60	1,775.10

 **NOTE:** In the simulation, up-bends are shown as blue and down-bends as red.

6.5.2.10 Zoom to Fit Stations in Report

When selected, the report shows only the current station. Otherwise, the report shows all the stations.

6.5.3 Report Languages Section

Select the language of your choice for the reports.

 **TIP:** To change the language of the user interface, go to the **Language** tab.

6.6 Units Tab

In this section, you determine which units of measurement to use for different displays:

34. Decide whether to work with metric or imperial units.
35. Set the unit for distance, machine/tool length, finger retraction, area, speed, force, mass, force/length, pressure, relaxation, and density. When there is only one option available, it appears grayed out.

36. Set the precision, which is the number of digits to show after the decimal place.

 **TIP:** You can always restore the default settings by clicking the **Reset Factory Units** button.

6.7 Themes Tab

You can set the colors for all the different displays and save your color settings in a file or select a predefined theme from a list. Click the different tabs to see the available options.

6.7.1 Selected Theme

To select a theme from the list supplied with **EsaBend3DM**, click the down arrow next to **Selected theme**. The colors change immediately from the **Default** theme to the new selection.

To start a new file, click the **New** icon  and type a name in the **Define New Theme Name** dialog box.

To use the current settings as the basis for changes, click the **Copy** icon  and save your changes under a new name.

6.7.2 User Defined

You cannot select **User Defined**. This is simply a sign from **EsaBend3DM** that the currently displayed theme is not one of the predefined themes.

Once you copy a predefined theme or create a new one, **EsaBend3DM** recognizes it as **User Defined** and you can make changes.

6.8 Language Tab

Select one of the available languages for the user interface.

Languages for the reports are in the **Reports** tab.

6.9 Live Update Tab

When you select **Check for Updates**, every time you start **EsaBend3DM**, the program checks to see if there are software updates to install. It checks in the folder indicated here.

When a company receives a service pack, the administrator can copy the files to one central location. Each workstation can then update the software automatically.

EsaBend3DM asks you if it should install the updates before proceeding.

In this tab you can see the numbers of the most recently installed **EsaBend3DM** versions.

6.10 Post-Processors Tab

This tab contains options for the NC file name and the NC editor, and displays some non-editable parameters.

6.10.1 Common NC Parameters Section

This section contains options for reuse of NC name and the NC editor.

6.10.1.1 Reuse NC Name for the Same Part

When you select this option, each time you generate NC, **EsaBend3DM** overwrites the NC file for the current part.

6.10.1.2 NC Editor Application

By default, the editor for modifying NC files is MEdit.exe. You can change this to the editor of your choice.

6.10.2 Supported Post-Processor Types

This section displays machine parameters. You cannot edit them.

As you move from machine to machine (row to row), the parameters in the section below reflect the options in the post-processor.

6.10.3 Post-Processor Option Names

As you click each of the options in the left column, the details of the option are shown on the right. **EsaBend3DM** passes these options to the machine via the NC. These options are not simulated in **EsaBend3DM**. You can edit some of these properties, but only for options that are marked with a check:

- **Display Name** – the name of this option in the control user interface
- **Tooltip** – text that appears when you hover over this option in **Hits Parameters**
- **Min Value** – the minimum value allowed
- **Max Value** – the maximum value allowed
- **Default** – the default value

These values are visible and editable in [Hits Parameters](#) in the Simulation stage.

6.11 Support Tab

In this tab you can configure your problem report. You can type in the name of an alternative email provider in **Mail profile name**.

The **To** address is fixed. To send carbon copies (CC) of emails to addresses of your choice, click the **Address book** icon  and select contacts from your list.

When you check the **Send support e-mail** option, the email opens so you can edit it before sending it.

6.12 Automation Tab

These options apply when in [Automation mode](#).

6.12.1 Auto Sequence Execution Parameters Section

Here you can define the maximum time for automatic sequencing.

6.12.2 Automation Script Execution Parameters Section

This section displays options relating to execution of automation scripts, including the number of parallel batch threads.

6.12.2.1 Show Document during Report Generation

When this option is selected, as you generate the report, **EsaBend3DM** displays the screenshots.

6.12.2.2 Execute Parallel File Simulation Steps in Automation Script

This option tells **EsaBend3DM** to use multi-threading for the automation process, thereby enabling EsaBend3DM to process several parts simultaneously.

6.12.2.3 Number of Parallel Batch Threads

With this option you can determine how many parts to run in parallel during automation. EsaBend3DM displays the number of possible parallel threads, according to the capabilities of your PC. For best performance, it is recommended that you use half the possible number. For example, if you have the possibility of eight threads, for this option, select four.

6.12.2.4 Limit Document Processing Time

Here you can define the maximum time for producing a report.

6.13 Debug Tab

The options in this tab are only relevant when you are instructed to use them support personnel.

7 Tabs

The tabs at the top change according to what you are doing in **EsaBend3DM**.

7.1 EsaBend3DM Tab

This section explains the **EsaBend3DM** tab in the EsaBend3DM software.

When you click the EsaBend3DM tab, the screen is split into three columns: the side menu, recent files, and recent places.

7.1.1 Side Menu

The left column contains these options:

- **New Part** offers these alternatives:
 - **New profile** opens the [New Part Wizard](#).
 - **Library profile** opens a list of defined library profiles. Choose one.
 - **Base flange** allows you to define the X and Y dimensions of a base flange.
- **Open** – Opens a dialog box where you can decide which type of file to open. When you select an option from the dropdown list, the [Operation Mode](#) dialog box opens.
- **Save** – Save the current document or save all open documents.
- **Save As** – Allows you to save the current document as an **EsaBend3DM** (MBCAM) or DXF file, or to export it to **cnckad** as a DFT file.
- **Close** – Select which document(s) to close.
- [Recent](#)
- **Help** – the options are self-explanatory, except for [Problem Report](#).
- [Machines](#)
- [Materials](#)
- [Tools](#)
- [Options](#)
- **Close Application** – Closes **EsaBend3DM**.

7.1.2 Recent Files

When you hover over the recent files (in the middle column), a preview of the file pops up. Click a file. The [Operation Mode](#) dialog box opens.

The number of files you see is dependent on the value in the [Recent Documents Maximum Size](#) option in the **Options => General** tab.

7.1.3 Recent Places

The right column displays a list of folders you have visited recently.

The number of folders you see is dependent on the value in the [Recent Documents Maximum Size](#) option in the **Options => General** tab.

7.1.4 Creating a Part

When you select **New profile**, the **New Part Wizard** opens:

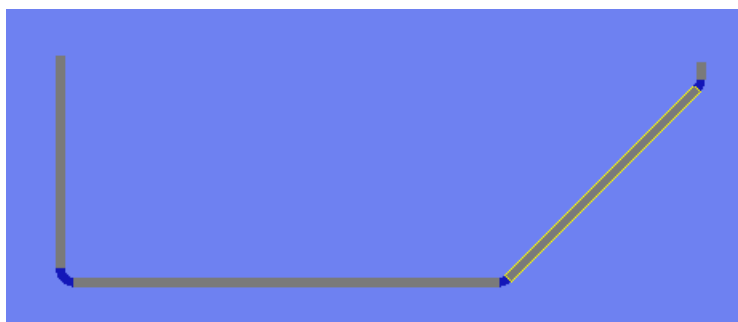
You can define the default material, thickness, and bend radius to use for all the flanges and bends in this new part.

These are the icons on the left of the toolbar:

-  **Append** – Adds another flange to the drawing.
-  **Edit** – Edits existing flanges.
-  **Delete** – Deletes the current flange.
-  **Delete all** – Deletes the entire drawing.
-  **Show line height** – Displays the flange measurements.
-  **Show angle** – Displays the bend measurements.

7.1.4.1 Drawing the Profile

Click the **Append** icon to start drawing flanges. To start a line, click the blue area. To end the line, click again. You can continue clicking to draw your approximate shape:



Do not try too hard to make the measurements precise; you can adjust them soon.

7.1.4.2 Ensuring Exact Measurements

On the right of the drawing you can see the dimensions of all the points.

Below that is the data for the selected bend. You can edit it. Move between one flange and another by selecting a flange number from the dropdown list or by clicking the flange. When you change one of the measurements, click the Set icon  to apply the change.

Click the **Edit** icon to stop automatic drawing and type exact measurements. For example:

Profile Points Overview			
	Height	Angle	Radius
	25.0	270	1.0
	50.0	90	1.0
	30.0	135	1.0

7.1.4.3 Setting Default Thickness/Radius

Above the drawing you can see and change the default parameters for thickness and radius (external/internal). Any changes you make to these default values affect all the flanges and bends in the current profile.

These are the icons on the right of the toolbar:

-  **Pan** – Allows you to move the drawing around in the display window using the mouse.
-  **Zoom** – Allows you to use the left mouse button or the mouse wheel to zoom in and out.
-  **Zoom window** – Click this icon and then define a rectangle using your mouse.

EsaBend3DM zooms in to the window you define.

-  **Fit** – Makes the current drawing fit the size of the display window.

7.1.4.4 Configuring Profile Extrusion

Click **Next** to move to the next step in the part creation process. Click the Back button at the top left of the screen to return to the previous step.

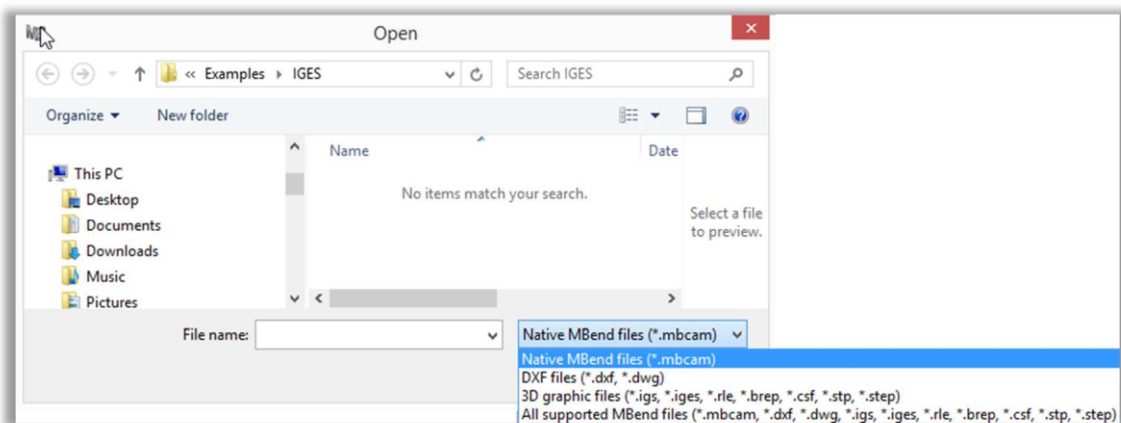
The next screen contains these parameters:

- **Part Extrusion Parameters:**
 - **Part width (extrusion length)** – The width to apply to the profile.
 - **Dimensions:** internal/external – The measurements.
- Save new library profile: name of profile, name of project, and (optional) description. If you have already defined a project, you can select it from the dropdown list. You can edit and add profiles and projects in the [Profiles Library](#).

Click **Finish** to complete the part creation process. Click the Back button at the top left of the screen to return to the previous step.

