

# Arc Welding Angle Features



When defining each arc welding tag, arc welding engineers always consider three basic angles, [Weld Angle](#), [Rake Angle](#), and [Wire Roll Angle](#) to optimize operational quality and productivity.

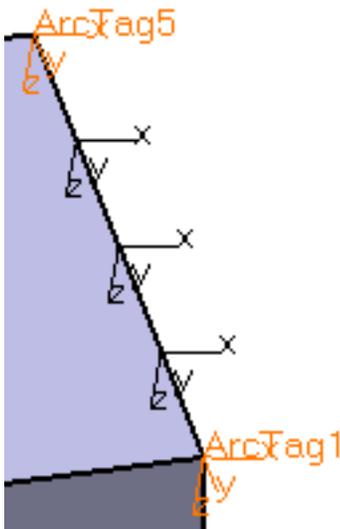


To modify the tag point with respect to these three angles, Weld Angle, Rake Angle, and Wire Roll Angle for arc welding, it is necessary to specify two walls of a welded product and a curve for a weld seam.

Pick any tag point, for which weld geometry has been attached, and modify the angles, i.e., Weld Angle, Rake Angle, and Wire Roll Angle for arc welding.



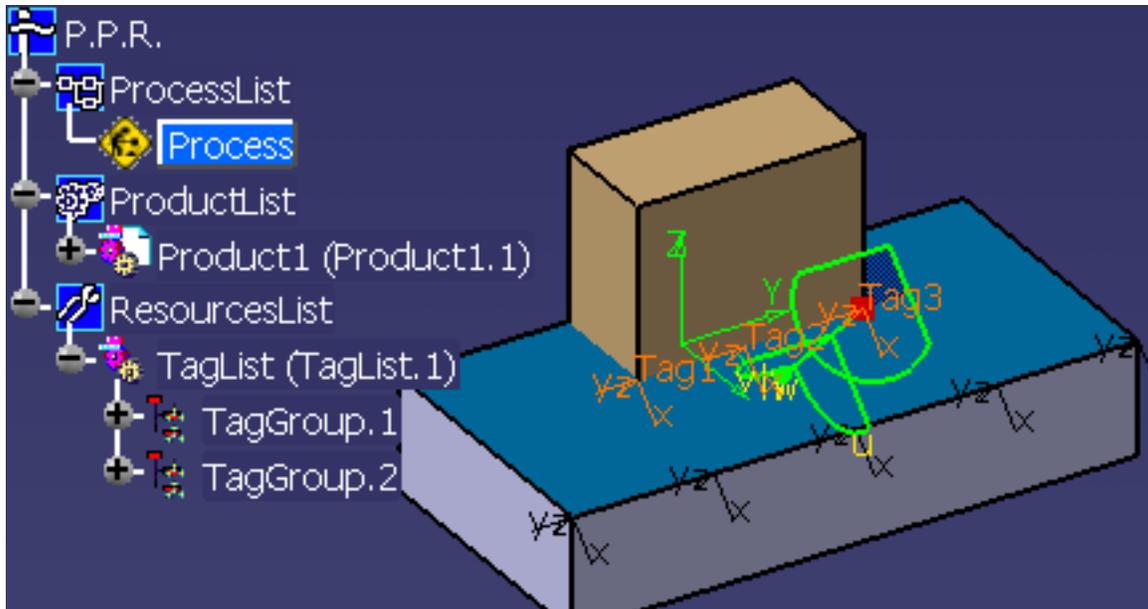
This dialog box allows you to select a Tag or a Tag group (all tags). You will be able to modify weld angles of all tags independent of weld angles of other tags when more than one tag is selected, and set individual reference to all the tags. Also, once the tag group is selected, holding down the Ctrl key, you are able to de-select the tags that are not required in the 3D Geometry window. In the example, ArcTag1 and ArcTag5 are the only two selected.



