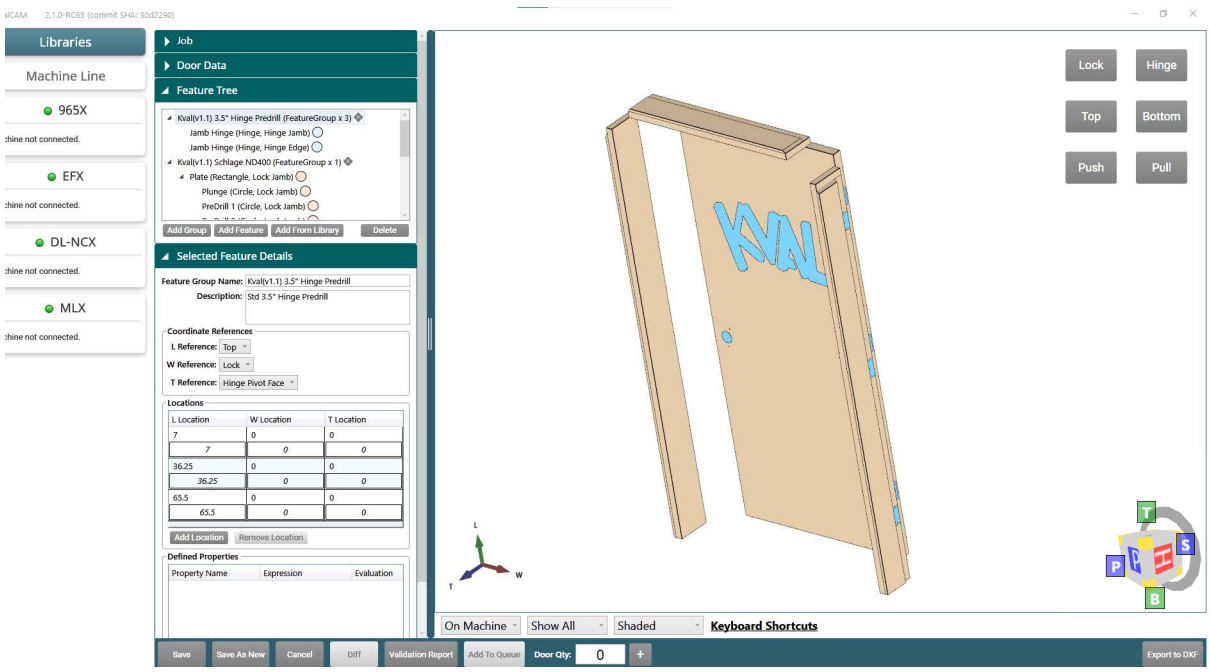
KvalCAM® Reference Guide

Published: January 25, 2023

Innovation, Quality & Honesty

KvalCAM® Reference Guide



Proprietary Notice

This manual is confidential and contains proprietary information and intellectual property of **Kval** Inc., and is to be used solely by Customer as an operating manual for **Kval Inc.** machines. Neither this manual nor any of the information contained herein may be reproduced or disclosed under any circumstances without the express written permission of **Kval Inc.** For authorization to copy this information, please call **Kval Technical Support** at (800) 553-5825 or fax (707) 762-0485.

Manual Name: **KvalCAM Reference Guide**

Manual Revision: **Rev 2**

KvalCAM® is a registered trademark of **Kval Incorporated**.

Beckhoff®, TwinCAT®, and EtherCat® are registered trademarks and are licensed by Beckhoff Automation GmbH

Contacting Kval

For further information about this manual or other **Kval Incorporated** products, please contact us.

Mailing address:

Kval Incorporated
825 Petaluma Boulevard South
Petaluma, CA 94952

Phone and Fax:

call: (800) 553-5825
fax: (707) 762-0485

General Office Business Hours

Mon-Thu:6:00 AM - 4:00 PM PST
Fri: 6:00 AM - 3:30 PM PST

Parts

Contact us for all parts related needs, from orders to inquiries. Call, email, contact us on our web-site at the “Contact Us” page.

email: parts@kvalinc.com

Technical Support

For machinery support and troubleshooting. Call, email, contact us on our website at the “Contact Us” page.

Mon-Fri:4:00 AM - 4:00 PM PST

email: support@kvalinc.com

Field Service Support

For any other inquiries or to schedule on-site service. Call, email, contact us on our website at the “Contact Us” page.

email: service@kvalinc.com

Sales Support

For machinery information, specifications, and quotes. Call, email, contact us on our website at the “Contact Us” page.

email: sales@kvalinc.com

Kval Website

Learn about **Kval**, order parts, get information on our array of machines (including new machine releases), learn about our machine software solutions, download machine documentation, view videos of our machines in action, contact all the departments.

http://www.kvalinc.com

NOTICE OF OWNERSHIP OF KVALCAM SOFTWARE AND LIMITED LICENSE TO USE

READ THIS NOTICE CAREFULLY BEFORE USING THE KVALCAM SOFTWARE WHICH OPERATES KVAL MACHINERY. THIS DOCUMENT CONSTITUTES NOTICE TO YOU THAT YOU HAVE A LIMITED LICENSE TO USE THE KVALCAM SOFTWARE ON THE TERMS AND CONDITIONS APPEARING BELOW.

BY USING THE KVALCAM SOFTWARE YOU ARE CONSENTING TO BE BOUND BY THIS LIMITED LICENSE. IF YOU DO NOT AGREE TO ALL OF THE TERMS OF THIS LICENSE, THEN DO NOT USE THE KVALCAM SOFTWARE.

KVAL, Inc., is the owner of all rights in respect of the software and documentation (referred to as “Licensor”). You are the purchaser of KVAL Machinery operated by the KVALCAM Software are the “Licensee”.

The computer program(s) and related documentation and materials (herein collectively referred to as “the KvalCAM Software” and further defined herein) which are used in the operation of the KVAL Machinery are licensed, not sold, to you for use only upon the limited terms of this license, and Licensor reserves any rights not expressly granted to you. Licensor retains all ownership of the KvalCAM Software.

Title, ownership rights, and intellectual property rights in the KvalCAM Software shall remain with KVAL, Inc. The KVALCAM Software is protected by copyright laws and treaties. Title and related rights in the content generated through the KVALCAM Software are also the property of the Licensor and are protected by applicable law.

1. **Definitions**.

a.“KVALCAM Software” means the KVALCAM computer application installed in the KVAL Machinery and written documentation and materials provided to you, as well as any res or updates of such computer application and documentation.

b.“Install” means storing of the KVALCAM Software in the computer component of the KVAL Machinery.

c.“Use” means executing the KVALCAM Software for purpose of operating the KVAL Machinery and use of the documentation for properly operating KVALCAM Software.

2. **Grant of License**.

a.Licensor hereby grants Licensee a non-exclusive, non-transferable license to Use the KVALCAM Software upon payment of all amounts due for the purchase of the related KVAL Machinery.

b.Licensee will make no copies of the KVALCAM Software or alter the KVALCAM Software in any way. Title to the KVALCAM Software will remain vested in Licensor, and nothing in this License will give or convey any right, title or interest therein to Licensee except as a licensee.

c.Licensee agrees that it will use the KVALCAM Software or related documentation directly or indirectly for the benefit of Licensee, and only pursuant to the scope of the grant of the License set forth herein.

d.Licensee will not decode, alter, decompile, reverse engineer, perform reverse analysis on or disassemble the KVALCAM Software.

e.This License will terminate automatically if Licensee fails to comply with the limitations described above.

Table of Contents

Chapter 1 KvalCAM Reference

Table of Contents

Table of Contents

CHAPTER 1 KvalCAM Reference

This chapter describes the **KvalCAM** interface.

Chapter 1 at a Glance

Section Name	Summary	Page
About KvalCAM	KvalCAM overview.	page 1-2
Summary of the KvalCAM Interface	Description of the Machine Line, Libraries, and Machine Control interfaces	page 1-3
About KvalCAM Libraries	Describes the KvalCAM library selections and differences associated with them.	page 1-5
Controls at the Library Screen	Describes the various controls to operate the controls at the library interface.	page 1-8
About Revisions	Describes the available revision options.	page 1-14
About Door Job Creation	Describes the interface selections at the Door Job screen. Including: Door Job Name Table page 1-17 Door and Jamb Data Tables page 1-18 Feature Groups page 1-25 Control Buttons page 1-29 Job Preview Screen page 1-30	page 1-16
Comparing the FaceProfile and LiteCutout Feature Types	Describes the Lite Cutout machine options to create a face cutout.	page 1-44
About the Machine Line Screen	Describes the controls to machine a door with the properties of the selected Door Job.	page 1-46
About Backing up Data and Checking the Revision Status	Describes the options to backup data and check revision status of KvalCAM.	page 1-50

About KvalCAM

KvalCAM allows you to easily define the shapes, sizes, and locations to machine a door. The **KvalCAM** software includes a single **User Interface** to control a single machine or an entire machine line. Each machine can also be controlled separately or as a collective. **Door Jobs** and **Features** from a library can be downloaded remotely and created at the station. The **KvalCAM** interface uses tabbed navigation to jump to desired screens.

For more information about **KvalCAM** and to view a video about **KvalCAM,** go to https://kvalinc.com/. Select the **KvalCAM** feature tab.

Input Block Diagram

KvalCAM has the versatility to connect with many types of inputs. A **Door Job** is built from **Door Data** and **Features**. The **Door Job** communicates with the Machine or Machine Line to process the door.

Figure 1- 1 illustrates the multiple inputs that can be used by **KvalCAM** to create a door.

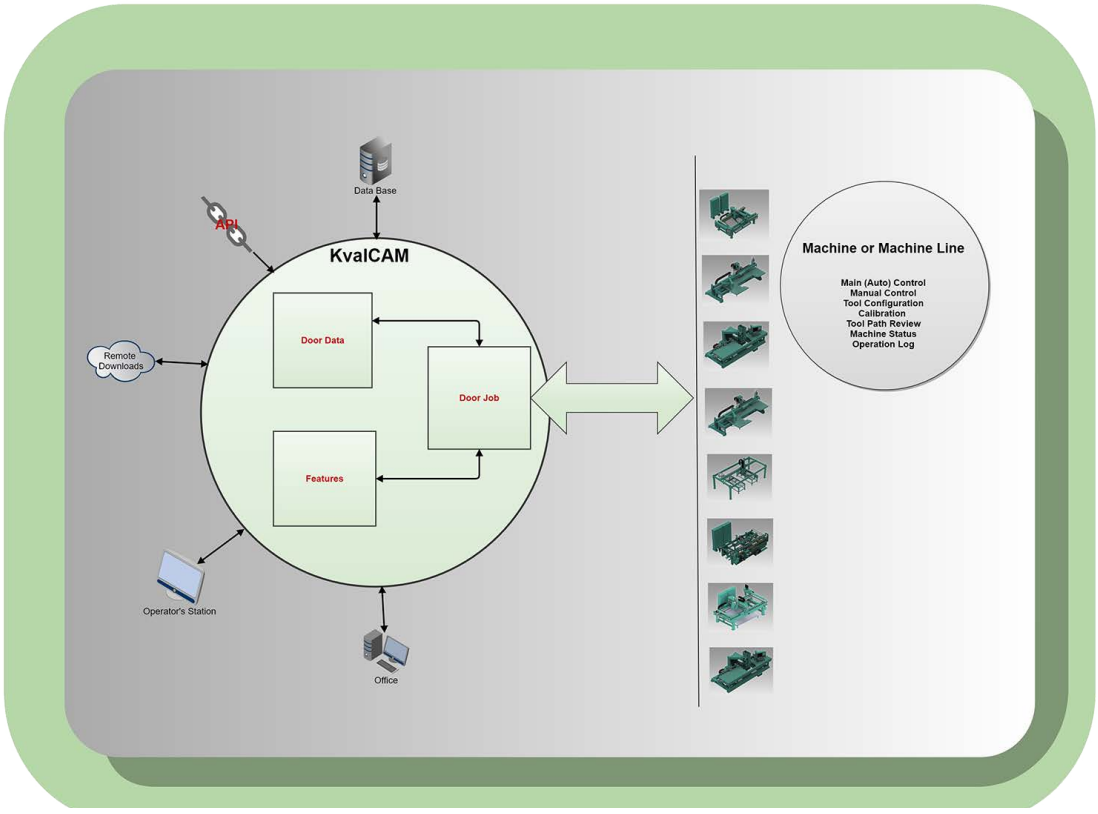


FIGURE 1- 1. Input Block Diagram

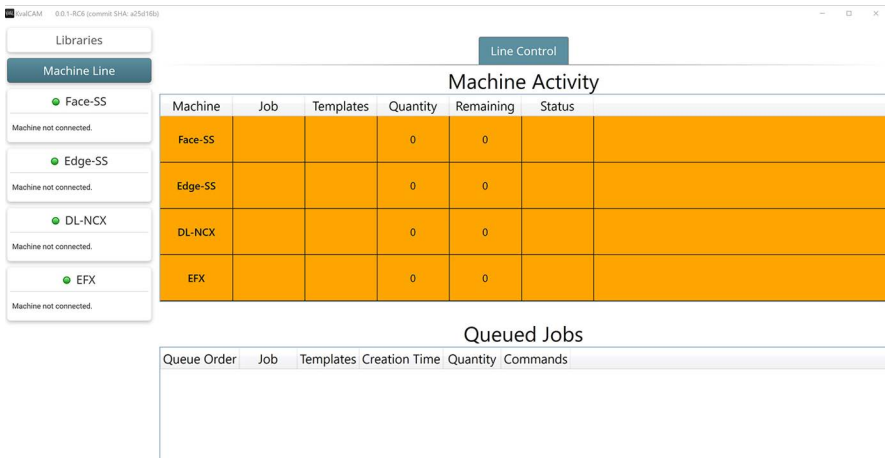
Summary of the KvalCAM Interface

KvalCAM contains three main interfaces.