7.1.5 Opening a Part

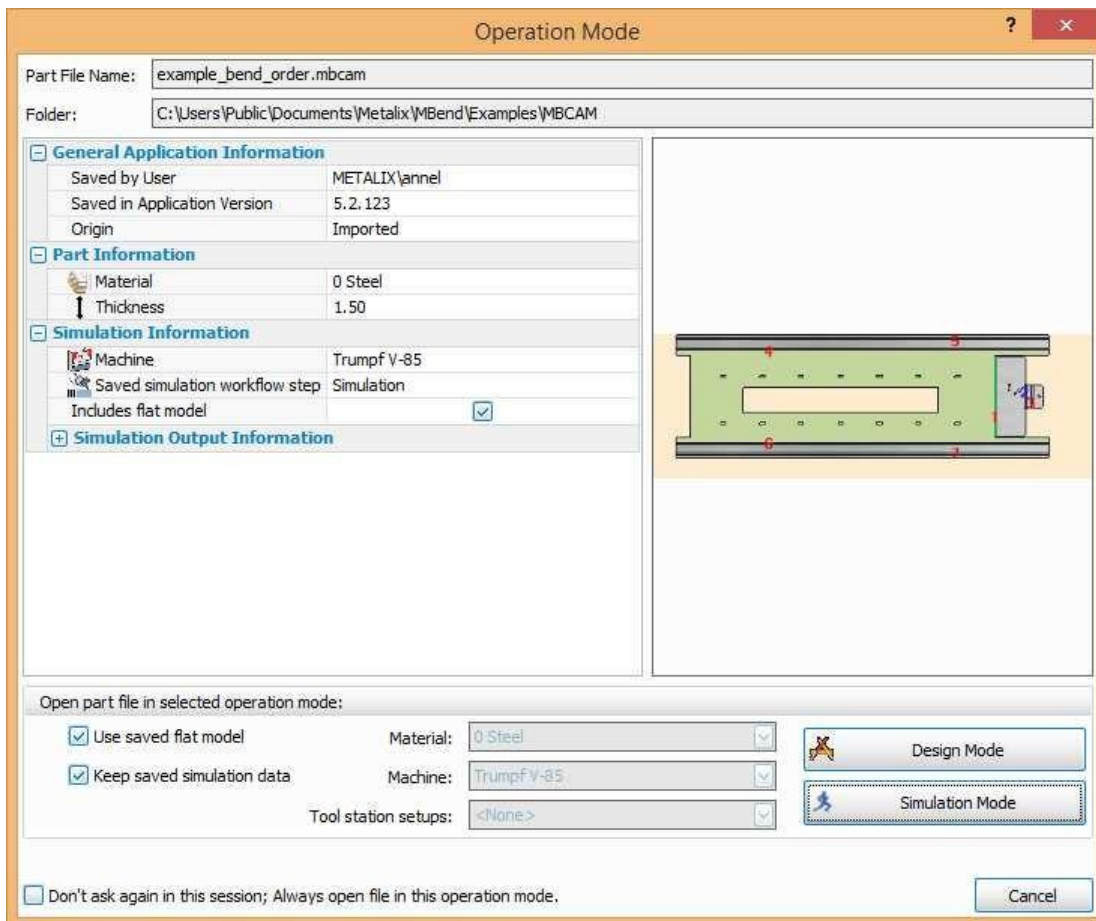
When you open an existing part file, the **Open** dialog box opens. Select the type of file to open:



The **Operation Mode** dialog box opens.

7.1.5.1 Opening an MBCAM Part

When you choose to open an **EsaBend3DM** (MBCAM) file, the file includes design data. For example, this is how it looks in the **Operation Mode** dialog box:



In the **Operation Mode** dialog box you can see information about the file, and select the mode:

- **Use saved flat model:**
 - When checked, opens all the saved simulation data (including the compensation factor mode).
 - When not checked, regenerates the flat pattern before opening the part. The calculations for bend compensation are based on the factor selected in the **Home** tab => [Compensation Factor](#).
- **Keep saved simulation data** -- When checked, opens the file with the simulation data saved previously, including tools, fingers, and sequencing, etc. When not checked, you can select the material, machine, and tool station setup.

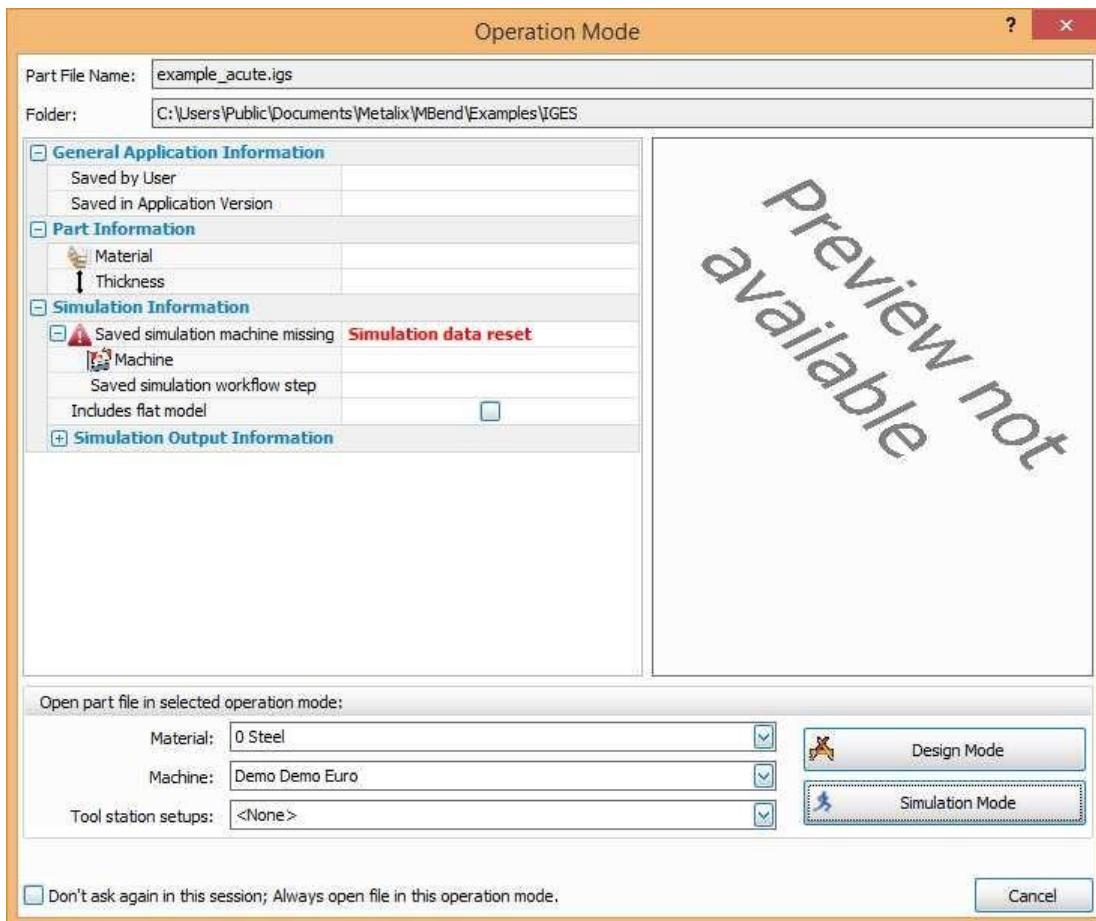
If you try to open an MBCAM file that was saved with a machine you don't have, you will see the **Simulation data reset** warning. To open the file, in this same dialog, you must select a material and machine.

To open files always using these choices, check the checkbox at the bottom of the window.

Decide whether to open the file (no matter which type) in [Design](#) mode or in [Simulation](#) mode and click the appropriate button.

7.1.5.2 Opening an IGES or SPT Part

When you choose to open 3D graphic files such as IGES, or STP files, you need to select a material, thickness, and optionally a tool station setup. This is how the dialog box may look:



(The **Simulation data reset** warning always appears at this stage.)

The [compensation factor mode](#) is the one you select by clicking the **Compensation Factor** icon  on the **Home** tab.

Decide whether to open the file (no matter which type) in [Design](#) mode or in [Simulation](#) mode and click the appropriate button.

7.1.5.3 Opening a DXF Part

When opening DXF files, you should choose contour or bending lines for different document layers. You can also select a material, thickness, and tool station setup. For example:

Load DXF part ? x

DXF file name: C:\Metalix\p\Ex_DXF\Door_3.dxf

Length unit: ☒ Metric units ☐ Imperial units

Radius: ☐ Neutral ☒ Internal ☐ External

DXF document layers			
Layer Name	Layer Usage		
DOWN_CENTERLINES	☐ Contour	☐ Bend Lines	☒ Ignore
INTERIOR_LOOPS	☐ Contour	☐ Bend Lines	☒ Ignore
OUTER_LOOP	☐ Contour	☐ Bend Lines	☒ Ignore
UP_CENTERLINES	☐ Contour	☐ Bend Lines	☒ Ignore

Material: 0 Steel

Thickness: 1.0 mm

Machine: MBend Demo Euro

☒ Save layer setup as default

OK Cancel

Decide whether to open the file (no matter which type) in [Design](#) mode or in [Simulation](#) mode and click the appropriate button.

7.1.6 Materials Dialog Box

The **Materials** dialog box contains the data for each material, including tensile strength and density:

Materials

Icons: [New] [Rename] [View/Edit BT Materials] [Set as Default] [Close]

ID	Material	Tensile Strength	Density	BT Material	Overbend...	Correction
0	Steel	42.5	7.8	BT_Steel	1.0	1.0
1	Aluminium	24.0	2.7	BT_Aluminium	1.5	0.8
2	Stainless	60.0	7.8	BT_Stainless	2.0	1.2
3	Galvanized Steel	50.0	10.0	BT_Stainless	2.0	1.2
4	Aluminium-5052	24.0	2.7	BT_Aluminium	1.5	0.8
5	Steel Scoop	42.5	7.8	BT_Steel	1.0	1.0
6	SUS304	60.0	7.8	BT_Stainless	2.0	1.2

Marked as the default material

OK Cancel

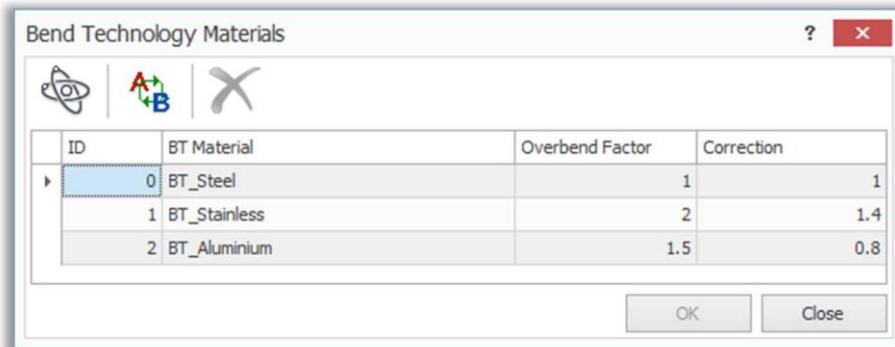
You can change the data by simply typing new values or selecting from the dropdown lists. These are the icons on the toolbar:

-  **New** – To add a material to the list.
-  **Rename** – To change the name of a material.
-  **View/Edit BT Materials** – To open the [Bend Technology Materials](#) dialog box.
-  **Set as Default** – This material is always suggested first.