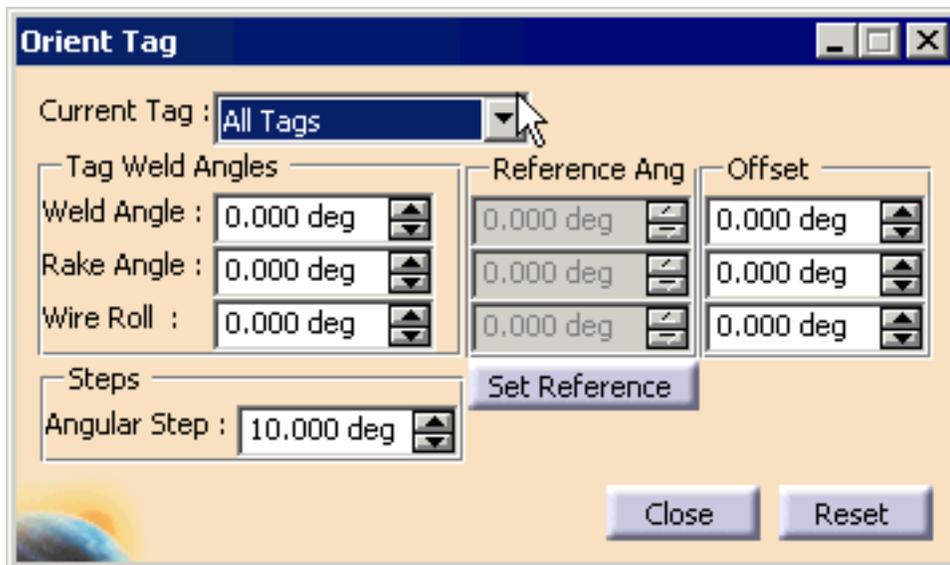
The steps in this procedure are illustrated using the file [OrientTags.CATProcess](#).



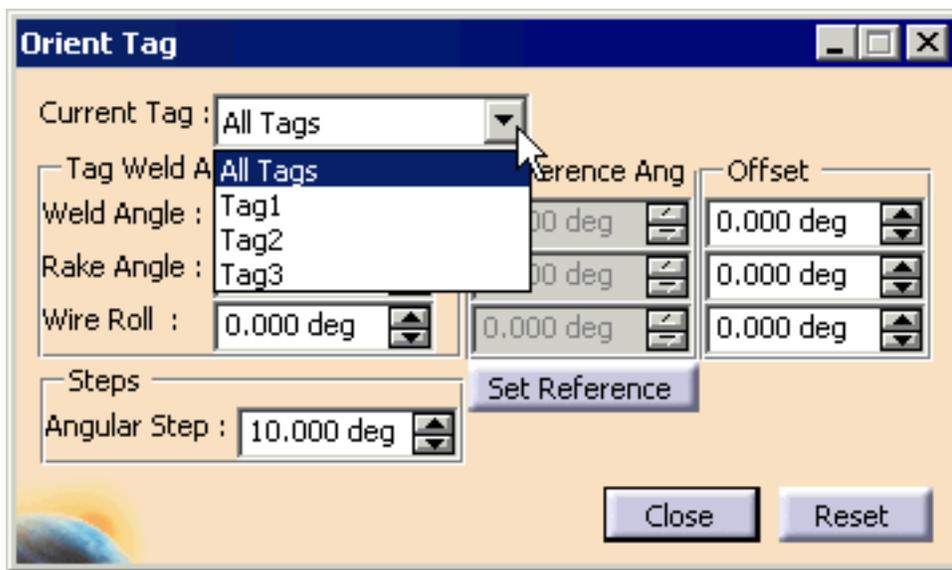
1. From the Tag toolbar, click **Orient Tag/Tag Group** . Modify tag points based on your selection of wall and side surfaces.
2. Click **Tag Group**, select the TagGroup.1 under the ResourcesList / TagList (TagList.1)



3. When the tags are highlighted in the 3D geometry window, the **Orient Tag** dialog box appears.



4. This dialog box allows you to select a Tag or Tag group (all tags).



- o Selecting a Tag

The **Orient Tag** dialog box is displayed and weld angles (with reference angles and offsets) of the selected tag are displayed and the compass moves to the tag location. Now any modifications either using the compass or from the dialog box are directly applied to the tag.

You can select multiple tags by repeating the selection of tags. If the tag selected is already in list of selected tags then, it will be removed or else, it will be appended to the list of selected tags. How the command behaves in case of selection of multiple tags is described in detail in selecting a tag group.

- o Selecting a **Tag Group**

This is possible only if all the tags of the Tag group have geometry assigned to them. Now, the menu for label **Current Tag** will be filled with names of all the tags and extra element labeled **All Tags**. By default, the menu will be set to All Tags.