- Machine Line
- Libraries (**Door Job**, **Door Data**, and **Feature Group**)
- Machine Control

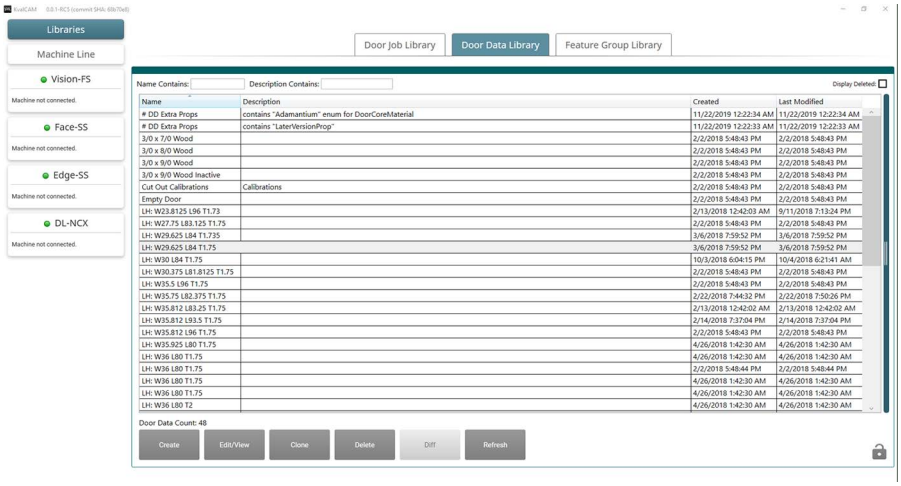
Machine Line

This screen is the boot-up screen for **KvalCAM**. View the entire process of the machine line, queued jobs, quantity and remaining doors, and status of each machine. Some line control is available.



Libraries

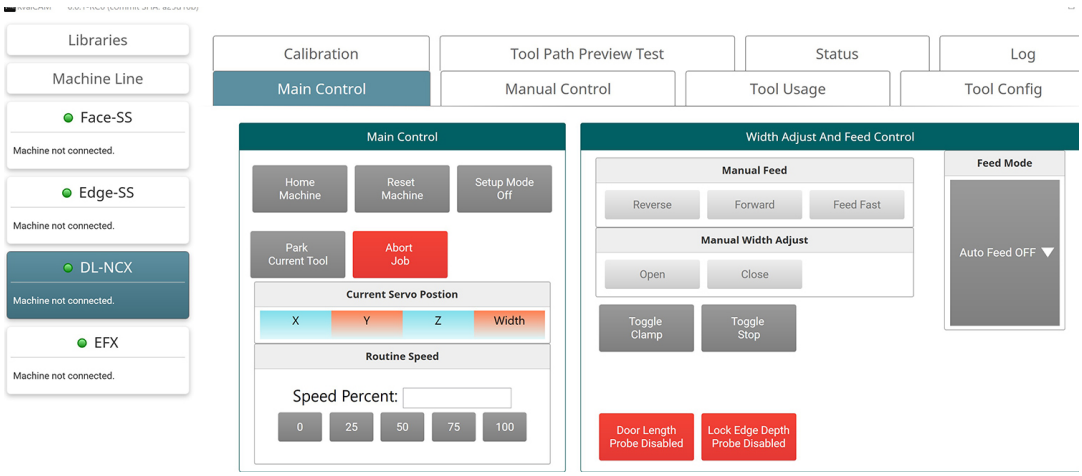
The Libraries include three tabs, the **Door Job Library**, the **Feature Group Library**, and the **Door Data Library**. At each library screen, files can be created, edited, cloned, deleted, and downloaded. Each Library contains a version section.



Machine Control

Each machine has a distinct control screen. **KvalCAM** is purpose-built to allow all compatible machinery to communicate with one another. Select the desired machine button to take control of that machine.

Note: Information about the Machine Controls is located in the **Machine Operation Manual**.



About the Libraries

This section describes the Library Screens. Select the Libraries tab at the upper left of the screen and then select the desired library. Use the buttons at the bottom of the screen to Create, Clone, Edit, Compare, or Delete files. Lock editing capabilities and refresh tabs are also available.

Distinguish Between the Library Types

The table below shows the details of the **KvalCAM** Libraries.

The Library Screens include:

- The **Door Job Library**
- The **Door Data Library**
- The **Feature Group Library**

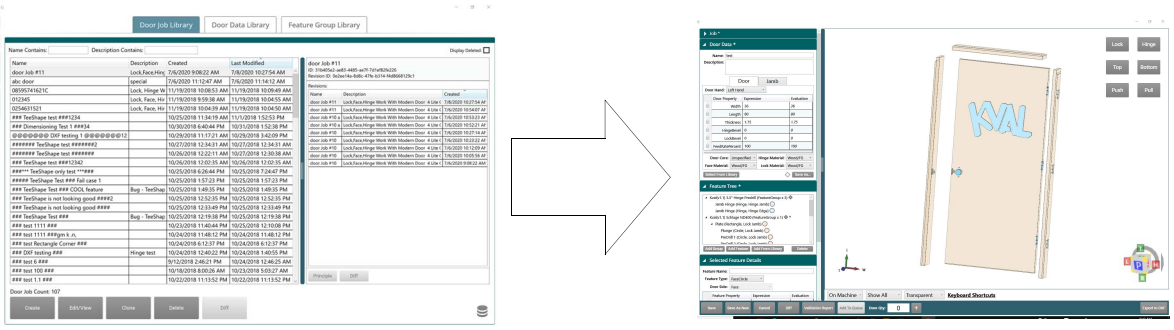
Detail	Door Job	Door Data	Feature Group
Saves Cut Information	Yes	No	Yes
Saves Door Parameters	Yes	Yes	No
Number of Feature Groups Allowed	Many	0	1
Load Work onto Machines (Cut Doors)	Yes	No	[1]Yes

1. For Testing Purposes Only

About the Door Job Library Screen

Below is a list of highlights about this screen.

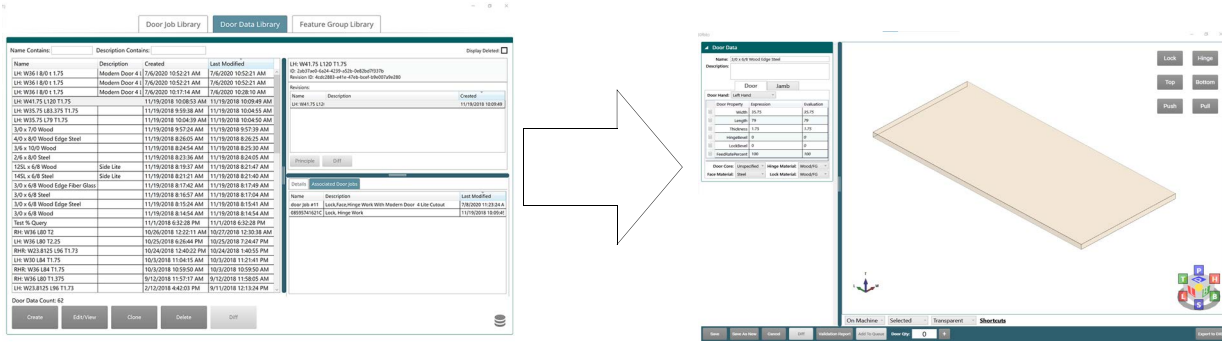
- Select a file from the table to open the **Door Job Creation** screen.
- The **Door Job Library** contains all the files in the selected database.
- The **Door Job Files** contain all the information to create a door.
- Files support revisions.



About the Door Data Library Screen

Below is a list of highlights about this screen.

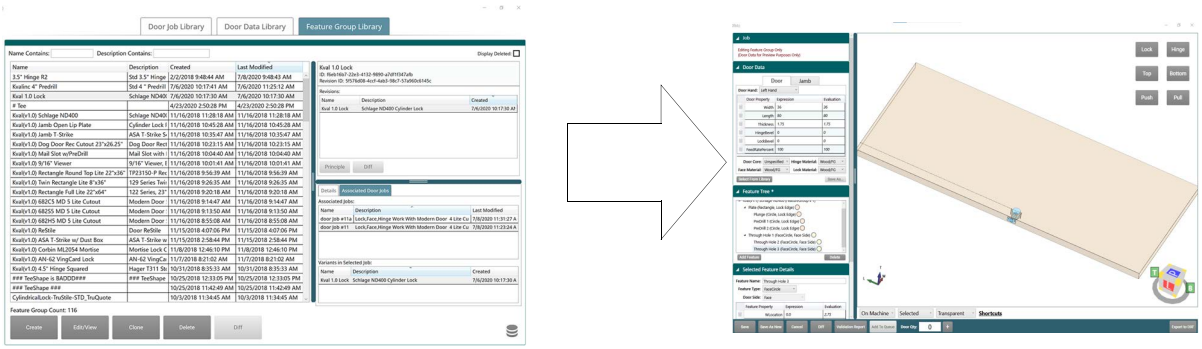
- Select a file from the table to open the **Door Data Creation** screen.
- The **Door Data Library** contains the specifications about an unprocessed door.
- No shape-cutting information is at this screen.
- Files can be saved and be attached to the many **Door Job** files.
- Files support revisions.



About the Feature Group Library Screen

Below is a list of highlights about this screen.

- Select a file from the table to open the **Door Feature Creation** screen.
- The **Door Feature Library** contains shape information.
- There is one shape information per file.
- Files can be saved and be attached to the many **Door Job** files.
- Files support revisions.
- Tracks variants.



Controls at the Library Screen

This section describes operations located at each **Library Screen**. Select the **Libraries Tab** located at the upper left and then select the desired library.

Note: The operations described here are common to all screens.

Note: The **Revision Display Pane** is hidden.To open the panel, hover the mouse over the right side border to display a pointer. Right click and drag the border over to display the pane.

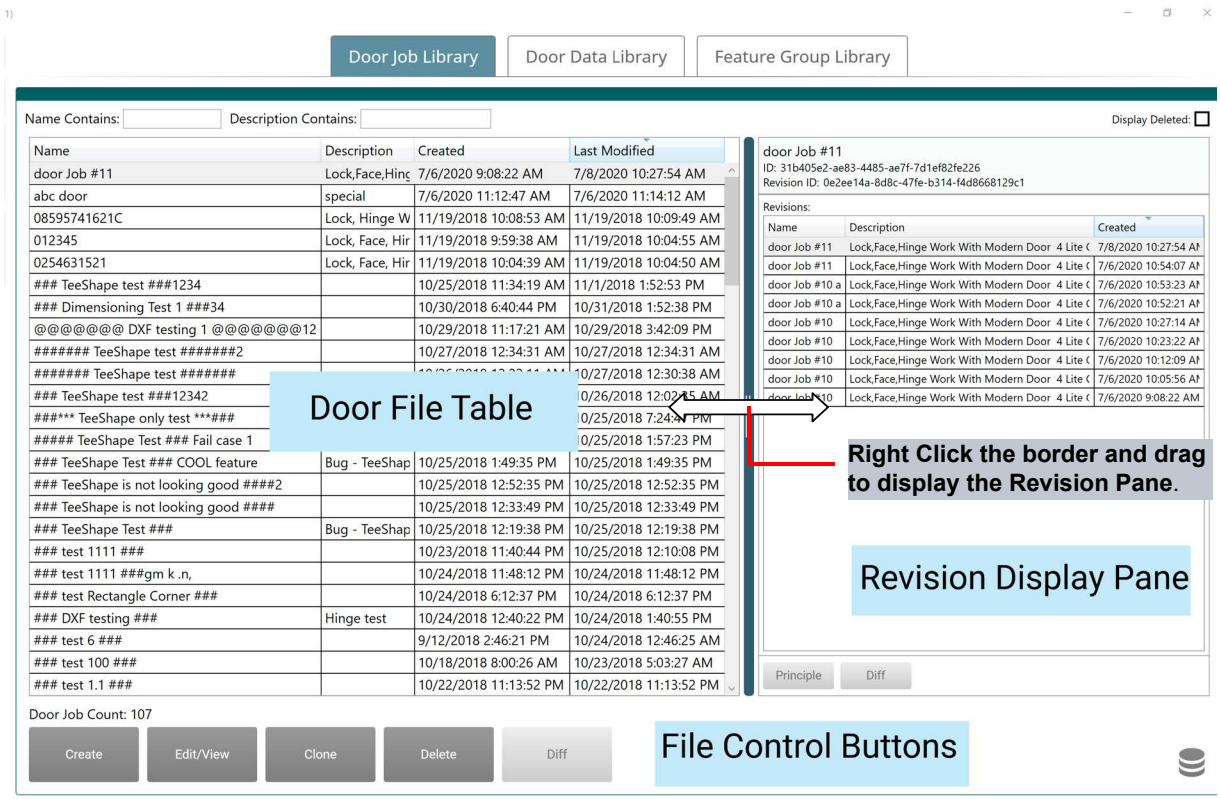


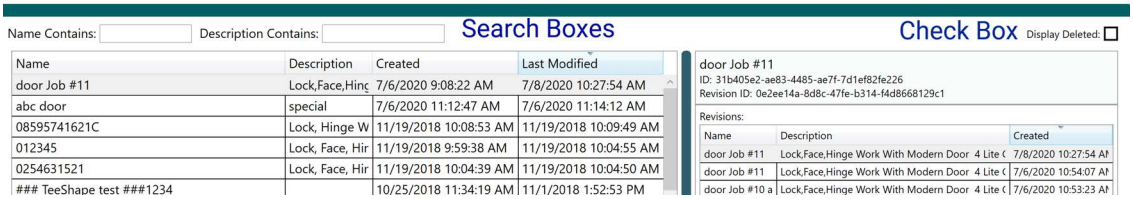
FIGURE 1- 2. Library Screen

Using the Door File Table

The list below shows information about general use of the tables. See the figure below.