-  **Delete** – Deletes the active line.

7.1.6.1 Bend Technology Materials

In this dialog you can add a new technology material, rename an existing one, or delete it:



These are the icons on the toolbar:

-  **New** – To add a technology material to the list.
-  **Rename** – To change the name of a technology material.
-  **Delete** – Deletes the active line.

 **TIP:** You can delete a technology material only if it is not being used by one of the materials in its [BI Materials](#) setting. So before you can delete a technology table change that material's setting or delete it altogether.

You can also edit the properties' technology materials by typing new values in the appropriate field:

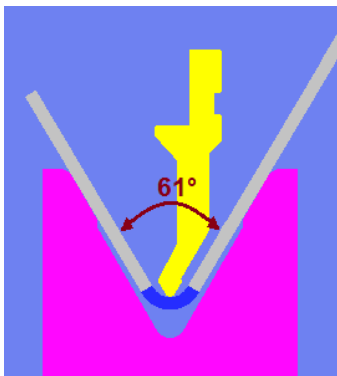
- **Overbend Factor** – The [overbend](#) for this technology material. This will be the value for all materials that use this technology table.
- **Correction Factor** – The [correction](#) for this technology material. This will be the value for all materials that use this technology table.

7.1.6.2 Overbend Factor

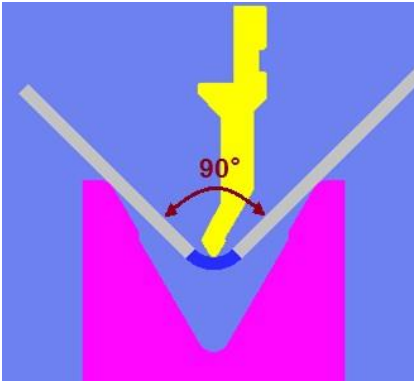
EsaBend3DM uses the overbend factor to calculate the overbend angle.

After the machine presses the material, the bend opens to some degree, due to the material's flexibility (the springback). The overbend angle is the difference between the angle to which the part must be pressed and the desired final angle.

Below is an example of bending 5 mm (0.2") armor plating, which has a very high overbend factor. To achieve a bend with an angle of 90° it is necessary to press the material to a product angle of about 61°:



When the beam moves up, the material relaxes, springing back to the desired angle:



This is how this springback is calculated:

$\Delta = \text{PunchRadius} / (\text{Thickness} * 2.1);$

• Formula from "Press Brake Technology - Steve D. Benson" pages 96-100.

$\text{SpringBack} = \Delta * \text{OverbendFactor}$

$$\text{SpringBack} = \frac{\text{OverbendFactor} * \text{PunchRadius}}{\text{Thickness} * 2.1}$$

7.1.6.3 Correction Factor

To select the correct die width for a specific bend, **EsaBend3DM** relies on the [Radii Values table](#) in the **Tools** dialog box.

When creating the flat of a part, **EsaBend3DM** examines each bend and selects the correct die width. **EsaBend3DM** uses this die width to select the correct value from the Compensation Table.

Because there is only one Radii Values table, **EsaBend3DM** must make allowances for the properties of different materials. To achieve a bend radius of 2 mm (approx. 0.08") for mild steel requires a V16 die (0.623"), while for aluminum it might require a V12 (0.472") die.

The **Correction Factor** determines how to select the correct die width, adjusted to the specific material of the part. **EsaBend3DM** takes a given radius (r), multiplies it by this factor, and arrives at the radius for this material (rM):

$$rM = r * \text{Correction Factor}$$

EsaBend3DM then finds the correct die width for this adjusted radius in the Radii Values table. For example, this is the default Bend Technology table:

ID	BT Material	Overbend Factor	Correction
> 0	BT_Steel	1	1
1	BT_Stainless	2	1.2
2	BT_Aluminium	1.5	0.8

For a bend with a radius of 1.2 mm, **EsaBend3DM** makes the following selections:

V	r	B Rel
4.0	0.5	
5.0	0.7	
6.0	0.8	
8.0	1.0	
10.0	1.2	
12.0	1.5	
16.0	2.0	

Aluminum ($rM = 1.2 * 0.8 = 0.96$)

Steel ($rM = 1.2 * 1 = 1.2$)

Stainless ($rM = 1.2 * 1.2 = 1.44$)

So, for aluminum you get V8, for steel V10, and for stainless V12 (if there is no exact match then **EsaBend3DM** takes the next largest).

7.1.7 Reporting a Problem

This option allows you to report problems occurring in **EsaBend3DM** and makes it easier to resolve them.

During your work with **EsaBend3DM** it may happen that you encounter a problem or wish to make a suggestion for inclusion in the future versions. This can be anything from a feature that does not perform as expected, to a comment about an icon's picture not being relevant to its action. If this happens, we would like to hear about it.

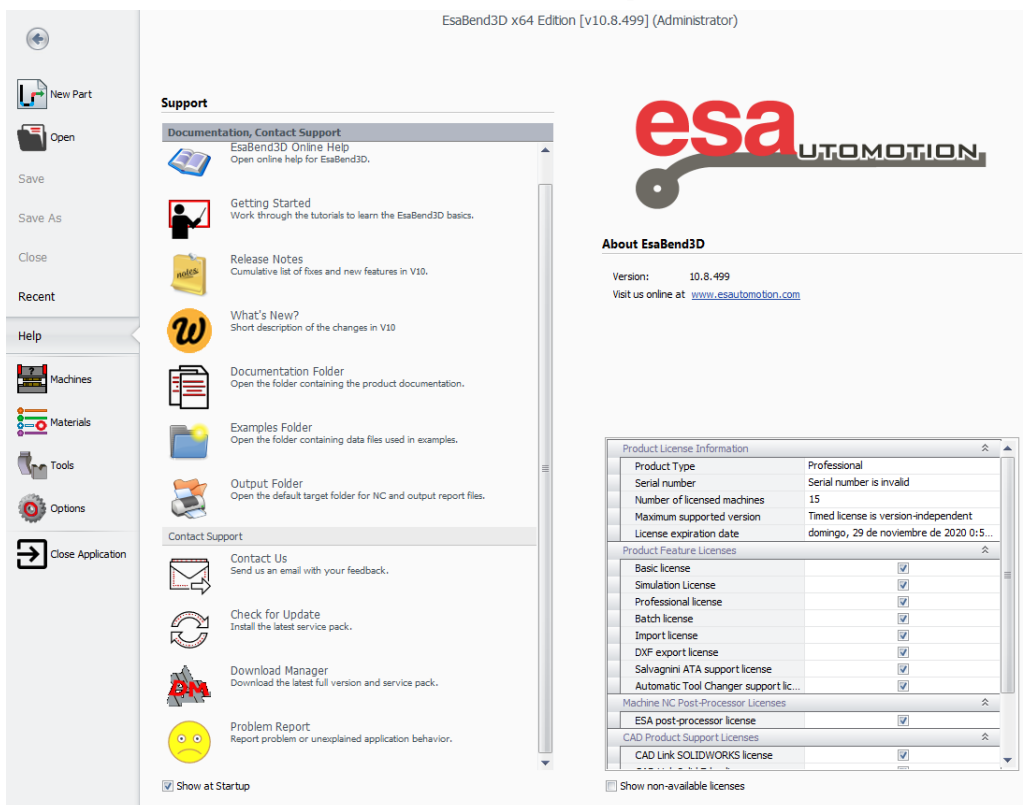
💡 One of the major driving forces behind new developments is user feedback.

To make contact with us as easy as possible, we have introduced the **Problem Report**; despite its name, this report can be used for any type of information you wish to convey to us.

When you encounter a problem, the natural reaction is to want it be resolved. For us to do this, we need to reproduce the problem; this means recreating the exact conditions under which the problem occurred, by mirroring your system and loading the part file you were using at the time. To do this, we need information about your system configuration: operating system, **EsaBend3DM** version, machine configuration, and more.

This is where the **Problem Report** becomes a powerful communication tool. When you create a new report, **EsaBend3DM** automatically includes all the files necessary to mirror your system, and enables you to add any files that may help to understand the issue, such as screen captures.

7.1.7.1 Sending a Problem Report

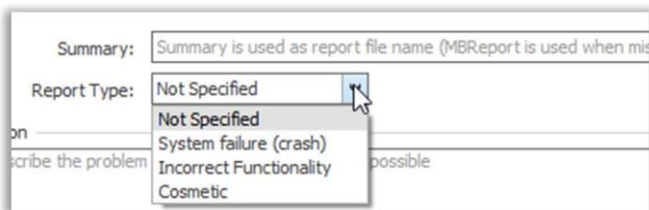


To send a **Problem Report**, select **Report Problem** from the **EsaBend3DM => Help** tab:

7.1.7.2 Problem Description and Reproduction

First, summarize why you are sending this report.

Next, select from the dropdown list what **Type** of issue this is:



Then, you see two tabs:

- **Description** – Give a comprehensive description of the issue.
- **Reproduce** – This is the most vital piece of information. How did the problem come about? How often does it happen? Use the dropdown list and the text box below it to provide a step by step procedure for locating the problem. The more complete the description, the easier it will be to reproduce your problem.

Click **Next** to move to the next dialog box. You can click the back arrow  at any stage to return to previous dialog boxes.

7.1.7.3 Personal Data

After you send the **Problem Report**, you would probably like us to respond with a fix or a workaround. For this to happen, you should supply details for contacting you.

You only have to fill in this dialog box once. This information will be saved for future use.

7.1.7.4 Reduced Problem Report

The problem report can be sent for the **Current Machine Only**, or for **All Machines**, depending on which options you choose in this dialog:

- **Current machine and its components only** – The information on the current machine is sent to the technical support team. This option means that a relatively small file is sent.
- **All active machines and machine components** – The information on all machines installed on your working station are sent to the technical support team.
- **Include factory database** – This database can be large, so only include it if **EsaBend3DM** tech support requests it.
- **Select reports to include** – Select if you are experiencing problems with reports.

7.1.7.5 Additional Files

Add files that you think will help to solve the problem, such as screen captures showing exactly what is wrong.

Attach original file – Include any additional files.

7.1.7.6 Completing and Generating the Report

EsaBend3DM generates the entire report, along with all the included files, as a single file with the MBPR extension. The final step is to send the file.

You have these options:

- **Send report immediately by e-mail** – Click the **OK** button to send the report to technical support using your default mail client.
- **Save report at location** – You can choose this option and browse for a destination directory for the problem report. You can open the folder immediately. (This is the safer option.) Send the file to **EsaBend3DM** technical support service@esautomotion.com.

Click the **Generate Report** button.

7.2 Home Tab

This chapter explains the **Home** tab in **EsaBend3DM**.

7.2.1 File Group

This group contains shortcuts to frequent file operations.