When selecting a name of a tag from the menu, the dialog box will display the weld angles of that particular tag and the compass is positioned at the position of that tag. The dialog will behave as if only one tag (the one selected) is selected and all the changes are applied only to that tag.

When selecting the **All Tags** option, all the fields will display 0 degrees. The dialog box displays 0 degrees in all the weld angle fields because each tag can have distinct weld/reference/offset angles, as it is not possible to have meaningful values that are valid for all the tags. Then, you can modify the orientations of all the tags using one of following two methods:

- o Using the main weld angle fields: The main weld angles will enable you to enter a absolute values of weld angles. Any change in these will be set to

all the tags. Example, initially weld angles are 0 degrees, 0 degrees and 0 degrees. Now, when you enter 45 degrees as a weld angle then, all tags will re-oriented in such a way that their weld angle is 45 degrees but, their rake and wire roll angle will remain same. This will enable you to modify individual weld angles without modifying others.

- o Using Offsets: All offsets will be applied to the tags independently. Example, if you have selected three tags (their offset angles are in brackets); tag1 (10 degrees, 0 degrees, -10 degrees), tag2 (0 degrees, 0 degrees, 0 degrees), and tag3 (-10 degrees, 0 degrees, 10 degrees). When an offset of 10 degrees is set in the weld angle then, the tags will be oriented in such way that their offset angles for weld angle will be 20 degrees, 10 degrees and 0 degrees respectively. The offsets of rake and wire roll angle will remain same.

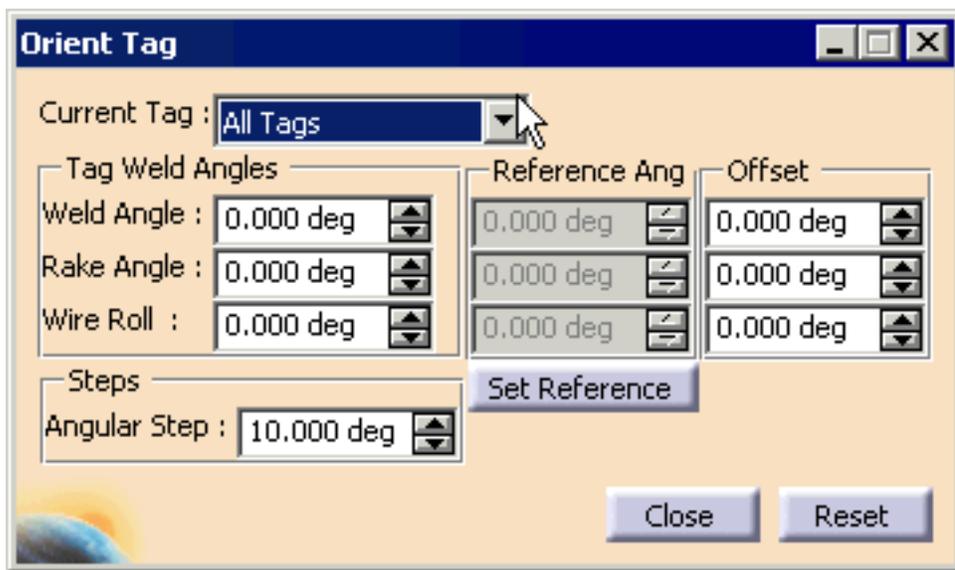
The **Set Reference** button will set the current weld angles of each tag as its individual reference, offset values are reset to 0 degrees as the offsets of all tags will become 0 degrees. Moreover, the dialog box will not display any reference angle values as each tag can have its own distinct set of reference angles.

Finally, the compass will be placed at the position of last tag of tag group (or last selected tag). Any change in orientation using compass will be applied to all the tags.

Behavior of **Reset** Button:

This command will remember the initial orientation of all the tags and when you select the **Reset** button, the tag will return to its initial orientation. When multiple tags are selected as in the case of the All Tags option, all the tags will return to their initial orientation, or else only the tag whose name is being displayed will be reset to its initial orientation.