- Each library table shows the files in the selected database.
- Click the desired table heading to sort by Name, Description, Date Created or Date Modified.
- At the top enter key words to search by name or description.
- Select the **Display Deleted Check Box** to view or recover deleted door files.

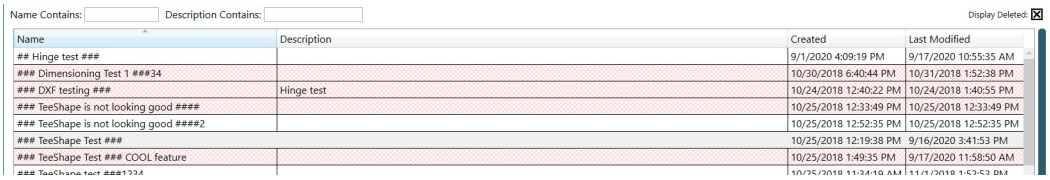
Tip: Change the column widths by selecting the column border and dragging to the desired width.



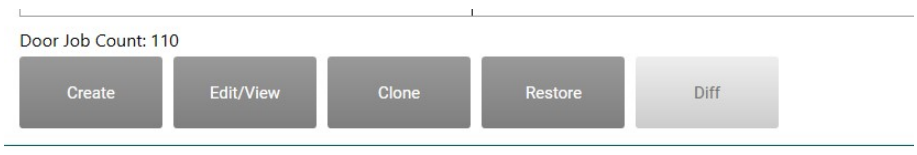
Using the Display Deleted Check Box (Recover a Door File)

Follow this procedure to recover a door file.

1. Select the **Display Deleted Check Box**, located in the upper right hand corner.
2. Deleted files are highlighted in red.



3. Select the file to be recovered.
4. At the bottom of the page, select the **Restore Button** to recover the file.



Using the File Control Buttons

Use the buttons at the bottom of the screen to create, clone, edit/view, or delete/recover files. Database selection is also available.

Using the Create Button

Use this button to create a new file in the desired library.

Using the Edit/View Button

Use this button to open an existing file to view or edit.

Edit or view a **Door Job**, **Door Feature**, or **Door Data** file.

1. Select a file from the **File Table**.
2. Select the **Edit/View** button to go the file screen.

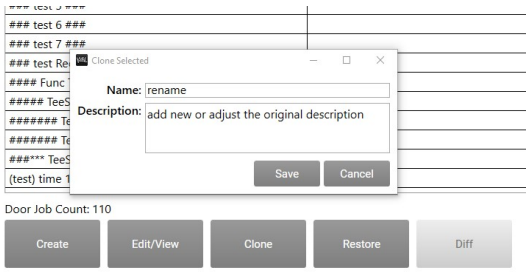
Tip: Double-click the desired file in the table to go straight to the screen.

Using the Clone Button

Use the **Clone Button** to create a copy of a door file.

To Clone a File

1. Select the file to be cloned from the table.
2. Select the **Clone** button.
3. At the Pop-Up window, rename the file and, if needed, update the description.
4. Select the **Save** button to complete the process.



Clone Pop-Up Screen

Using the Delete/Restore Button

Use this button to delete a file or restore a file.

Note: The Delete Button turns into the Restore Button when the Display Deleted Check Box is selected.

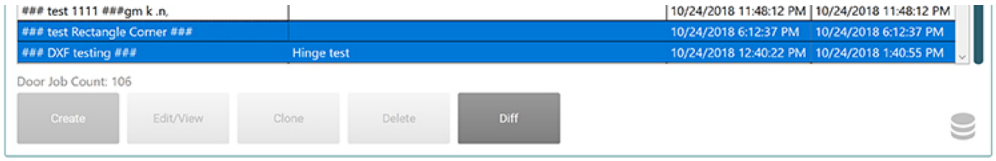
To Delete a File

1. Select the file to be deleted from the table.
2. Select the **Delete** button.
3. At the Pop-Up window select **Yes** to delete the file.

Note: To restore a file, see “Using the Display Deleted Check Box (Recover a Door File)” on page 1-9.

Using the Diff Button

This button compares two files. The figure below shows two highlighted files to be compared.



Use the Diff Button to Compare Two Files.

1. Select two files to compare. Press and hold The **CTRL** or **SHIFT** key, then select the two files to highlight in blue.
2. Select the **Diff** button.
3. In the Pop-Up window, the differences are highlighted.

   The top selected file is highlighted in red while the second file selected is highlighted in green.

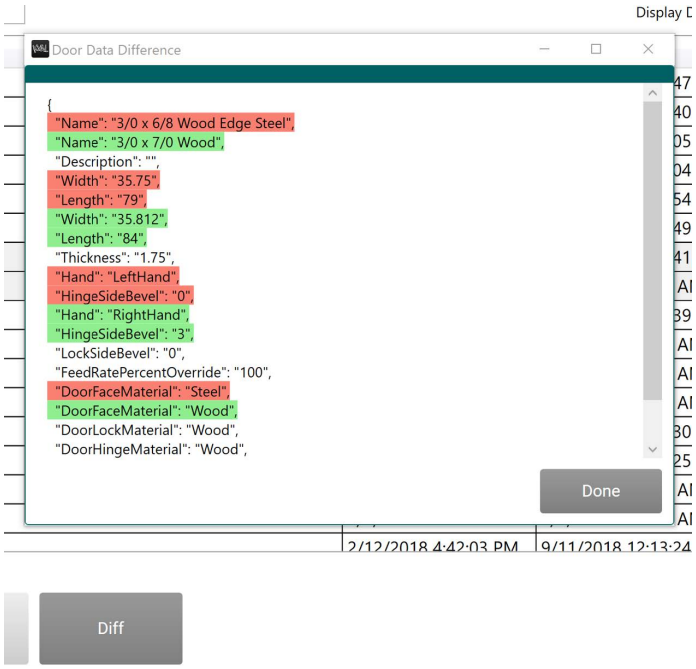


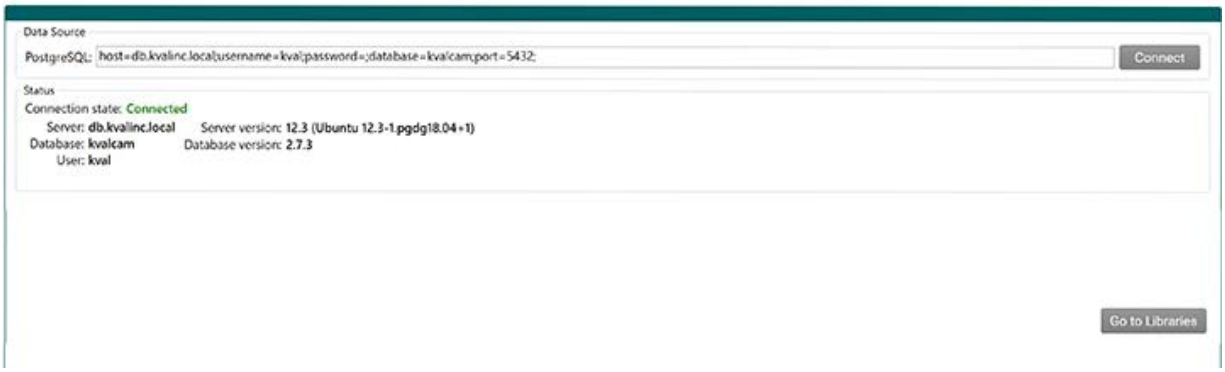
FIGURE 1- 3. Comparing Two Files

About the Database Icon

In some instances, multiple databases may be available. Follow the procedure below to connect to different database

To Select a Different Database:

1. Select the **Database** icon.
2. At the **Database** screen, enter the desired database path into the **PostgreSQL Text Box.**
3. Select the **Connect** button.
4. Select the **Go to Libraries** button that is located at the bottom of the screen.



About the Database Screen Contents

The database screen contains the following:

- Data Source path (PostgreSQL)
- Status Information
    - Connection State (**Tip:** If not connected, verify path)
    - Server (Multiple servers may be created)
    - Database (This is the name assigned to the database)
    - User (Assigned User)
    - Server version (OEM server version)
    - Database (Kval database version)

About Revisions

Revisions are created after editing an existing **Door Job**, **Door Data** or **Feature Group** file in the **KvalCAM** library.

Revisions represent a save point in the history of editing, the **Principle** revision is the current save point in the case of a **Door Data** or **Feature Group**.

See “Controls at the Library Screen” on page 1-8, for instructions to open the Revision screen.

Principle and Diff

Each Revision Panel contains a **Principle** and **Diff** button. The **Diff Button** compares two files.

For information about using the **Diff Button**, see “Using the Diff Button” on page 1-12.

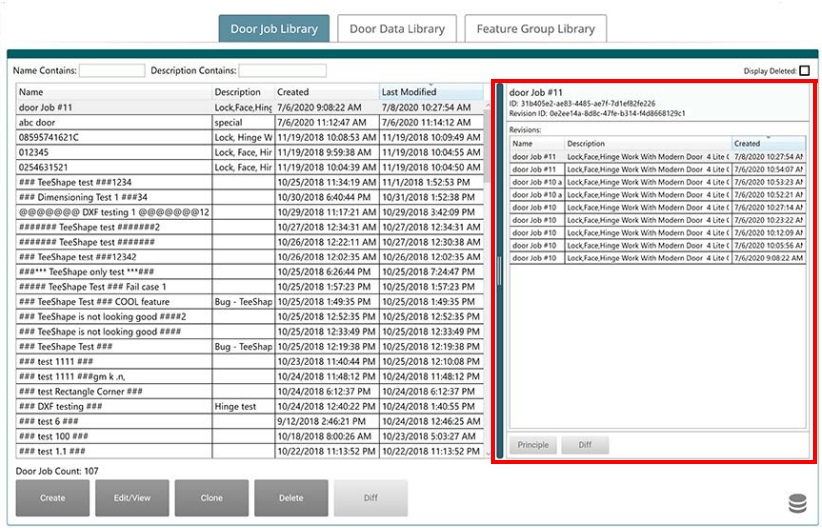
Using the Principle Button

Normally the top file in the table is the principle. However, any revised file can be assigned as the principle using the **Principle** button.

1. From the revision table, select to highlight the desired revision file.
2. Select the **Principle** button.
3. The selected file will be highlighted in green and will be assigned as the principle file.

Revisions at the Door Job Library

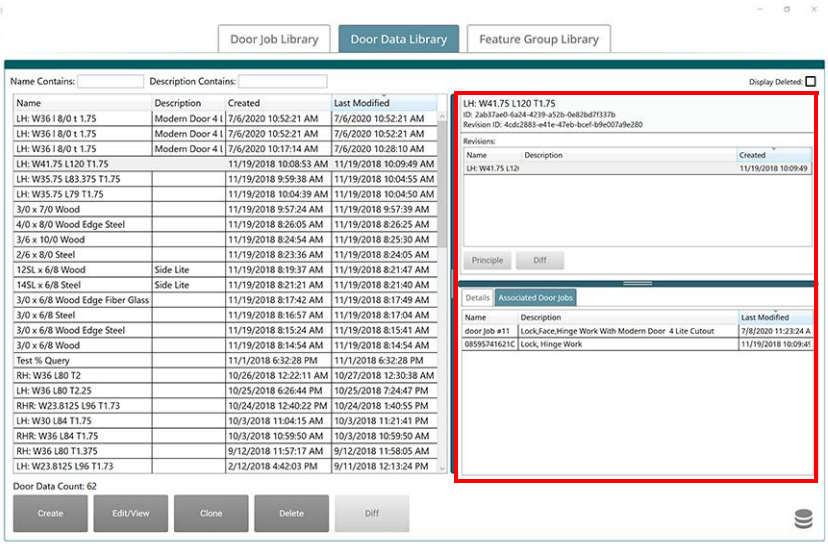
The **Door Job** file revisions be compared and any file can be assigned as the principle.