7.2.2 Configuration Group

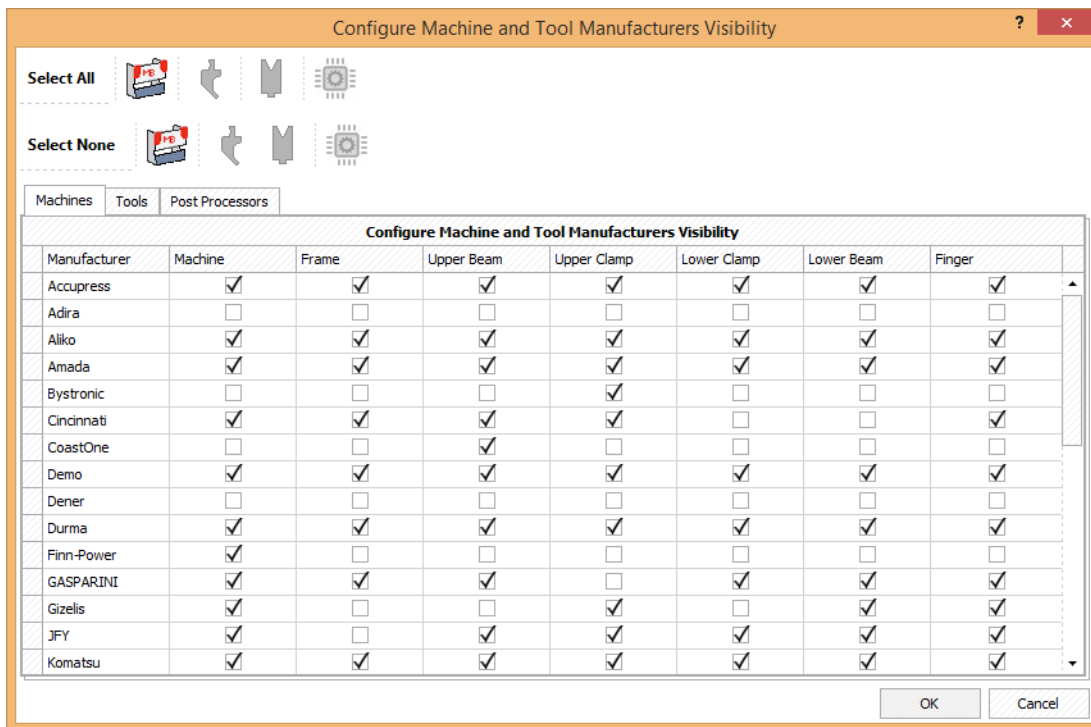
This group contains these items:

- [Machines](#)
- [Materials](#)
- [Tools](#)
- [Options](#)

... as well as the items in the following sections.

7.2.2.1 Manufacturers Visibility

In the **Configure Machine and Tool Manufacturer Visibility** dialog box, in the **Machines** tab, all the machines for the manufacturers are checked by default. If you find that components (tools, holders, and post-processors) for a specific manufacturer are missing from your configuration, you can add them here by checking the appropriate checkboxes. For example:



When you click the **OK** button, changes for each manufacturer are merged with the existing database.

In the **Tools** tab, you can indicate if the upper and lower tools and/or holders for each manufacturer are visible.

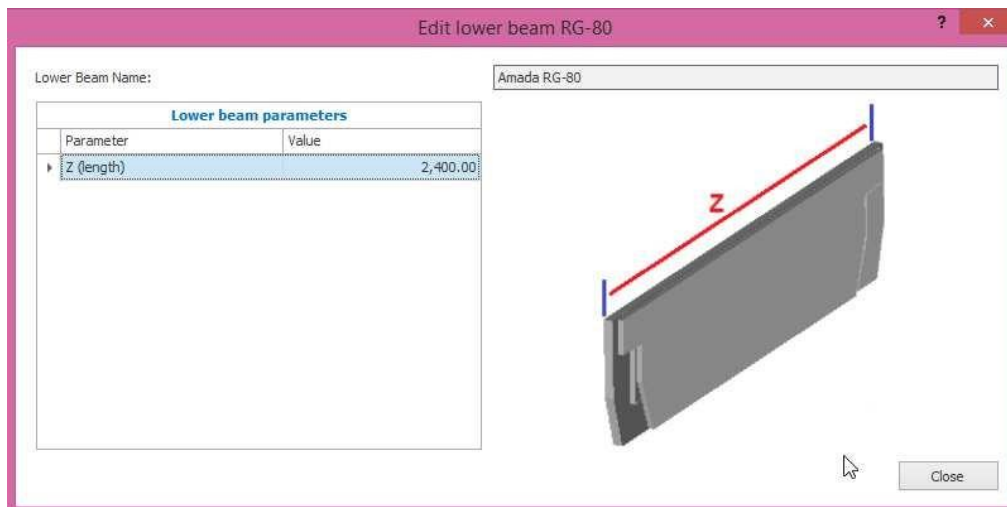
In the **Post-Processors** tab, all manufacturers are usually selected.

7.2.2.2 Frames, Upper Beams, Upper Clamps, Fingers, Lower Beams, and Lower Clamps

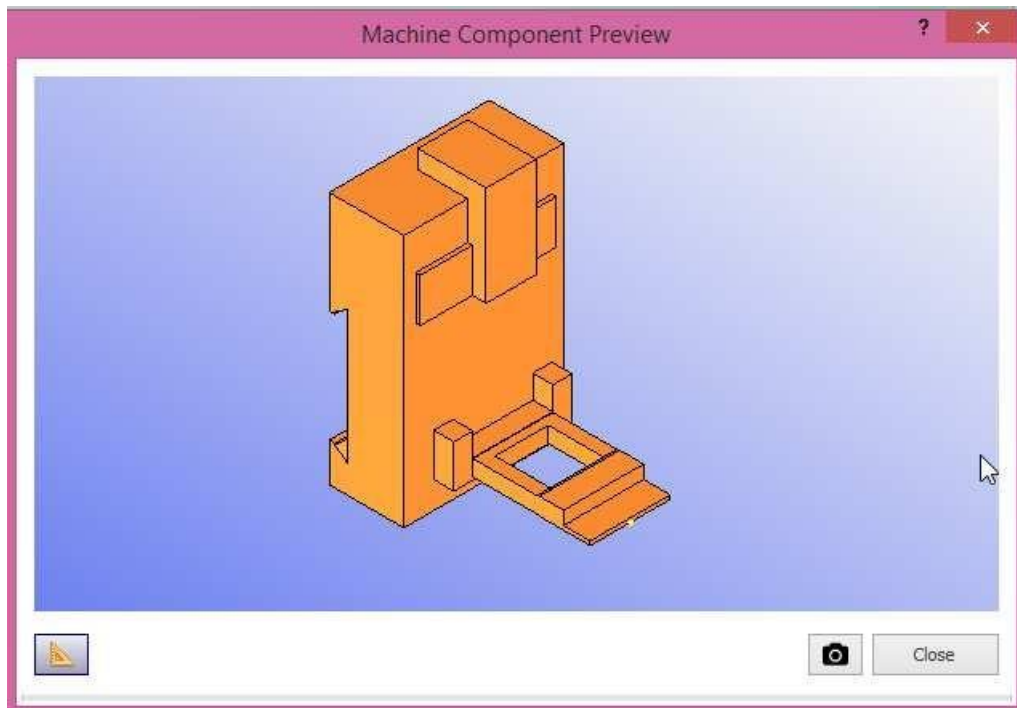
When you click one of these component types, the relevant dialog box opens, allowing you to view, edit, and create components, whether parametrically or from IGES files. In general:

- Add or make copies of different rows in the table, in which case they appear as **User Defined**. You must type the name of the new component.
- Rename or change the manufacturer of user-defined items by clicking the **Rename Manufacturer**  and **Change Manufacturer**  icons.
- Change any other parameters for this component by clicking the **Edit** icon . Different dialog boxes open, depending on the component you choose. In general, you can only edit components that are user defined and not imported.

- See the item's parameters by clicking the **View** icon . This option is visible for components that are not user-defined. For example, see this factory-defined lower beam:



- Manipulate the 3D image of the item by clicking the **Preview** icon  and using your mouse. For example, see this finger:



Some of these components require detailed explanations: [fingers](#), [upper and lower clamps](#).

7.2.2.2.1 Fingers

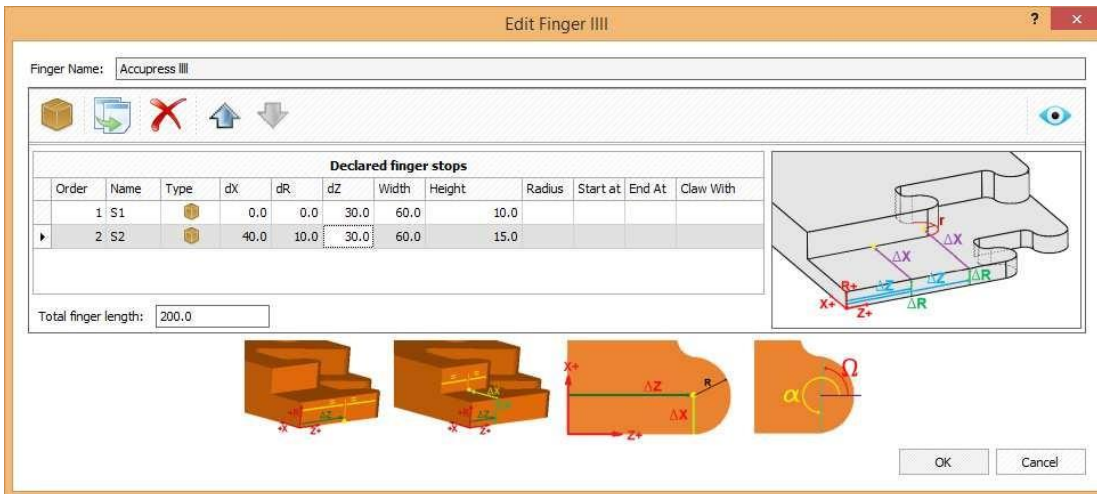
To define a new finger, click the **Fingers** icon  on the **Home** tab and click the identical **New** icon. You must give the component a name. Decide if you will define the component yourself or import the parameters from an IGES file.

When you define parameters for fingers, you can define flat finger stops. Figures for **dX**, **dR**, and **dZ** are relative to origin. The best way to define the flat finger stop is to indicate the middle of the flat face as the reference point.

For example, in the **Define New Finger** dialog box, type a name in the **Finger name** field and click the **Add flat finger stop** icon . In the **Edit Finger Stop** dialog box, configure the parameters for the first stop and click **OK**.

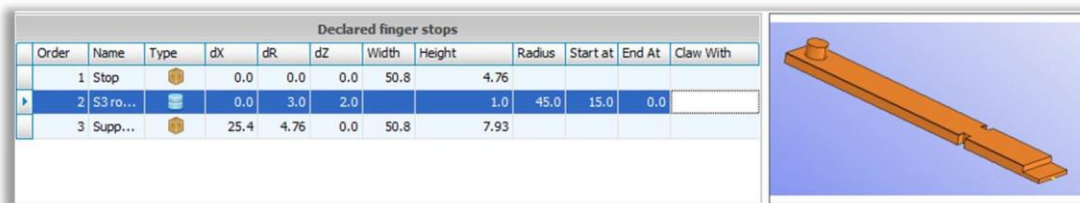
 **TIP:** It is helpful to work from a diagram.

For subsequent finger stops, you can duplicate the finger stop you created using the **Copy** icon  and make adjustments as required.



You can change the order of the stops using the up and down icons.