5. Using the dialog box, modify all the tags orientation using arc terminology.



- **Weld Angle**

The selected tag point's wire angle, also referred to as the torch angle can be modified. A dialog box displays the current wire angle value, which is dependent upon the value of the wire alignment system variable. The wire alignment variable defaults to "bisector". Therefore, a 0 degree wire angle value will be displayed in the dialog box even though the wire angle bisects the two selected surfaces.

- **Rake Angle**

The selected tag point's rake angle, also referred to as a push or pull angle, can be modified. A dialog box will display the current rake angle value. A given tag's x, y, z axes are defined as follows (in the usual case when no relevant AMP system variable modifies these definitions):

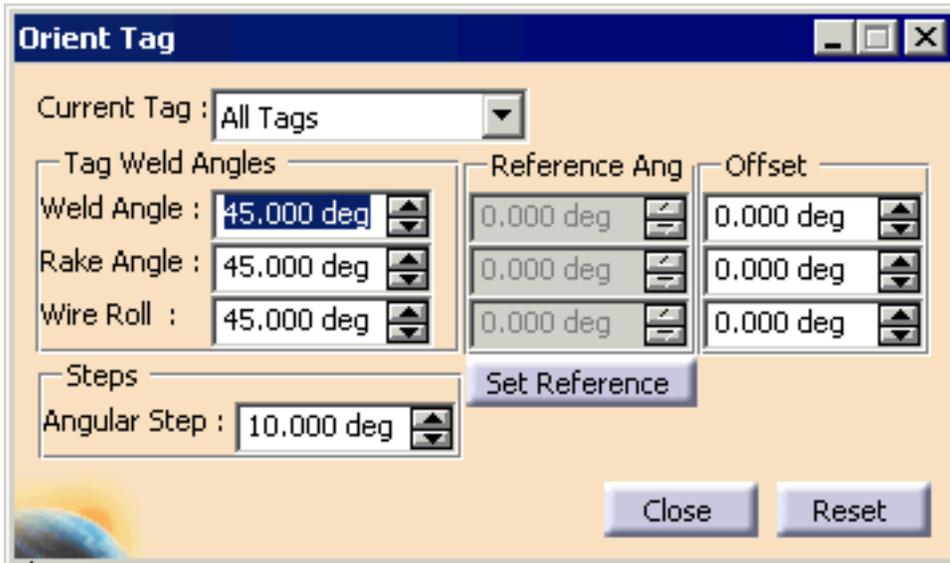
- y-axis is the cross product of wall normal and base normal. It is along the seam.
- z-axis is given by the bisector of the wall normal and base normal with the sense of direction reversed. So z-direction points towards the seam along the line given by the bisector of wall normal and base normal.
- x-axis is the cross product of y-axis and z-axis that are as defined in the above two statements.

The rake angle is the angle by which the y-axis is rotated about the x-axis. If we look in the direction of x-axis; then a positive value of rake angle gives a clockwise rotation of y-axis about the x-axis and a negative value of rake angle gives a counter-clockwise rotation of y-axis about the x-axis.

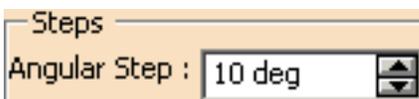
- o **Wire Roll**

The selected tag point's wire roll which is the rotation about the approach axes can be modified. A dialog box will display the current wire roll value.

6. Change the **Rake Angle** and **Wire Roll** to 45 degrees. Once the change is entered and you click in the next window, the tag changes its orientation. Close the window. (Click **Close** or use Enter on the keyboard.)



7. Angularity can be stepped up or down 10 degrees using the arrows. To change the step size, change the number of the **Angular Step**.



8. Ideally, in an arc welding process approach, the axis is oriented in such a way that it bisects the two surfaces being welded. But this might not always be the case and it may be necessary to specify your own reference values. The additional angles allow this. Reference angles are user-specified to achieve ideal bisecting angle values. These are set using the **Set Reference** button, and offset angles can be used to modify the orientation of the angles with ideal bisecting angles by providing an offset from the ideal angle values.
9. Select **Close** to terminate the command or **Reset** to restore the orientation.



Weld angles are displayed in the dialog box and are measured with respect to base/wall surfaces.



NOTE: This command is applicable to tags which contain weld geometry, i.e., surface normal information of the underlying surfaces. You can assign weld geometry to the tags by using the **Assign Weld Geometry**  command.