Revisions at the Door Data Library

In the upper panel, the **Door Data** file revisions may be compared and any file can be assigned as the principle.The lower panel displays:

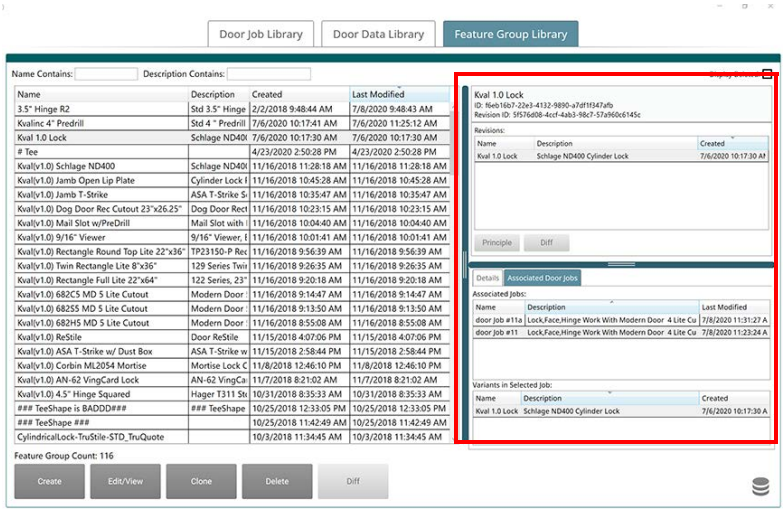
- The **Door Jobs** that contain the selected **Door Data File**.
- The Revision ID.



Revisions at the Door Feature Group Library

In the upper panel, the **Door Feature** file revisions may be compared and any file can be assigned as the principle. The lower panel displays:

- **Door Jobs** that contain the selected **Feature Group File.**
- The Revision ID.
- Any Variant in the files.For a **Variant** definition, see “Variant” on page 3-22.

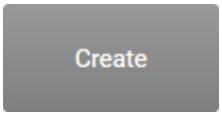


About Door Job Creation

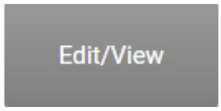
This section describes the functions available at the **Door Job Creation** screen. Select the **Libraries Tab** and then make sure you are at the **Door Job Library Tab.**

Note: Sample of face, lock, and hinge job creations are located in this manual.

Note: For a definition of validation errors, see “Validation” on page 3-20.



To create a new **Door Job,** select the **Create** button at the bottom of the screen.



To edit or view a created **Door Job**, select the item from the table, then select the **Edit / View** button on the bottom of the screen.

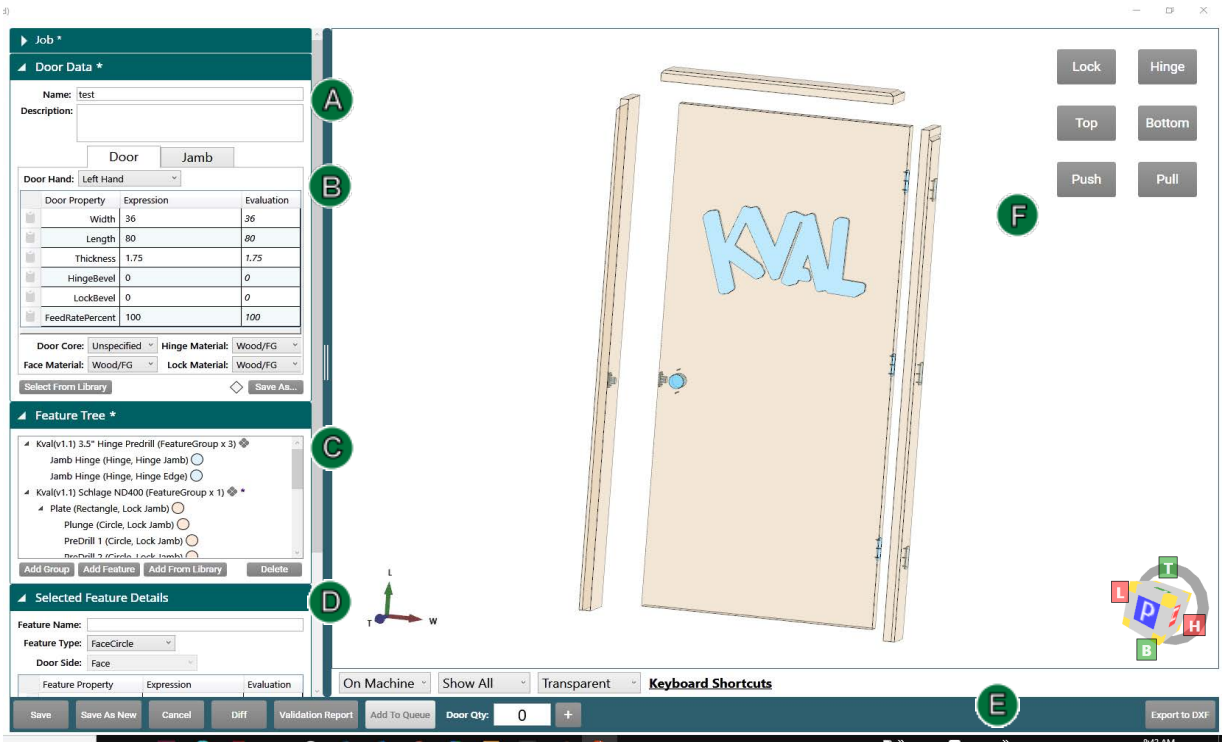


FIGURE 1- 4. Door Job Screen

About the Door Job Name Menu

At the top of the screen to the left, enter the desired name of the door job int the **Job Name** text box. To identify the **Door Job** fully, enter a description in the **Job Description** text box.

Job Name: Job Name is displayed in the Library table.

Job Description: Add an description of the **Door Job.**

FIGURE 1- 5. Door Job Name Section

The name and description are be displayed in **Door Job Library** along with the creation date and date of any modifications. See Figure 1- 6 below.

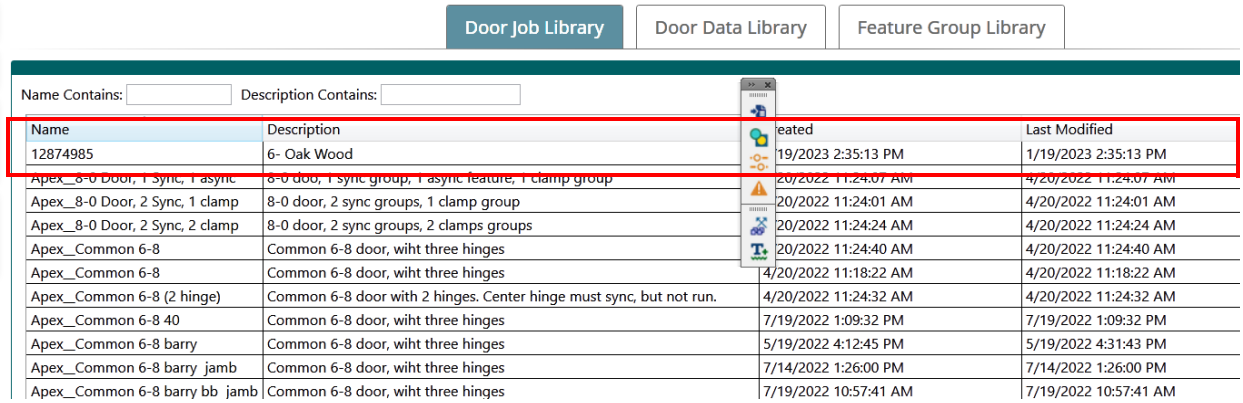


FIGURE 1- 6. Door Library

About the Door and Jamb Data Menus

The **Door Data** menu contains raw door data and raw jamb data to create a **Door Job**. **Door Data** and **Jamb Data** are located under separate tabs.

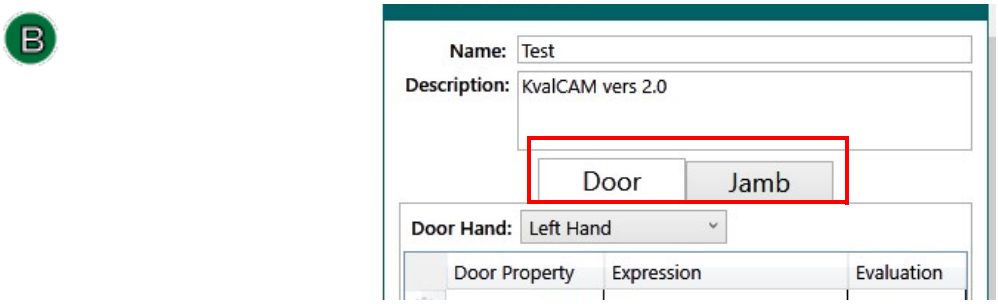


FIGURE 1- 7. **Door Data Menu**

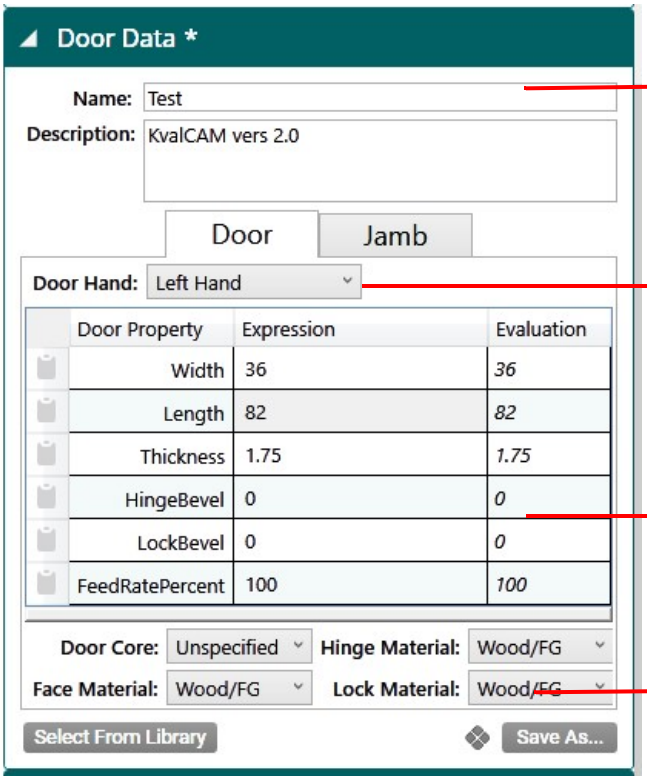
Door Data and Jamb Data Highlights

Note: Definitions of ad hoc, expressions, and revised files can be found in the Common Terms Chapter of this Reference Guide.

- **Door Data** and **Jamb Data** can imported into the **Door Job** from the **Door Data Library.** (Most common)
- Data can be saved to the **Door Data Library** as an ad hoc file, a revised file or as a new file.
- By way of the **Door Data Library**, door and jamb data can be shared with many **Door Job** files.
- Expressions are available.
- One click expression copy is available.
- If needed, data can be entered and changed manually.

Description of the Door Data Table Selections

Select the **Door** tab to view, edit, or save the door data properties. The figure below describes the available **Door Data** properties. For an example of using the **Door Data** section, See "Door Data Process Steps" on page 2-2.



Name and Description: Add a file name and description.

Door Hand: Select the Hand Orientation of the Door. From the drip down menu, select:

- Left Hand.
- Right Hand
- Left Hand Reversed
- Right Hand Reversed

Door Parameters: Displays the basic parameters of the door being processed.

FeedRate% Override: Manually adjust the servo speed of the drill / routers. For example, for a harder material may call for a lower percentage.

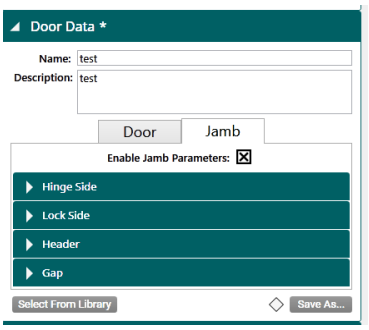
Door Core: Clamping pressure will adjust to the selection. (Unspecified, Hollow, or Foam)

Door Material: Select type of material of the Face, Hinge side, and Lock side of the door. (Wood, Fiber -Glass, or Steel)

FIGURE 1- 8. Door Data Table

Description of the Jamb Data Table Selections

Select the **Jamb** tab to view, edit, or save the jamb data properties. The figure below describes the available **Jamb Data** properties.