Parameters imported from an IGES file can include cylindrical finger stops. You need to define the center of the cylinder, the radius, and the section of the arc. For example:



7.2.2.2.2 Upper and Lower Clamps

To define a new upper or lower clamp:

37. Click the **Upper Clamps** icon  or the **Lower Clamps** icon  on the **Home** tab and click the identical **New** icon. You must give the component a name.
38. Decide how to create the component:
 - Define the component's parameters yourself.
 - Import the geometry from an IGES file (for clamps, the IGES must be a 2D surface) and define clamp parameters.
39. For upper and lower clamps, you have to define the tools' joint type.

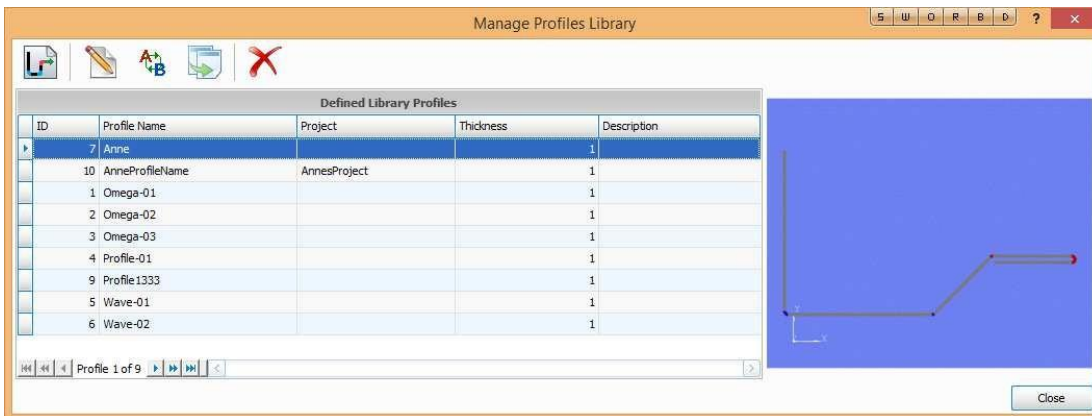
To edit an existing upper or lower clamp, click the **Edit** icon .

7.2.2.3 Manage Saved Tool Station Setups

Opens the dialog box where you can see the defined and saved tool station setups and their details.

7.2.2.4 Profiles Library

Opens the **Manage Profiles Library** dialog box, where you can change the geometry and other parameters of the profiles in your library:



A preview of each profile is shown on the right.

Click the column headers to change the sort order of the profiles.

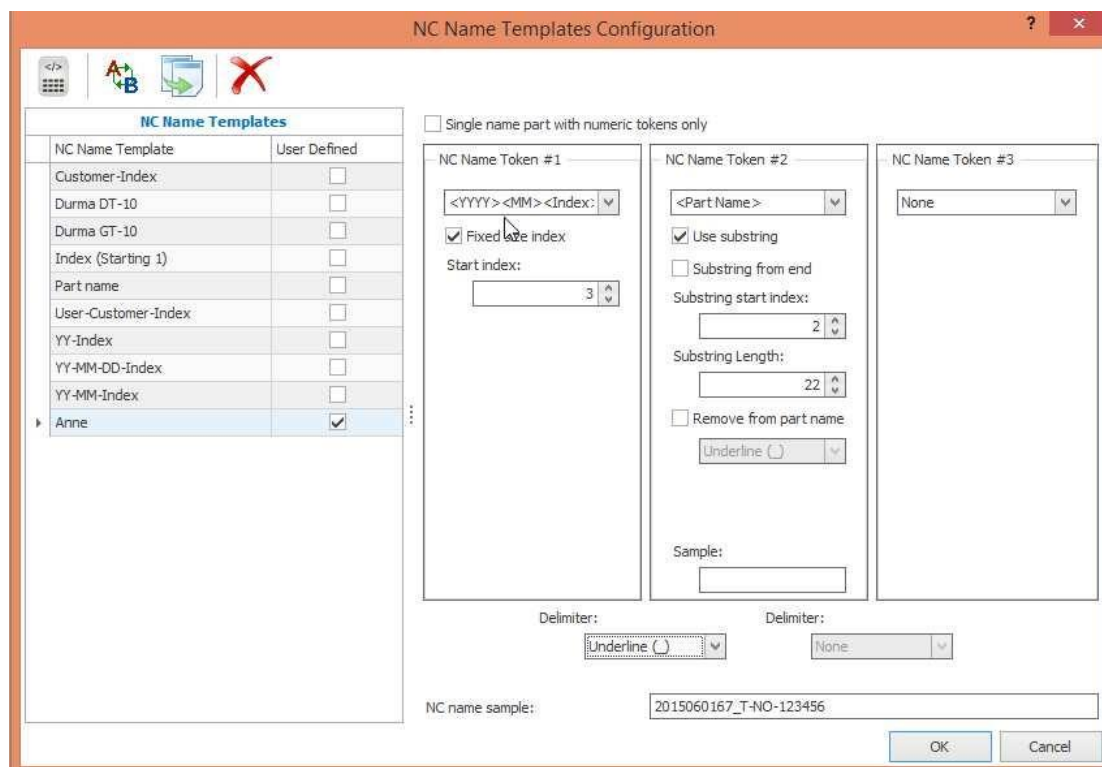
In this dialog box you can perform any of these actions:

-  Create a new profile.
-  Edit an existing profile. The **Edit Profile** dialog box opens, where you can click each flange in the design and modify the height, radius, and bend angle.
-  Rename an existing profile.
-  Make a copy of an existing profile.
-  Delete an existing profile.

7.2.2.5 NC Name Templates

This icon opens the **NC Name Templates Configuration** dialog box. When you add or duplicate an existing template, **EsaBend3DM** recognizes the new template as user defined, allowing you to make changes to the template name definitions.

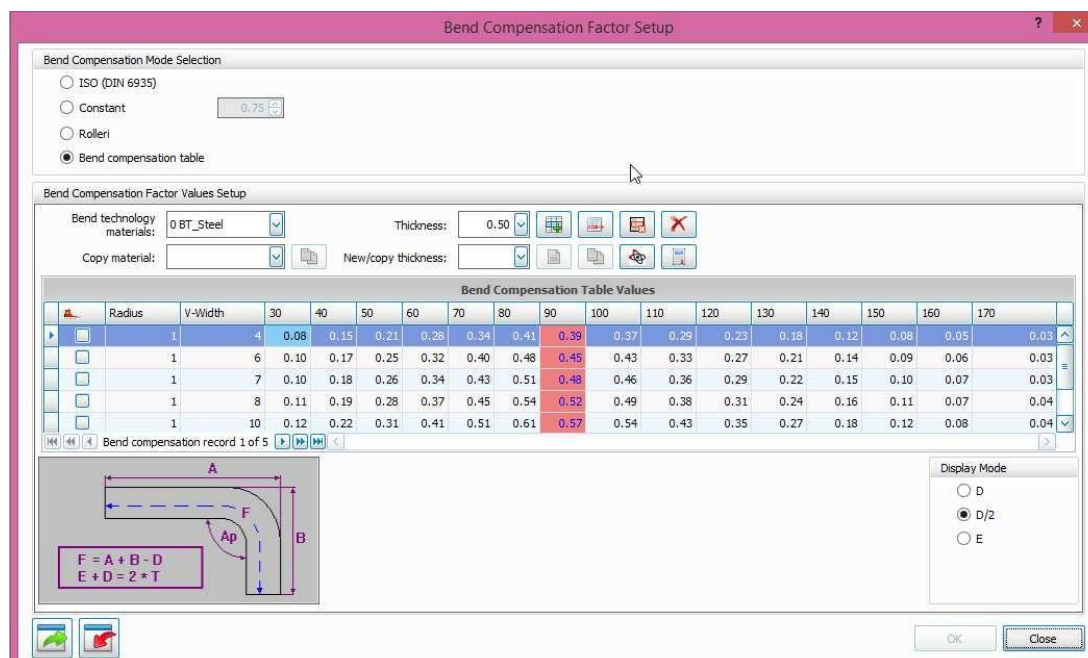
The name of each NC file you create will be according to this template:



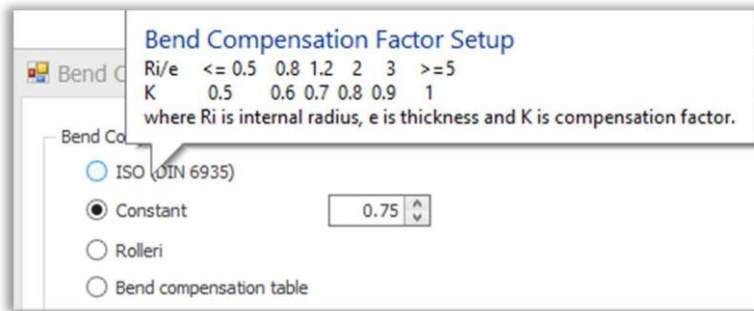
The name can consist of up to three different parts. As you edit the name, the changes are reflected in the **NC name sample** at the bottom of the dialog box.

7.2.2.6 Compensation Factor

This icon opens the **Bend Compensation Factor Setup** dialog box:



Towards the top of the dialog box you can choose the mode for calculating the bend compensation. Hover over each option (**ISO**, **Constant**, **Rolleri** or **Bend compensation table**) to see the tooltips. For example:



This is similar to **cnckad**'s **Bending Table** tab (under **Settings** => **Workspace Settings**).

To help you with the calculations, **EsaBend3DM** provides a [Deduction Calculator](#).

This dialog box contains bend factors tables, based on the material and thickness combination. If you change either of them, the data in the table changes accordingly.

There are also three compensation display modes: **D**, **D/2**, and **E**; where **D** stands for **Bend Deduction** and **E** is the calculation visible at the bottom of the screen:

$$F = A + B - D$$

$$E + D = 2 * T$$

You can create a new entry in the table based upon an existing entry.

7.2.2.7 Deduction Calculator

EsaBend3DM provides a calculator for you to try out different measurements and see their effect. Clicking this icon opens the **Deduction Calculator** dialog box. You can type in measurements for these parameters:

- Common Parameters
 - T = Thickness
 - Ap = Product Angle
 - R = Radius
- Geometric Parameters
 - A = Side A
 - D = Bend deduction
 - B = Side B
 - D/2 = Bend deduction divided by 2
 - F = The calculated flat
 - K = The neutral axis, which is a figure between zero and one representing a point relative to T.

When you click the **Calculate** button, **EsaBend3DM** calculates E for you, based on $E + D = 2 * T$.

Deduction Calculator

Common Parameters

T: Ap:

R:

Geometric Parameters

A: D:

B: D/2:

F: K:

E:

[mm]

Diagram: A diagram of a bent pipe with dimensions A, B, T, K*T, R, Ap, and F. The formulas $F = A + B - D$ and $E + D = 2 * T$ are shown in a box.

You can use these calculations in the [Bend Compensation Factor dialog box](#).

To restart calculations, click the **Clear** and **Clear All** buttons.

7.2.2.8 Switch Environment

Allows you to define, select, save, and load different EsaBend3DM work environments. [See the tutorial](#).

7.2.3 Help Group

- **Getting Started** – Opens at the first tutorial in the series.
- **View Help** – Opens the online help.
- **Videos** – Accesses instructional **EsaBend3DM** videos.

7.3 View Tab

This chapter explains the **View** tab in **EsaBend3DM**.

7.3.1 Zoom Group

Holding and dragging the mouse wheel causes the image in the 3D simulation display to rotate. There are additional ways to manipulate the image, using the zoom modes. Only one mode is active at a time. The active mode is indicated by the changed shape of the cursor:

- **Rotate** – Allows you to rotate the display by holding and dragging your left mouse button. (You can also do this by holding and dragging the mouse wheel button.)
- **Pan** – Allows you to move the item around on the display using the left mouse button. In this mode, moving the mouse wheel causes zoom.
- **Real time** -- Allows you to zoom the display in and out by holding and dragging your left mouse button left and right. You can also do this using the mouse wheel.
- **Window** – Allows you to draw a virtual rectangle over the display, causing **EsaBend3DM** to zoom in on that section.
- **Zoom to fit** -- Fits the display to the size of the window you draw. To make it work, click this option and draw a virtual rectangle over part of the display. **EsaBend3DM** zooms in to that section. Moving the mouse wheel causes zoom.

You can also change the mode by right clicking the display and selecting an option.

7.3.2 Orientation Group

These are the available options for displaying the part in the 3D simulation display:

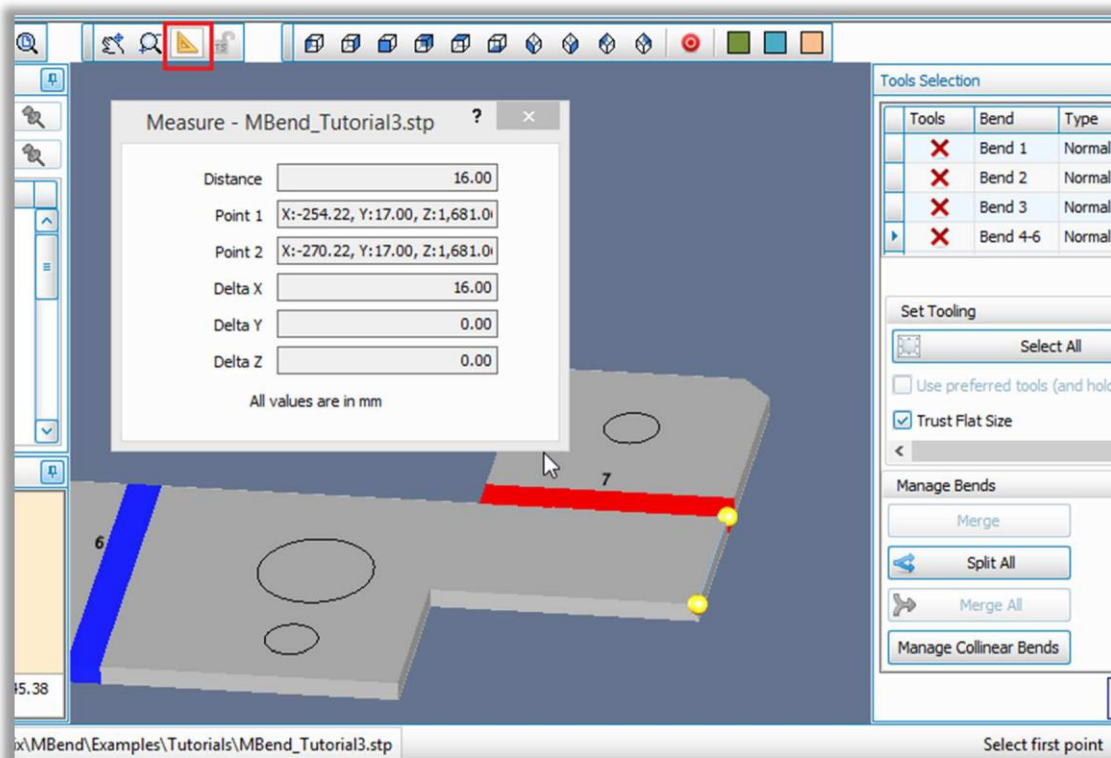
- **Left / Right / Front / Back / Top / Bottom**
- **Isometric Front-Left / Isometric Front-Right / Isometric Back-Left / Isometric Back-Right**

7.3.3 User Views Group

- **Record** – Preserves the current view so you can access it later. Click the **Record User View** icon . The **Setup User View** dialog box opens. Click the **New** button, type a name for the user view, and select a color to identify it. When you click **OK**, the name of the newly recorded view appears on the tab next to the **Record** icon.
- **Recorded Items** – The views you have recorded in the **Record** step. Click to see the orientation of the part in the 3D simulation display that you saved.

7.3.4 Measure Group

Clicking the **Measure** icon  requests **EsaBend3DM** to measure the distance between two vertices. Click the icon, then click the first vertex and the second vertex. The **Measure** dialog box opens and remains open until you close it or click the **Measure** icon again:

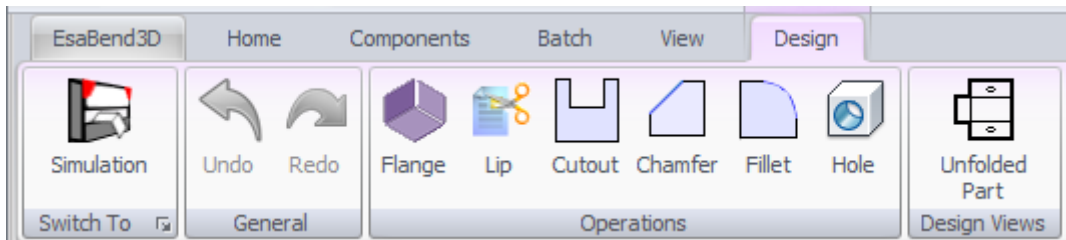


7.3.5 Windows Group

- **Use Tabbed MDI** – Rearranges all the open files into tabs.
- **Switch** – Allows you to move between one open file and another.
- **Tile Horizontal**, **Tile Vertical**, and **Cascade** are different ways of displaying the open files.

7.4 Design Tab

This section explains the **Design** tab in **EsaBend3DM**. When you create a new part using the [New Part Wizard](#) (or when you open an existing part and click **Design Mode** in the **Operation Mode** dialog box), you see the part in **EsaBend3DM**.



These are the options in the **Design** tab:

While you are in the process of designing items (via the **Operations** group), you cannot perform some actions on the current document including **Save**, **Close**, **Undo**, and **Redo**. You can still open and design other documents in parallel.

7.4.1 Switch to Group

These are the options in this group:

- **Simulation** – Goes into [Simulation](#) mode.
- **Export to cncKad** – Exports the current document to **cncKad** as a DFT file.
- **Problem Report** – Guides you through the process of [creating a report](#) to send to **EsaBend3DM** support.

7.4.2 General Group

Use the items in this group to undo and redo changes you make to your design. These buttons are not active while you are in the process of designing flanges, corners, and holes.

7.4.3 Operations Group

Use the items in this group to add [flanges](#), [lips](#), and [cutouts](#) to your design. You can use the [fillet](#) and [chamfer](#) items in this group to design the corners of your part, and add [holes](#). Each item causes item-specific options to open in a pane on the right side.

As you type the values, you can see the changes reflected immediately in the graphic display.

To tell **EsaBend3DM** to accept your changes, click the green check mark . This check mark only turns green when **EsaBend3DM** has enough information. For guidance, see error messages towards the bottom of the screen.

To tell **EsaBend3DM** to reject your changes, click the red X .

7.4.3.1 Flange

The parameters are split into two sections.

Click the **Flange** icon .

7.4.3.1.1 Flange Parameters Section

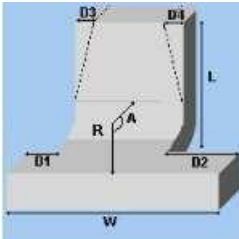
To select the edge where you want to extend a flange, hover over the part in the graphic display and click.

Type the length (**L**) of the flange. This value must be greater than 0. To indicate whether the flange should be angled down or up, click the arrow .

Type values for the bend angle (**A**) and the radius (**R**).

You cannot change the width (**W**), which is the width of the existing edge.

D1 and **D2** are the offsets from the ends of the part edge. For clarification, see the small graphic:



D3 and **D4** are the offsets on the outer edge of the flange, which result in a trapezoid extension.

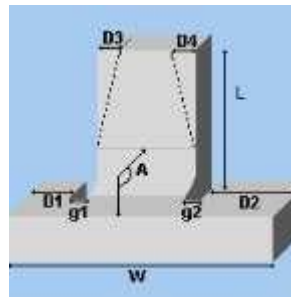
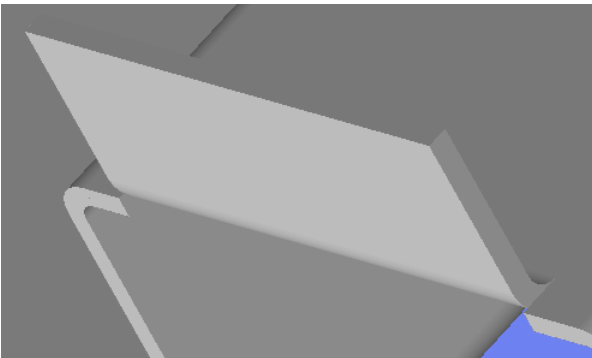
Dimensions – Select from the list. The small demonstration graphic changes according to your selection.

Flange Position – Select from the list. **Bend Inside** preserves the base measurement of the part, so that the new flange does not extend beyond it.

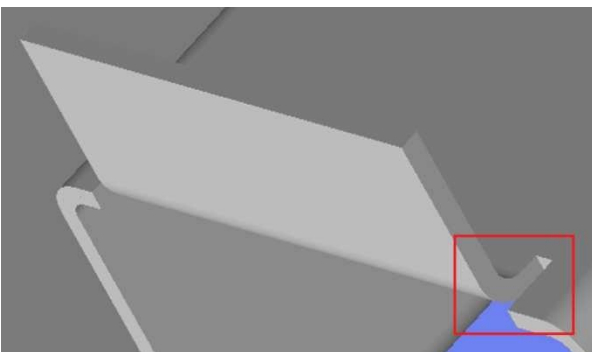
When your flange design is complete, click the green check mark .

7.4.3.1.2 Relief Definition Section

Relief helps avoid damage to the sheet metal on either side of the new flange, especially when creating an inside bend. This example does not use relief:



This same example now uses relief:



Relief Definition	
☒ Use relief	
G1:	1.0 mm
G2:	1.0 mm

Once you have selected **Use relief**, you can type values for **G1** and **G2**, which are the widths of the relief on either side of the new flange.

7.4.3.2 Lip

-  If you do not see the **Lip** option on your toolbar, right click the toolbar and select **Reset Ribbon Layout**.

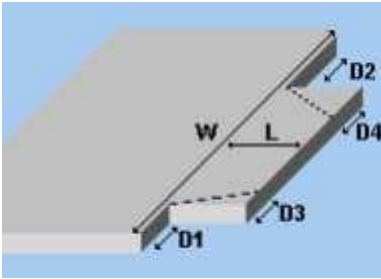
Click the **Lip** icon .

To select the edge where you want to extend a lip, hover over the part in the graphic display and click. (**Lip** is the opposite of **Cutout**.)

Type the length (**L**) of the lip. This value must be greater than **0**.

You cannot change the width (**W**), which is the width of the existing edge.

D1 and **D2** are the offsets from the ends of the part edge. For clarification, see the small graphic:



D3 and **D4** are the offsets on the outer edge of the lip.