Jamb Data Properties

Each properties table lists the following parameters:

- **Hinge Side**
- **Lock Side**
- **Header**
- **Gaps: Header, Hinge Side, and Lock Side**

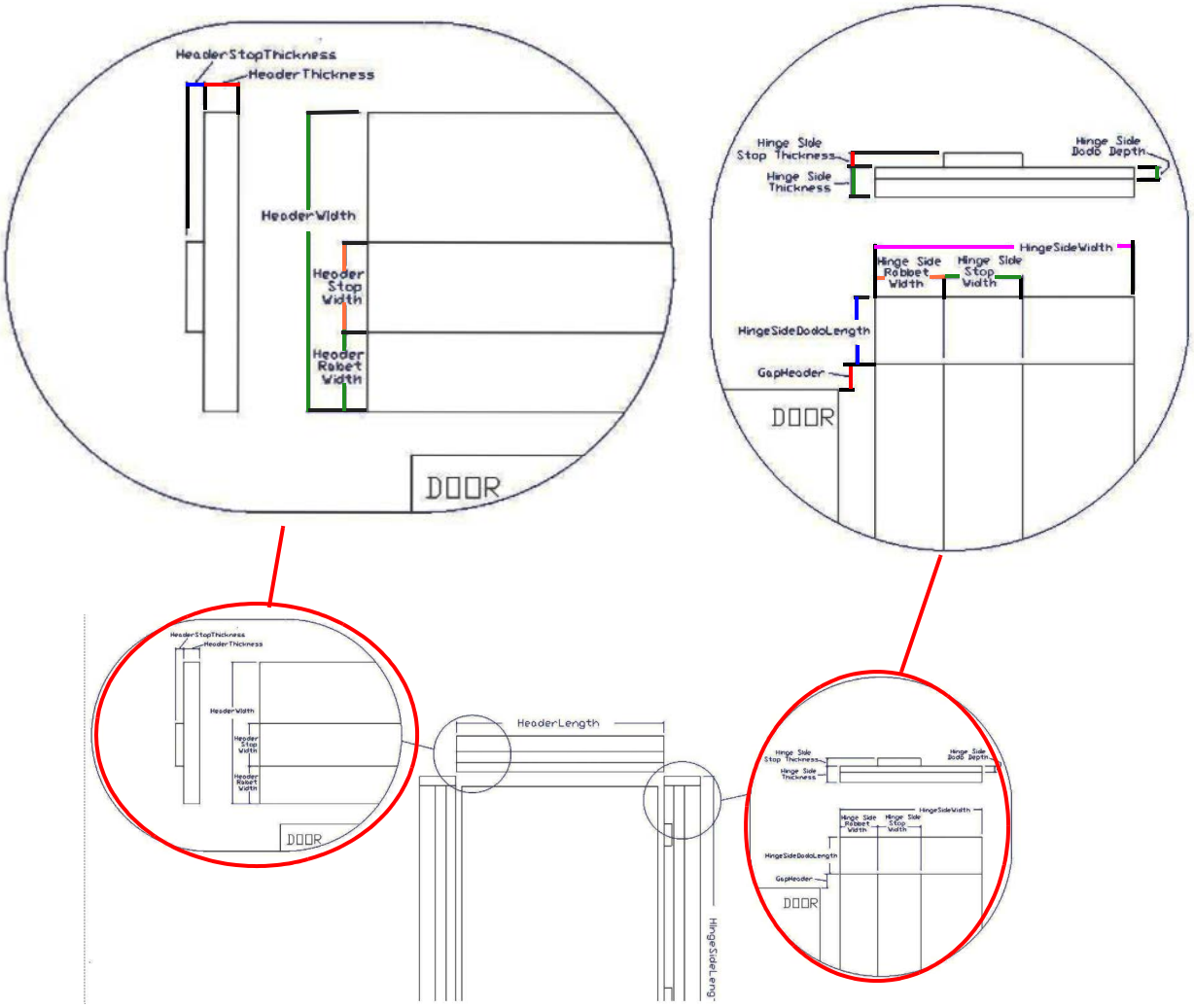


FIGURE 1- 9. Jamb Properties

Jamb Data Property Tables

Jamb properties include all the parameters to create a door frame. The data is normally created remotely and saved into the database. The properties are shown in the figure below. For an example of using the **Jamb Data** section, see “Jamb Data Process Steps” on page 2-3.

Note: To activate jamb data, the **Enable Jamb Properties** check box must be selected.

Figure 1- 10 below shows the **KvalCAM** tables.

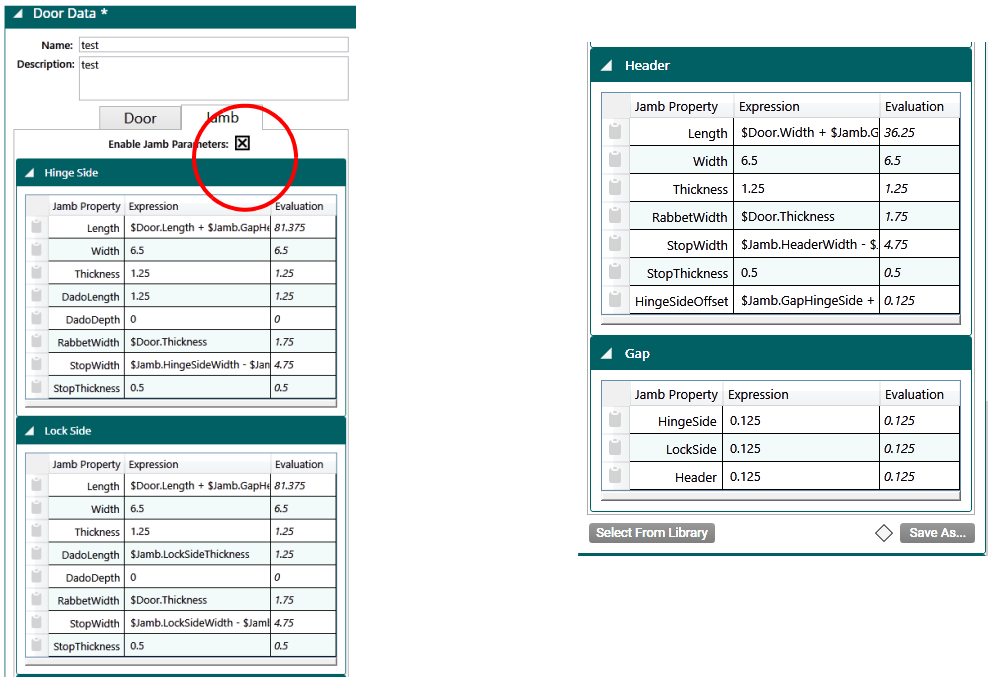


FIGURE 1- 10. Jamb Data Tables

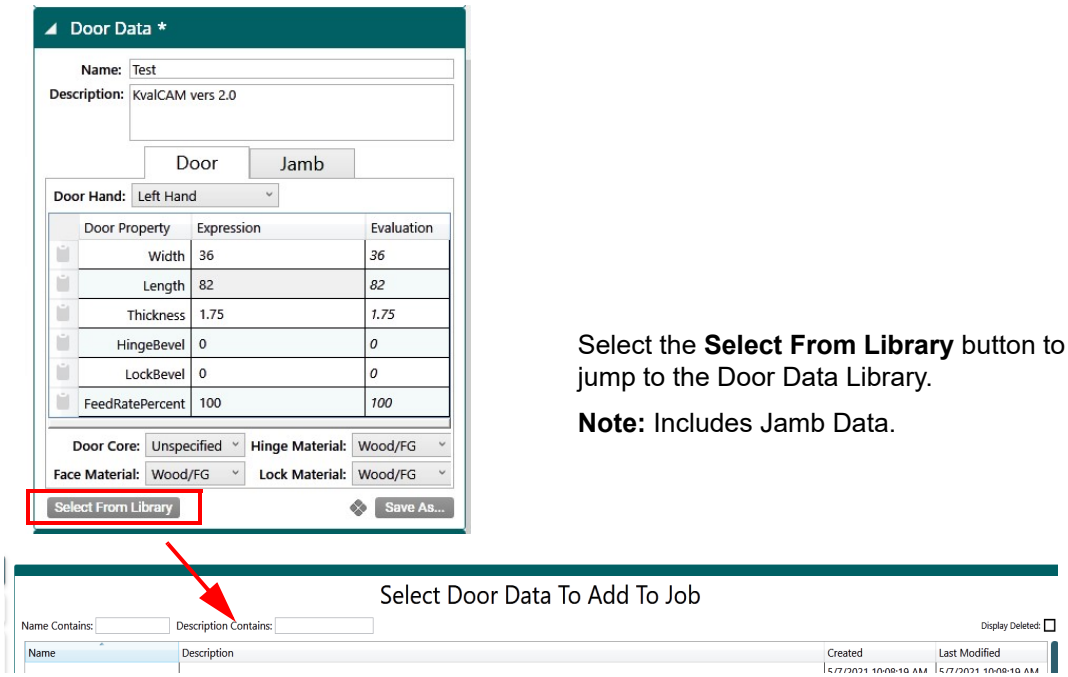
Properties available in the Jamb Properties tables are listed below.

Hinge /Jamb Sides	Header	Gap[1]
Length	Length	HingeSideOffset
Width	Width	LockSide
Thickness	Thickness	Header
DadoLength[2]	RabbetWidth	
DadoDepth	Stop Width	
RabbetWidth[3]	Stop Thickness	
Stop Width	HingeSideOffset	

1. Gap is the space between a closed door and the header, hinge jamb., and lock jamb.
2. A dado is a slot or trench cut into the surface of a jamb. See “Dado” on page 3-4
3. A rabbet is a slot at or near the end of a jamb. See “Rabbet” on page 3-17

Select From Library

This button is available in both the Door Data and Jamb Data screens. Select it to jump to the **Select Door Data** Screen to select files to bring into **Door Job.** See Figure 1- 11.



Select the **Select From Library** button to jump to the Door Data Library.

Note: Includes Jamb Data.

FIGURE 1- 11. Select From Library Button Action

Save Data

This button is available in both the Door Data and Jamb Data screens. Choose the **Save As** button to store the data file. At the Pop-Up screen, choose the desired action to save the file.

- **Save as New:** Complete the Name Field and Description.
- **Save as Revision:** Select a file and save as a revision.
- **Save as Ad Hoc:** Save changes as Ad Hoc.
- **Or Cancel the save.**

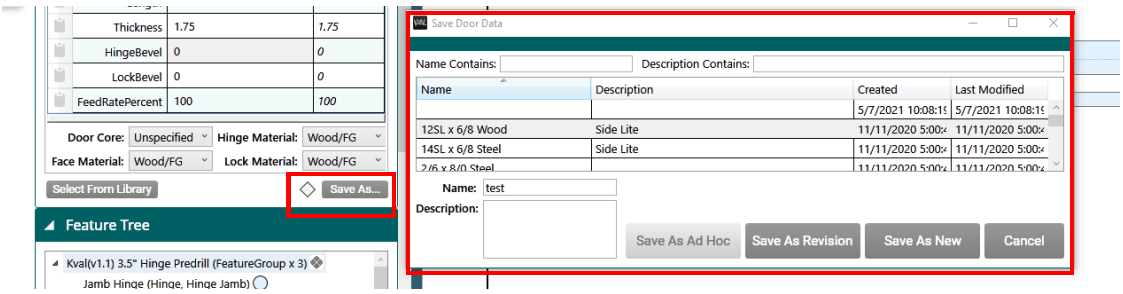


FIGURE 1- 12. Save Data Button Action

Tip: Another way to save data is to right click the mouse and select **Save Door Data As...** from the Pop-Up window. See Figure below.

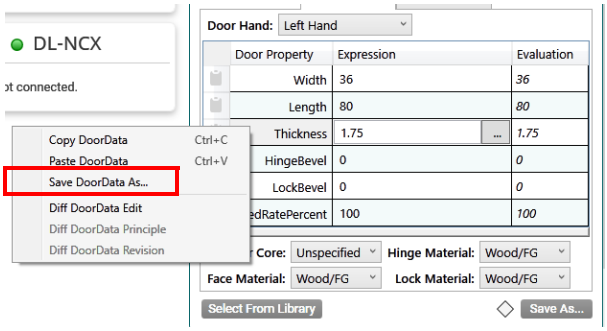


FIGURE 1- 13. Pop-Up Window to Save Door Data

One Click Expression Copy

This button is available in both the Door Data and Jamb Data screens. To copy an expression click the folder icon in the far left of the **Data Properties** table. Paste the expression to the desired location. For a definition of the term expressions, see “Expressions” on page 3-9.

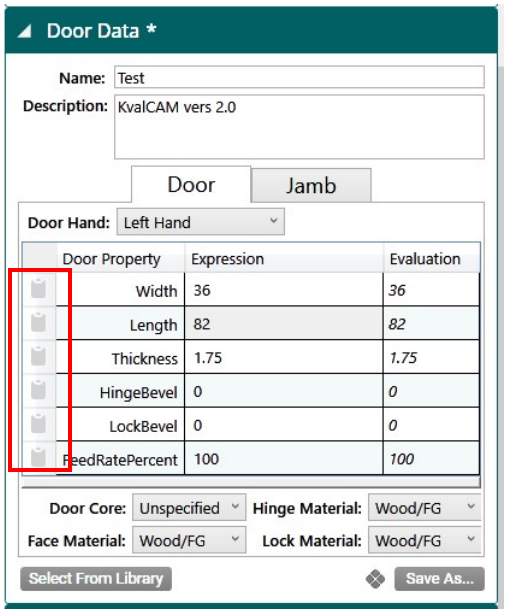


FIGURE 1- 14. Using One Click Copy

Tip: Another way to copy data is to right click the mouse and select **Copy Door-Data** from the Pop-Up window. See Figure below.

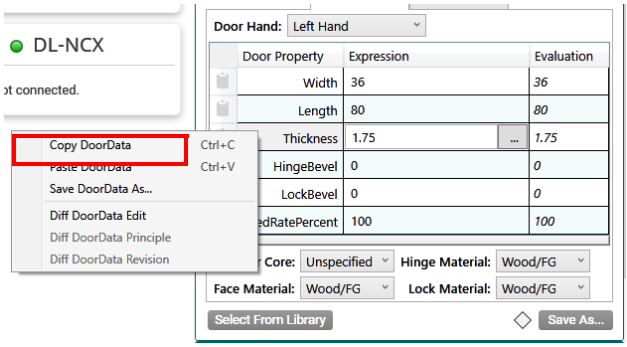


FIGURE 1- 15. Pop Up Window to Copy Data

Summary of a Feature Group and Features

Feature Groups and Features resemble an outline.

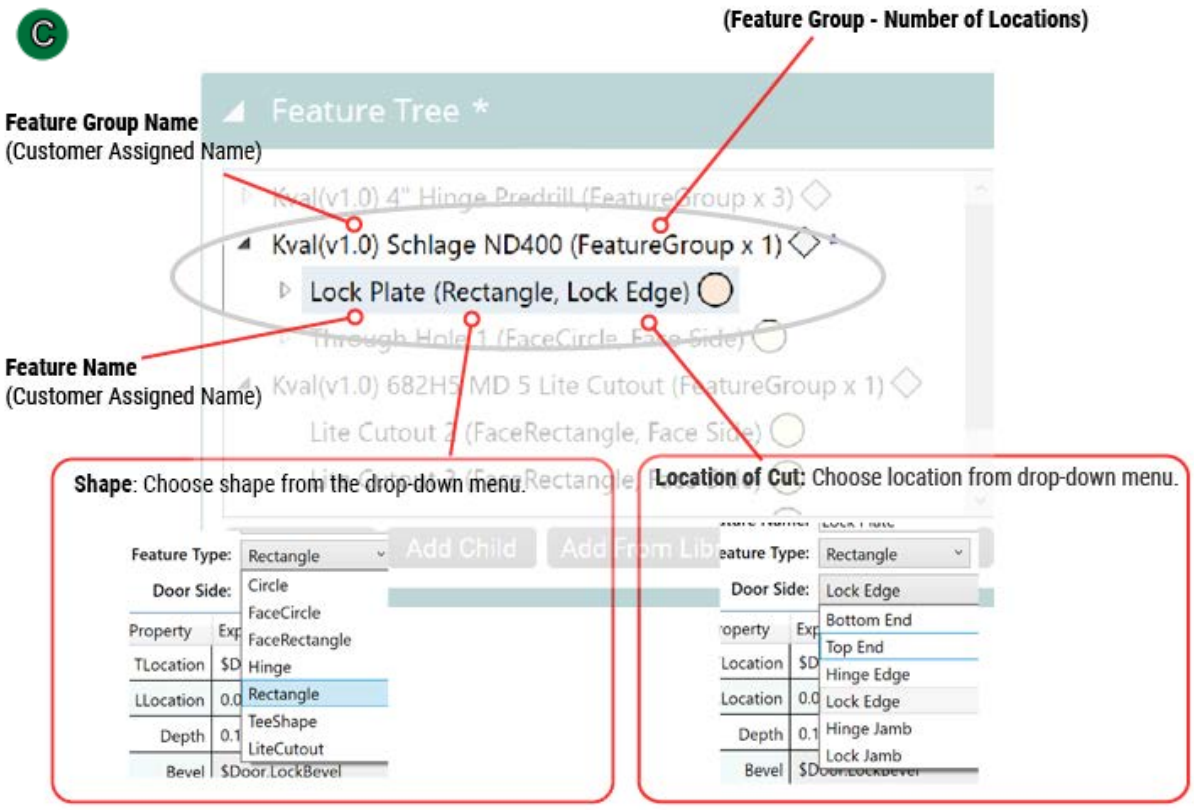


FIGURE 1- 16. Feature Group Summary

About the Feature Tree Menu

View, edit, or create features of the door. Also known as “Group” or “Template”, a Feature Group is a container in which individual or multiple features can be loaded to process a door. Feature Groups operate at the top level of the feature tree, from which **child** features branch out.

Notes/Tips:

- **Color Coded:** Indicators next to the **Features** are color coded to reflect the location on the door. (Hinge Edge, Lock Edge, Hinge Pivot Face, Opposite Hinge Pivot Face, Top End, Bottom End).
- **Validation:** If a cut is not correct, the offender will be highlighted by an orange rectangle in the Feature Tree Menu. Use the **Validation Report** to find the error. See “Validation Report” on page 3-20
- **Cut/Copy and Paste**: Select a Group or Child. Right click the mouse button. Choose Cut or Copy from the list. Position mouse at the desired location in the tree. Right click and choose Paste.

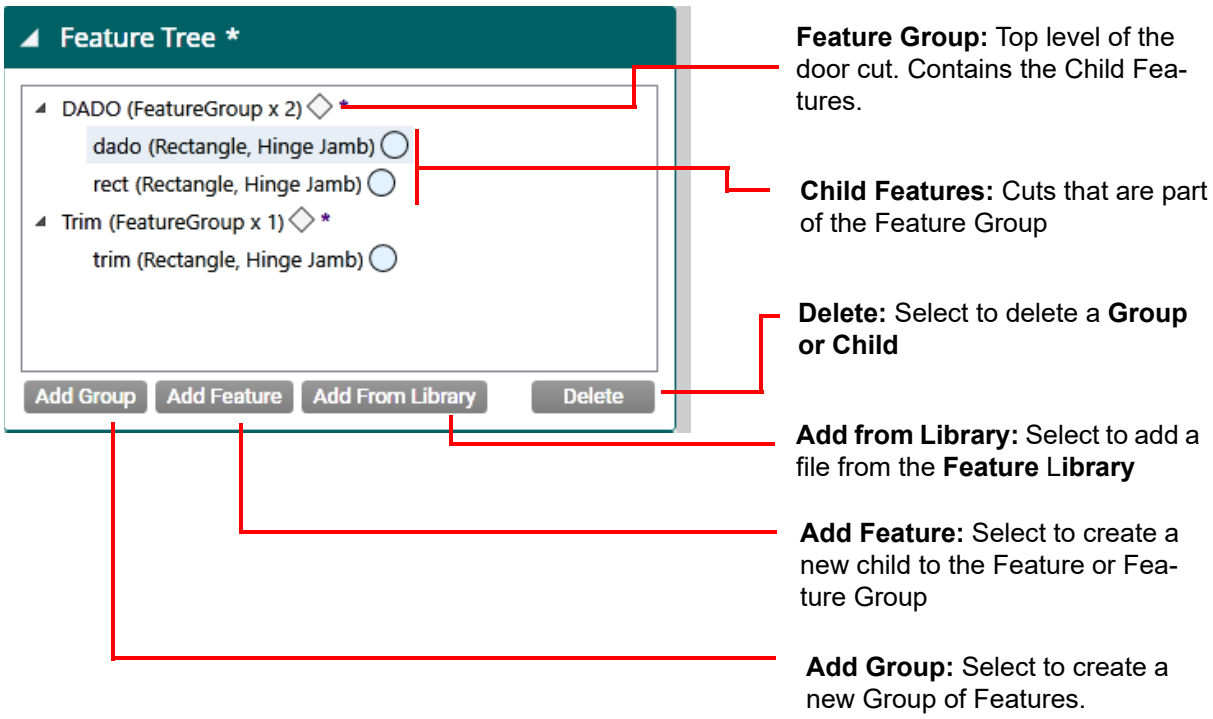
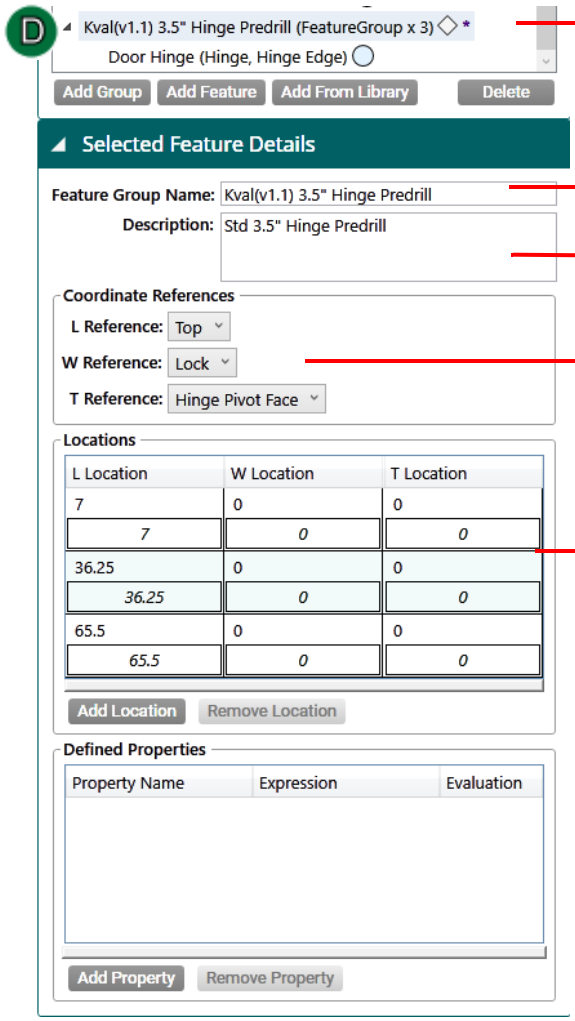


FIGURE 1- 17. Feature Tree Definitions

About the Selected Feature Details Menu

All **Feature Groups** have their own L (Length), T (Thickness), and W (Width) location that is separate from the features contained inside. Figure 1- 18 shows a **Hinge Cut** example.



Feature Group: The selected group is detailed below.

Feature Group Name: This field is required when saving a new template.

Description: Description of the Feature Group

Coordinate References: Set the reference in relation with the cut. The reference option will be displayed in **Job Preview.**

T (Thick) Reference:

- Hinge Pivot Face
- Key Face
- Opposite Key Face
- Opposite Hinge Pivot Face

L (Length) Reference:

- Bottom
- Top

W (Width) Reference:

- Lock
- Hinge

Locations: Add, Remove, Edit location information.

In this example, the hinge locations are located 7.0",36.25" and 65.5" with a reference from the top of the door.

Defined Properties: Create a custom property to be used for the selected Feature Group. In most cases, a Defined Property is created to simplify changes in a commonly used parameter in a Door Job.

Select **Add Property.** Add a Name and Expression. Error checking will help in adding the correct data.

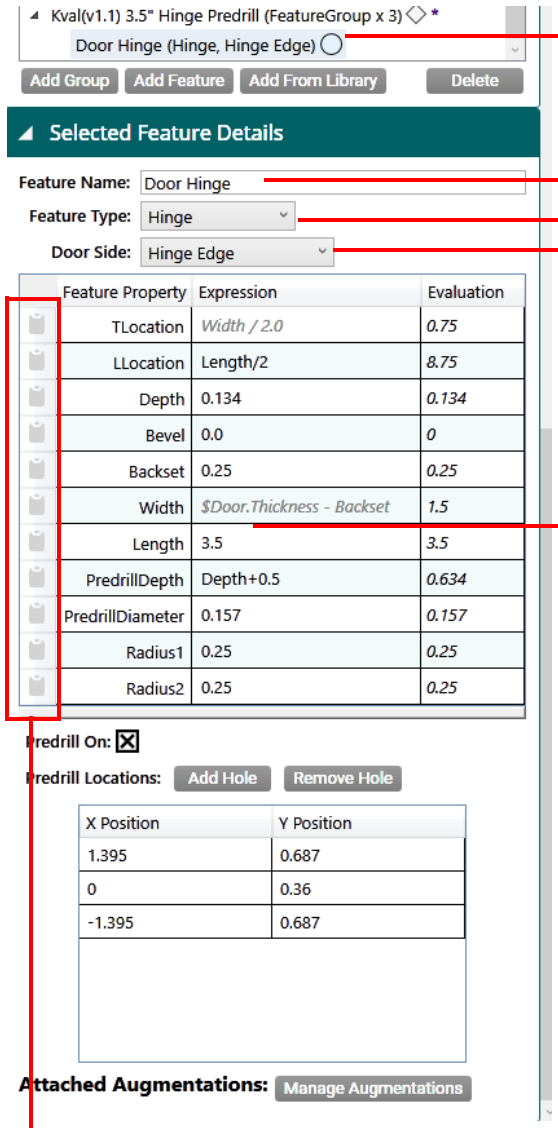
In the Children Feature Detail Screen, add a hashtag (#) in front of the created property name.