When your lip design is complete, click the green check mark .

7.4.3.3 Cutout

To select the edge to cut into, click the **Cutout** icon , hover over the part in the graphic display, and click. (**Cut** is the opposite of [Lip](#).)

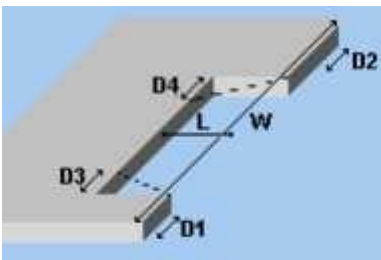
Type the length (**L**) of the cutout. This value must be greater than **0**.

You cannot change the width (**W**), which is the width of the existing edge.

D1 and **D2** are the offsets from the ends of the existing edge.

D3 and **D4** are the offsets on the inner corners of the cutout.

For clarification, see the graphic:

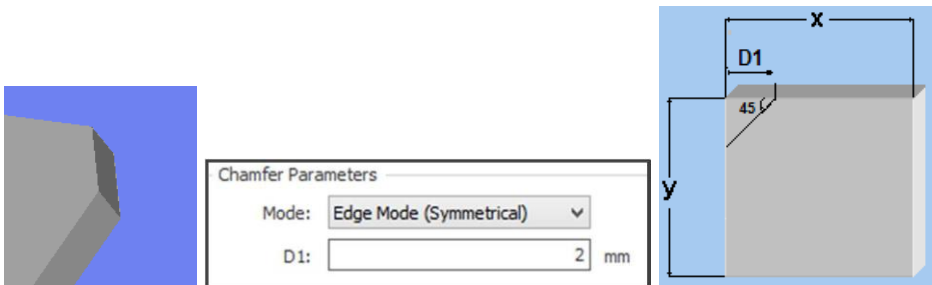


When your cutout design is complete, click the green check mark .

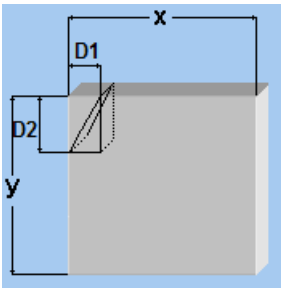
7.4.3.4 Chamfer

To cut out a corner, click the corner on your part and then click the **Chamfer** icon .

Type a value for **D1**. The resulting cut will be symmetrical at 45°. For example:

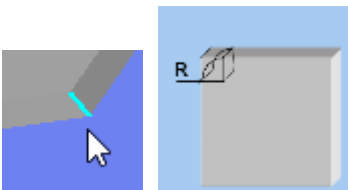


If you want an asymmetrical cutout, select **Face Mode** from the **Mode** dropdown list. Now you can type values for **D1** and **D2** (corresponding to the order in which you select the edges), as shown in the small graphic:

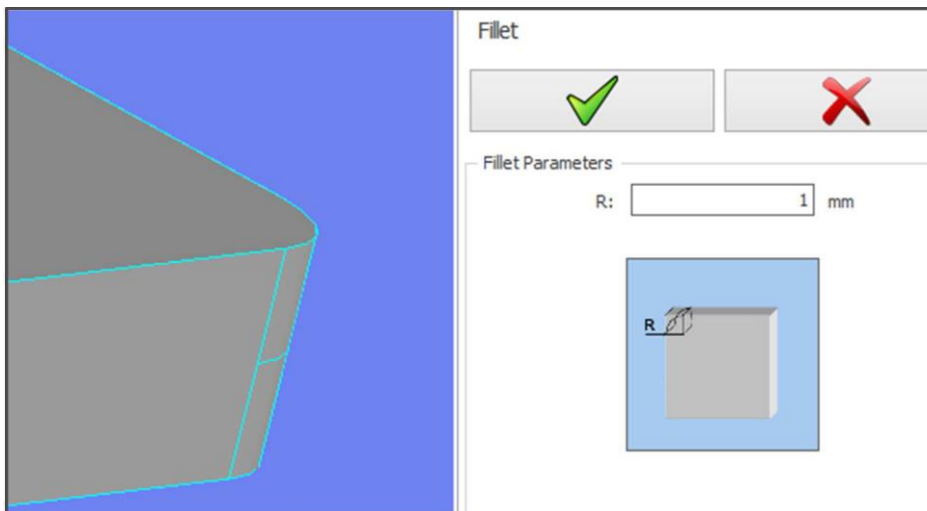


7.4.3.5 Fillet

To round off a corner, click the corner on your part and then click the **Fillet** icon . For example:



Type a value for the radius (**R**). For example:



7.4.3.6 Hole

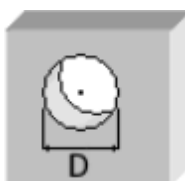
- If you do not see the **Hole** option on your toolbar, right click the toolbar and select **Reset Ribbon Layout**.

Click the **Hole** icon .

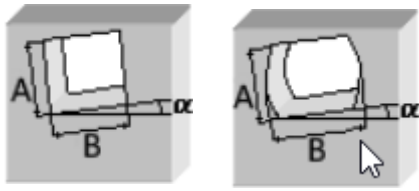
7.4.3.6.1 Shape Section

Select a cut type and type the values:

- For **Circular**: the diameter (**D**):



- For **Rectangular** and **Oblong**: the sides (**A** and **B**) and the angle of rotation (α):



- NOTE:** For oblong shapes, make the **A** side shorter than the **B** side.

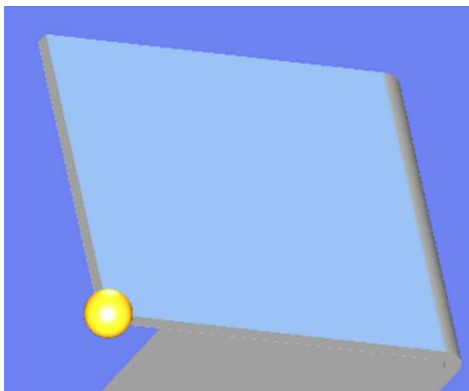
Click a face on your part.

If the cut continues through more than one surface, in **Hole Extends**:

- Select **Through all**
- Select **Blind** and type a value for how far to continue the cut

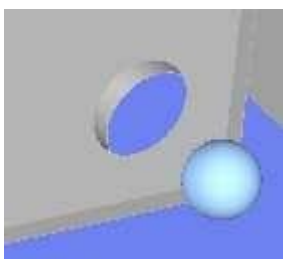
7.4.3.6.2 Origin Section

Determine the point where the measurements begin by clicking the right and left arrows. **EsaBend3DM** shows this origin position on the graphic display by adding the image of a ball. For example:



7.4.3.6.3 Properties Section

Indicate where to place the initial hole, relative to the origin position by typing values for **X** and **Y**. **EsaBend3DM** measures from the center of the ball to the center of the shape (circular, rectangular, or oblong). For example, if **D**, **X**, and **Y** are all **4**, the result might look like this:

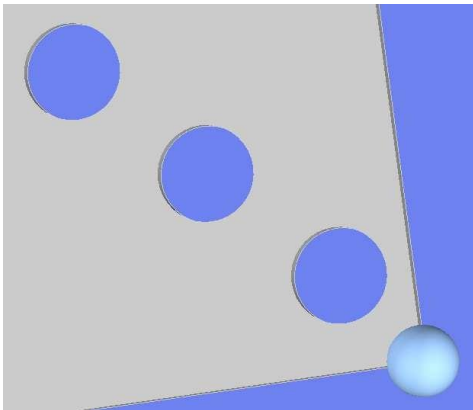


If you selected **Through all** or **To Extent** in the **Type** section, you can see the additional holes reflected in the graphic.

Select a pattern from the dropdown list:

- Single** – There is only one instance of the hole per face.
- On Line:**
 - X** and **Y** indicate the distance from the origin to the center of the initial hole.
 - L** indicates the distances between holes.
 - #** is the number of instances of the hole per face, arranged in a straight line.
 - α indicates the angle for placing the line of holes, in degrees.

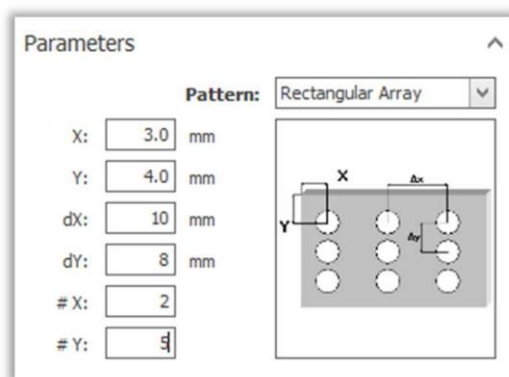
For example, for a circular hole with diameter 4, with origin 3 (**X**) and 4 (**Y**), arranged in a line with distance between instances (**L**) of 7, for three instances (**#**), at 45 degrees (α), looks like this:



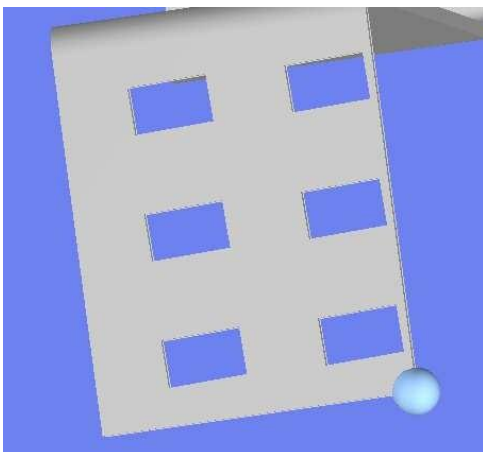
- **Rectangular Array:**

- **X** and **Y** indicate the distance from the origin to the center of the initial hole.
- **dX** and **dY** indicate the distances between holes.
- **# X** and **# Y** are the number of instances of the hole per face in both directions.

For example, a rectangular cut type with one side length (**A**) of 3 and the other (**B**) of 5, and rotated (α) by 2 degrees, is configured in a rectangular pattern as follows:



This is the result:

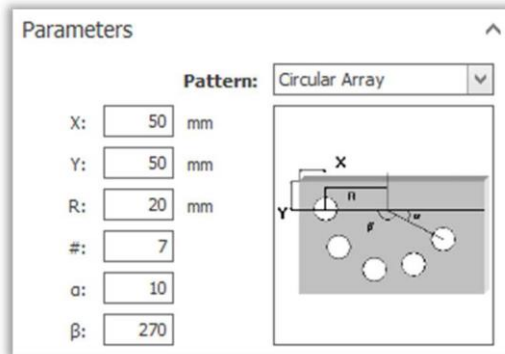


- **Circular Array:**

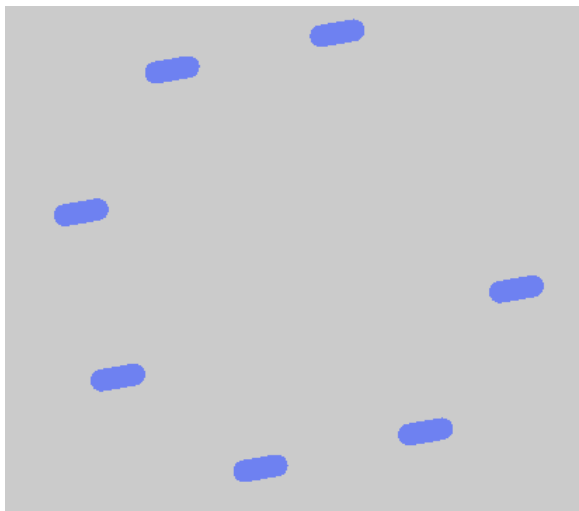
- **X** and **Y** indicate the distance from the origin to the center of the pattern.
- **R** is the radius of the circle.
- **#** is the number of instances of the hole per face, arranged in a circle.