FIGURE 1- 18. Feature Detail Section Definitions

About the Selected Feature Details Menu (Child Level)

The Feature Details of children of the feature groups are defined and displayed at this level.

The example below is the parameter of the Hinge Cut form the previous page. The example below details the parameters of the hinge cut. Predrill locations are also included in the example.



Feature Group Child: The selected group is detailed below.

Feature Name: Name of The Feature Under the Group.

Feature Type: Select type of cut:

- Circle
- FaceCircle
- FaceRectangle
- Hinge
- Rectangle
- TeeShape
- FaceProfile
- LiteCutout

(See "About Face Feature Types" on page 2-7.)

Door Side: Select Door Side:

- Bottom End
- Top End
- Hinge Edge
- Lock Edge
- Hinge Jamb
- Lock Jamb
- Header Jamb

(See "About Edge Feature Types" on page 2-6.)

Properties Table: Parameters of the cut. Includes Hinge Predrill locations.

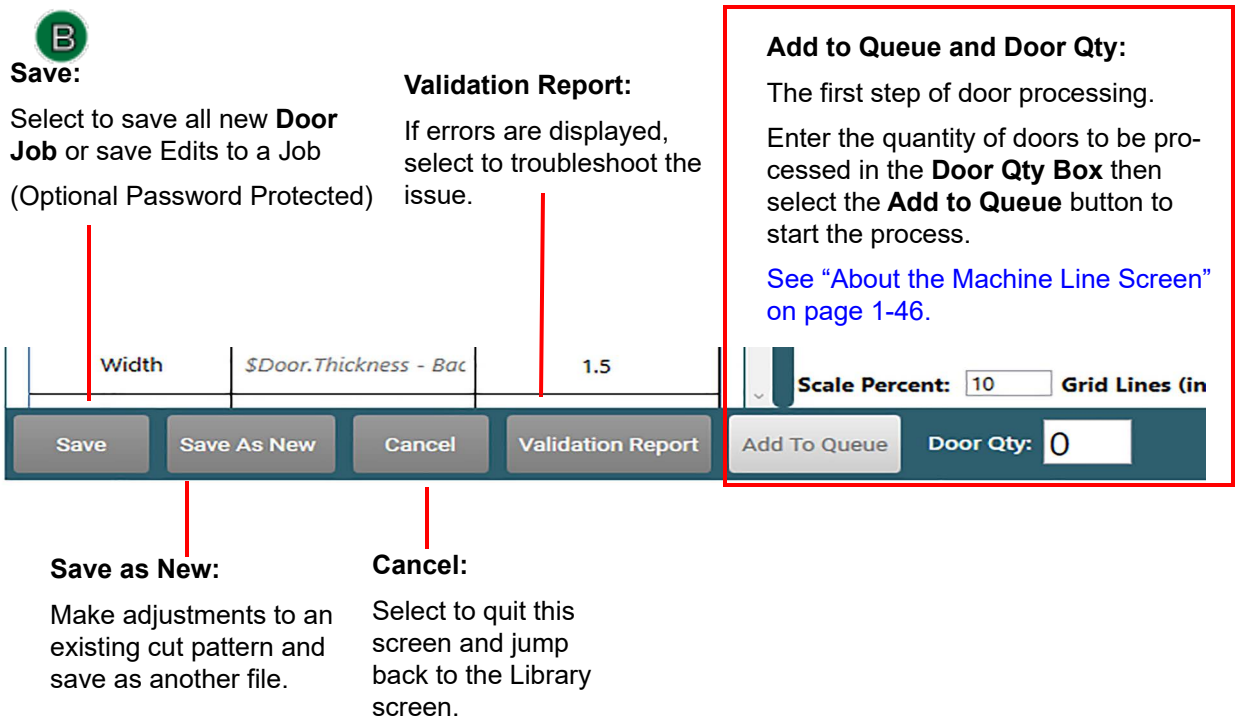
Copy Expressions: Click to copy expression in that row

Manage Augmentations: Add augmentations to the created Feature. Augmentations are created at the factory to aid common cuts.

FIGURE 1- 19. Feature Details Child Section Definitions

About the Control Buttons

The Control Buttons are located at the bottom of the screen. The first 4 buttons are related to saving or editing the file. The last button (Add to Queue) relates to running doors through the process.



Export to DXF:

Select the **Export to DXF Button** to create a blueprint of the **Door Job**. The background program will translate the parameters to a *dxf* file.

To view the file use a program that opens.dxf files. (For example: AutoCad® Draftsight®) Use this blueprint to share for review.

FIGURE 1- 20. Control Button Definitions

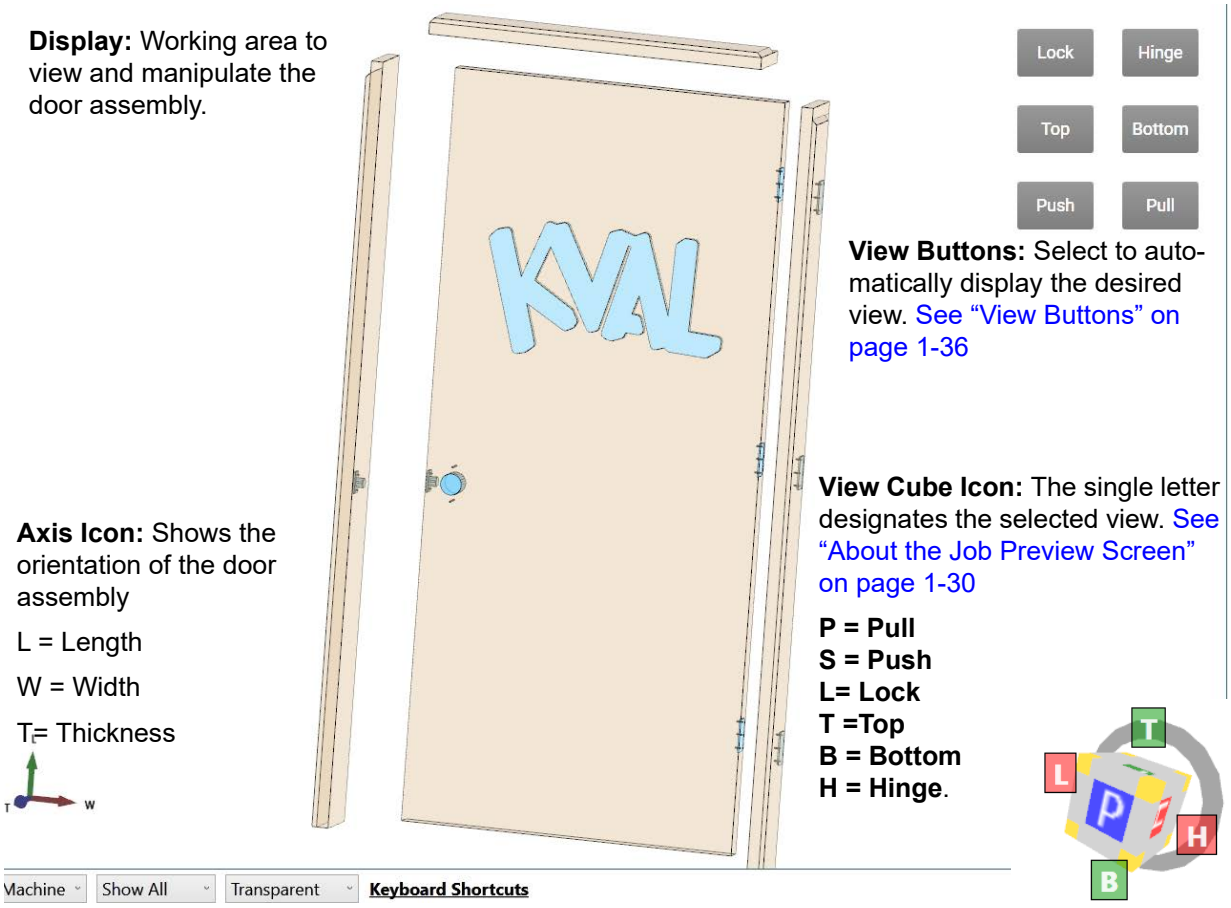
About the Job Preview Screen

This display supports viewing the door graphically before cutting, offering powerful opportunities to edit or verify the door parameters.

The **Job Preview** screen is a interactive graphical representation of the **Door Job**. The door can be viewed from different perspectives and configured to be in various assembly situations.

The door can be viewed in terms of components as they exist on the machine, or it can be viewed as components in their final, assembled position in a structure.

This section describes the options available at this screen



Bottom Buttons: These buttons manipulate how the door assembly is viewed. See “About the Bottom Buttons” on page 1-33

FIGURE 1- 21. 3-D Display

Using the Cube Icon to Navigate

Any of the faces can be clicked on to orient the camera to that standard view. In addition to this, any edge or corner of the view cube can be clicked on to get a corresponding camera position. The view cube has a ring and adjacent articles around one face. This ring is designed as a visual indicator of the "bottom" of the cube, or what would be considered the lower side of the "T" dimension.

The view cube is located in the lower-right corner of the screen. This cube has 6 sides, and the corresponding edges and borders or a normal cube. On every face of the cube, there is a single letter that corresponds to the standard view in which that view is oriented. Letters to the side identify adjacent views.

- **H** - Hinge edge
- **L** - Lock edge
- **T** - Top edge
- **B** - Bottom edge
- **P** - Pull face
- **S** - Push face

Figure 1- 22 shows the relationship of the cube icon to a Left Hand Door with the view from the pull side.

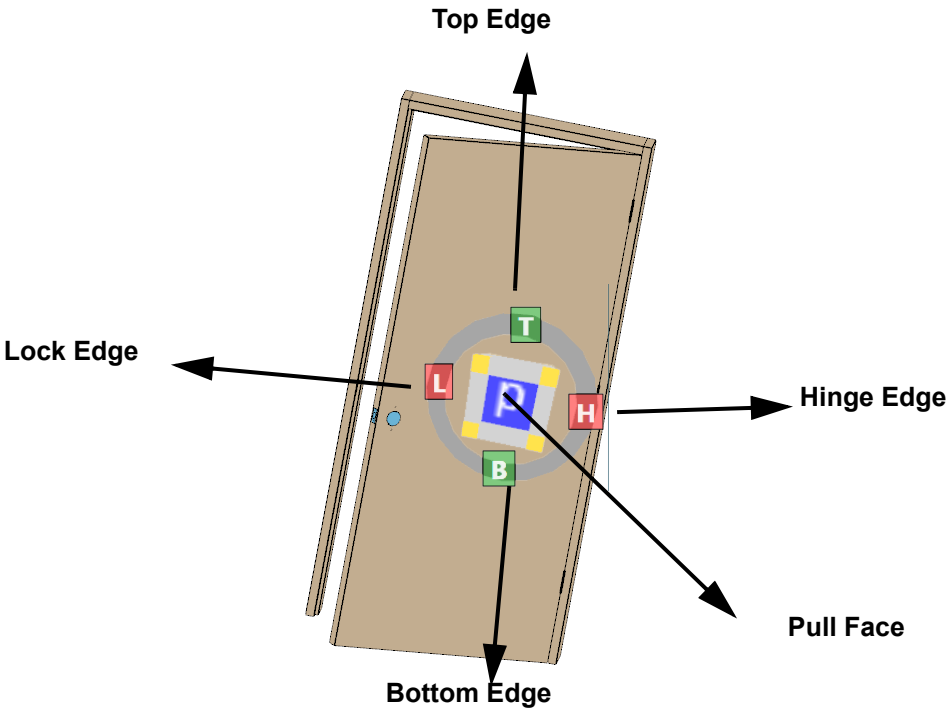


FIGURE 1- 22. Navigation Views

Color Coding in the Preview Screen

Colors define the type of selection or the status of the item in the screen. Error colors are paralleled from the Feature Tree to the graphical display.

- **Dark Blue**: Feature is selected
- **Light Blue:** Features added to the Door Job
- **Orange:** Validation Error
- **Red:** Evaluation Error

Figure 1- 23 shows an example of a feature selection and a validation error.