- α indicates the phase angle for placing the holes, in degrees. Changing this parameter results in rotation of the entire pattern around the origin (**X**, **Y**).
- β is the angle of the circle to cover with holes.

For example, an oblong cut type with one side length (**A**) of 2 and the other side (**B**) of 5, and rotated (α) by 10 degrees, is configured with a circular pattern as follows:

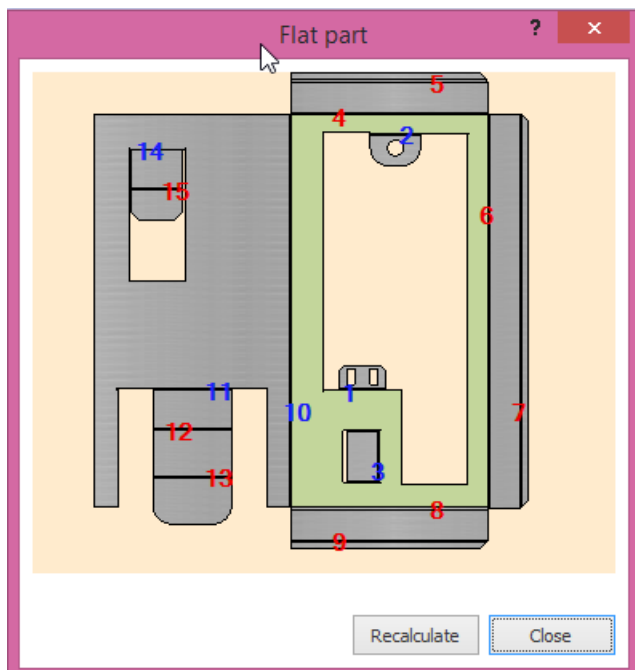


This is the result:



7.4.4 Design Views Group

Unfolded Part – Shows the current part, flattened, in a separate window. For example:



You can keep working on the design of your part.

8 Toolbars, Ribbons, Status Bar

This section describes the options in the toolbars, the ribbons, and the status bar.

8.1 Toolbars

This section explains the functionality and groupings of the toolbars in **EsaBend3DM**:



8.1.1 Mode Toolbar

Only one mode is active at a time:

-  [Design](#)
-  [Simulation](#)

8.1.2 Zoom Toolbar



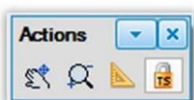
These items are all explained in the [Zoom](#) group.

8.1.3 Orientation Toolbar



These items are all explained in the [Orientation](#) group.

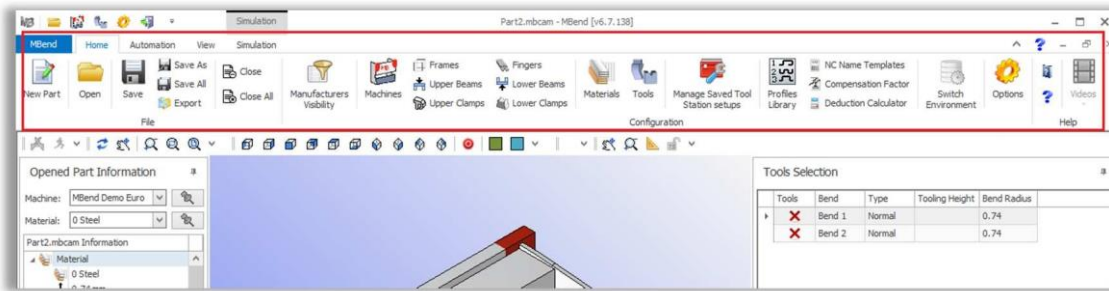
8.1.4 Actions Toolbar



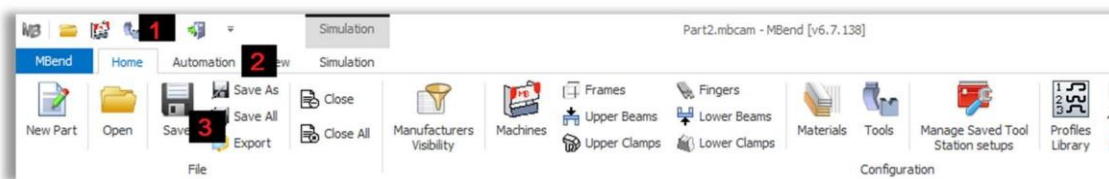
-  **Pan** and  **Real time** are explained in the [Zoom](#) group.
-  **Measure** is explained in the [Measure](#) group.
-  **Lock Tool Stations** -- Enables you to lock a certain tool station configuration, so it will not change or be deleted when you make changes. For example, when you change the bend sequence order, **EsaBend3DM** deletes the tool station configuration.

8.2 Customizing the Ribbon

The **EsaBend3DM** ribbon appears towards the top of the window. For example:



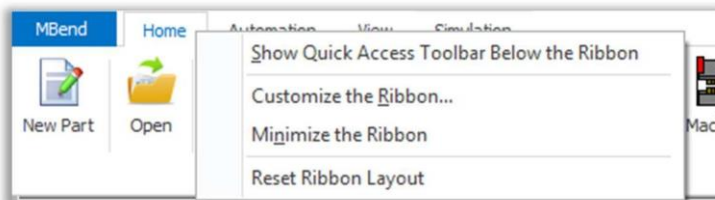
The options in the ribbon change, depending on what you are working and the tab you select (2). In a typical ribbon, this is what you might see:



These are the sections in the ribbons:

- (1) The Quick Access Toolbar.
- (2) Tabs. As you select different tabs, the options in the ribbon change.
- (3) A typical group: The **File** group contains options for **Open**, **Save As**, **Save All**, etc. Groups can also contain dropdown menus.

Several options are available when you right click the ribbon:



These options are explained in the following sections.

8.2.1 Managing the Quick Access Toolbar

You can situate the Quick Access Toolbar above or below the ribbon. Right click the Quick Access Toolbar and select **Show Quick Access Toolbar Above/Below the Ribbon**.

To add an option to the Quick Access Toolbar, right click the option and select **Add to Quick Access Toolbar**.

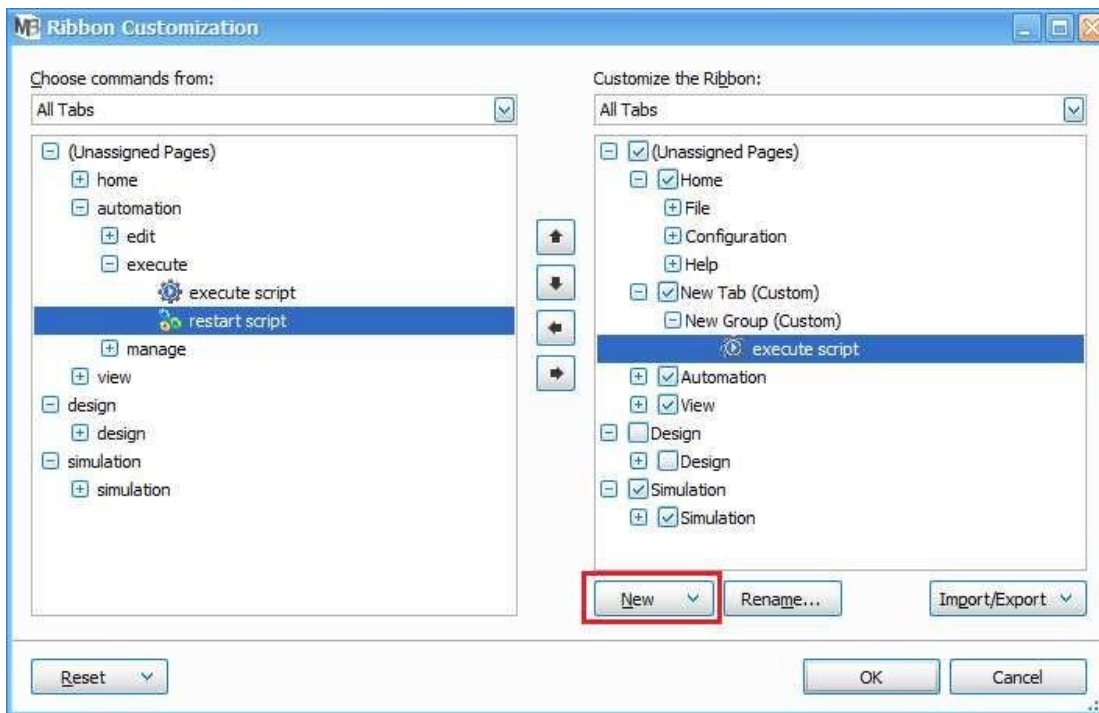
8.2.2 Adding Items to Ribbons

You can add and delete icons from a ribbon. First you must create a tab and/or a group. (You cannot add items to **EsaBend3DM** -designed ribbons.)

Right click the ribbon and select **Customize the Ribbon**. Click the **New** button and select what to create:

- A new category -- containing a set of tabs
- A tab -- containing a set of groups and/or items
- A group -- containing items

Select one item at a time from the list on the left and click **Add** to add to the new group within a tab:



Give the new tab/group a meaningful name by selecting it, clicking the **Rename** button, and typing a name.

Right click the ribbon and select **Customize the Ribbon**. In the **Ribbon Customization** dialog box, choose from where to select a command, find the command, click **Add**, and **OK**.

8.2.3 Reverting to Default

To revert to the default ribbon interface, right click the ribbon and select **Customize the Ribbon**. In the **Ribbon Customization** dialog box, click the **Reset** button and select whether to reset only the current ribbon or all customizations.

8.2.4 Minimizing the Ribbon

Right click a ribbon and select **Minimize the Ribbon**.

To maximize it, right click anywhere at the top of the screen and deselect **Minimize the Ribbon**.

8.3 Quick Access Toolbar

By default, the Quick Access Toolbar contains these icons:

- **Open** – the **Open** dialog box opens. Select a part. The [Operation Mode](#) dialog box opens.
- [Machines](#)
- [Tools](#)
- [Options](#)
- **Close Application** – Closes EsaBend3DM.
- [Customize Quick Access Toolbar](#)

8.4 Status Bar

The status bar at the bottom of each document file is called the Application Status Bar. It displays:

- The current file name
- When you highlight an object, the name of the current object
-  **Save the current document** icon
-  **Show operation trace** icon – describes the last steps done in

EsaBend3DM. The row at the bottom of the screen is the Document Status Bar.

It displays:

- Your **EsaBend3DM** login name.
-  **Save all open documents** – **EsaBend3DM** saves every document that is open.
-  **EsaBend3DM external interface started** – **CAD Link** is ready and can be used.
-  **Change theme** – opens the **Options** dialog box to the [Themes](#) tab.

Metric units -- The units of measure **EsaBend3DM** uses, e.g., **Metric units**. You can change this in the Options dialog box, in the [Units](#) tab.