Note: Along with color coded errors, error messages also appear on the **Preview Screen.**

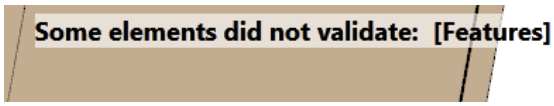
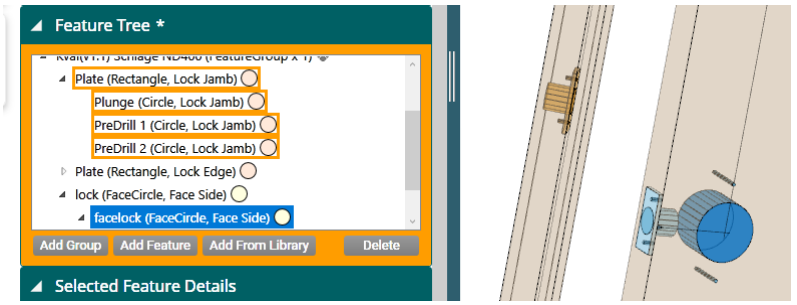


FIGURE 1- 23. Sample validation Error Message

Jamb Lock Plate Validation Error



Lock Selection

Evaluation Error

FIGURE 1- 24. Color Code Examples

About the Bottom Buttons

The bottom buttons offers different ways to view the door assembly.

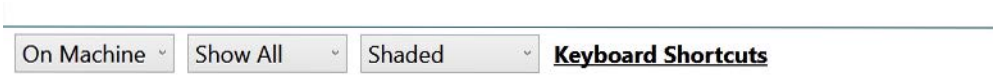


FIGURE 1- 25. Bottom Buttons of the 3-D Preview Screen

About the On Machine Button

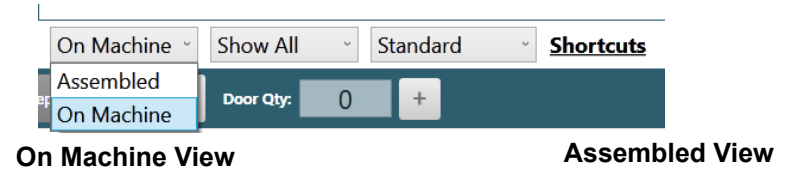
From the drop down menu, select **On Machine** or **Assembled.**

- **On Machine:** Shows the door as separated component articles of manufacture.
- **Assembled:** Shows the door as it would appear attached to a building.

Figure 1- 26 shows the display in an **Assembled** view and **On Machine** view. The door mode is shown in **Transparent** view to accentuate illustration.

Note: The default display is the **On Machine** view.

Note: The **Assembled** view always shows the wide-side up (the Pull side). Any door hand will result in the pull side being in the positive **"T"** direction.



On Machine View **Assembled View**

FIGURE 1- 26. The On Button Drop Down Menu

About the Show Mode Buttons

From the drop down menu, select **Has Feature** or **Show All.**

- **Has Feature:** Shows the articles that have one or more features assigned to them.
- **Show All:** Shows all of the articles regardless of whether they have assigned features.
- **Selected:** Shows selected articles from the drop down check box regardless of whether they have assigned features. Select the check box to show or hide the desired articles.

Note: Select the arrow next the Selected title to collapse or expand the article list.

Note: The **Has Feature** is the default mode.

Note: Figure 1- 27 shows the door in the **On Machine** view to accentuate the change in views.

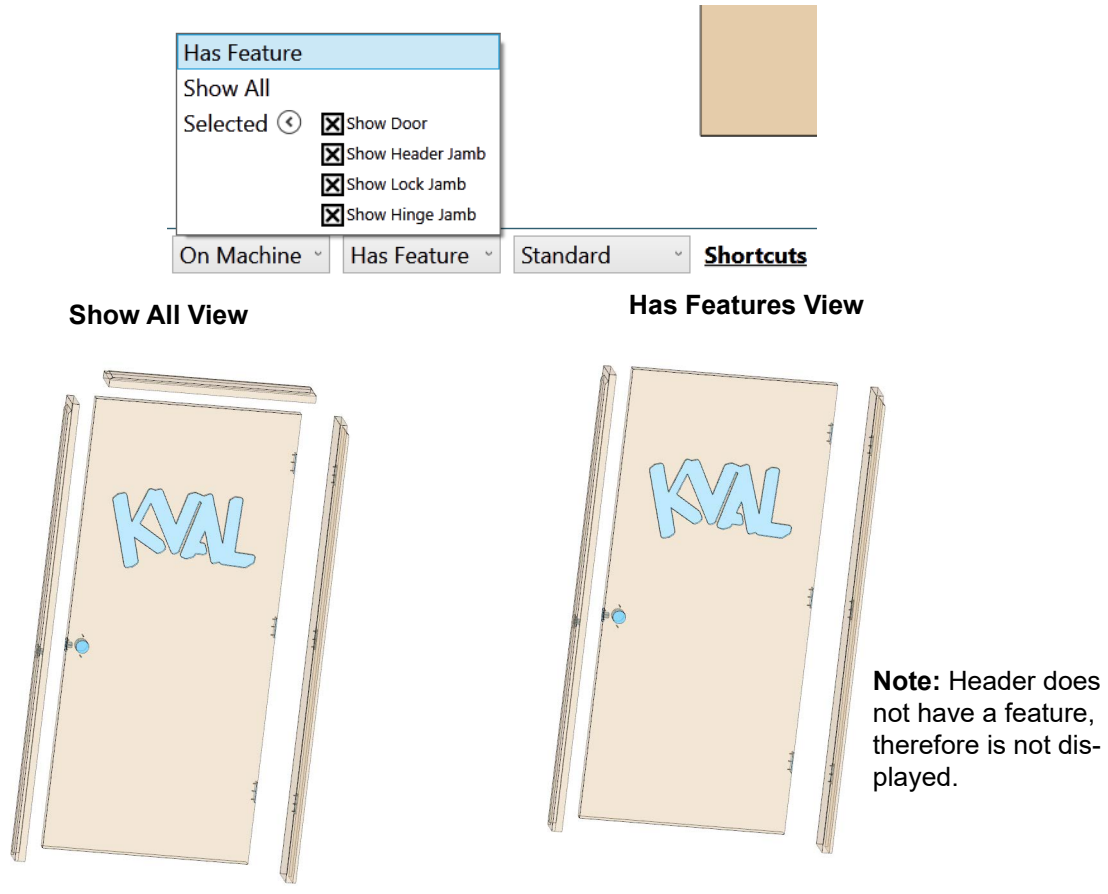


FIGURE 1- 27. The Show Button Drop Down Menu

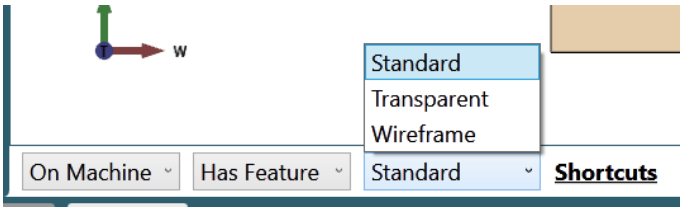
About the Standard View Buttons

From the drop down menu, select **Standard, Transparent,** or **Wireframe.**

- **Standard:** Shows the door assemblies in an opaque rendering with assigned features visible.
- **Transparent:** Shows all the assigned features with the door assemblies in a transparent rendering. This allows the viewing of features through the door without obstruction.
- **Wireframe:** Shows the door assemblies as a line drawing.

Figure 1- 28 shows each door renderings.

Note: The **Standard** view is the default mode.



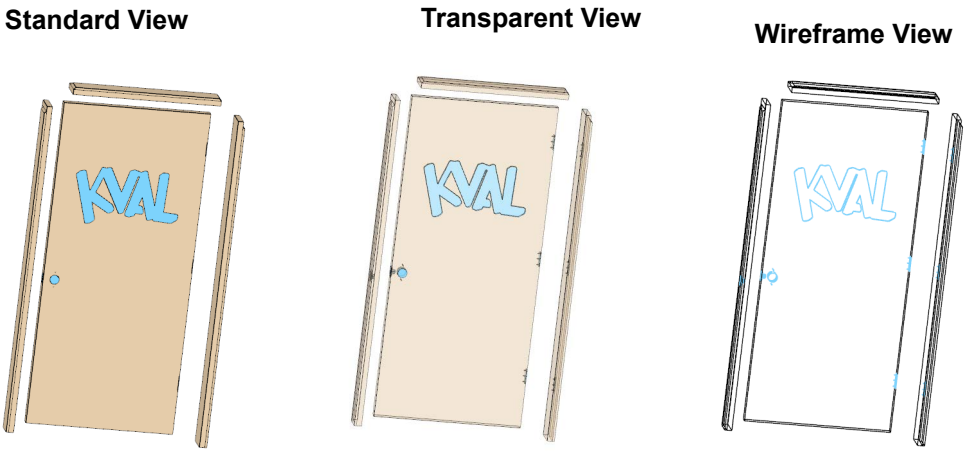


FIGURE 1- 28. The Standard View Buttons

View Buttons

With the view buttons, quickly orientate the display to the desired view. The **Push** and **Pull** views are affected by the door hand selected in the **Door Data** section. With each change in view, the Axis Icon and the View Cube will change to reflect the orientation. See Figure 1- 21 on page 1-30 for information on the Axis Icon and View Cube.

Tip: A mouse rollover over each button will display information about the View buttons. See the display examples in the list below.

- **Lock:** Select to view the door assembly from the lock edge side.
- **Hinge:** Select to view the door assembly from the hinge edge side.
- **Top:** Select to view the door assembly from the top edge side.
- **Bottom:** Select to view the door assembly from the bottom edge side.
- **Push:** Select to view the door assembly from the face side of the door assembly from the push view.
- **Pull:** Select to view the door assembly from the face side of the door assembly from the pull view.

Lock View

After selecting the Lock button, Figure 1- 29 shows the view of a door assembly in the Shaded view and On Machine mode.

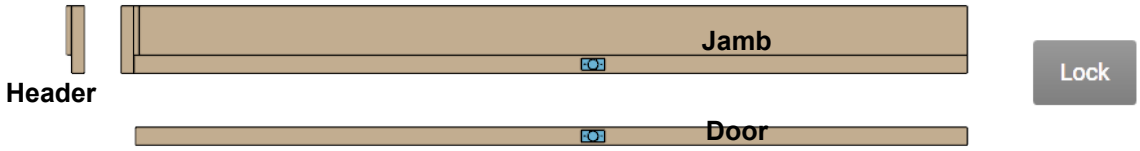


FIGURE 1- 29. Lock View

Hinge View

After selecting the Hinge button, Figure 1- 30 shows the view of a door assembly in the Shaded view and On Machine mode.

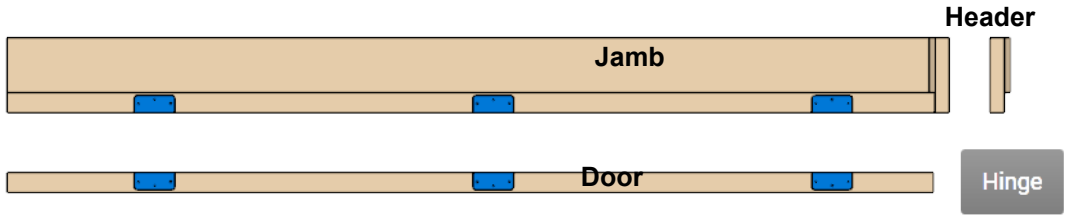


FIGURE 1- 30. Hinge View

Top View

After selecting the Top button, Figure 1- 31 shows the view of a door assembly in the Shaded view and On Machine mode.

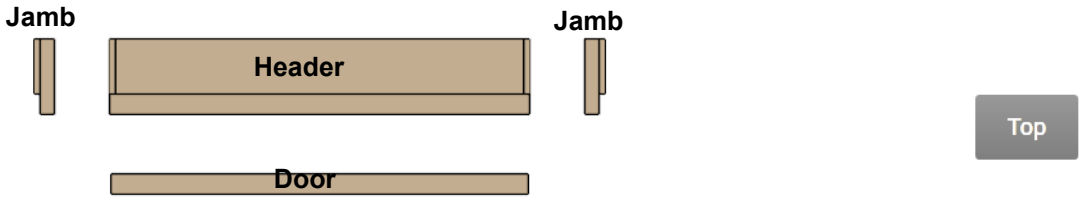


FIGURE 1- 31. Top View

Bottom View

After selecting the Bottom button, Figure 1- 32 shows the view of a door assembly in the Shaded view and On Machine mode.

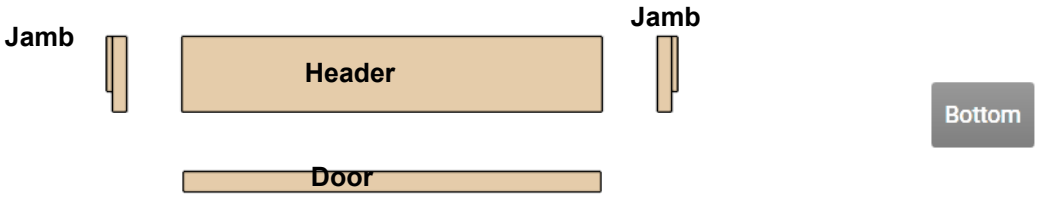


FIGURE 1- 32. Bottom View

Push and Pull View: Right Hand Door

Figure 1- 33 shows a right hand door in the push and pull mode.

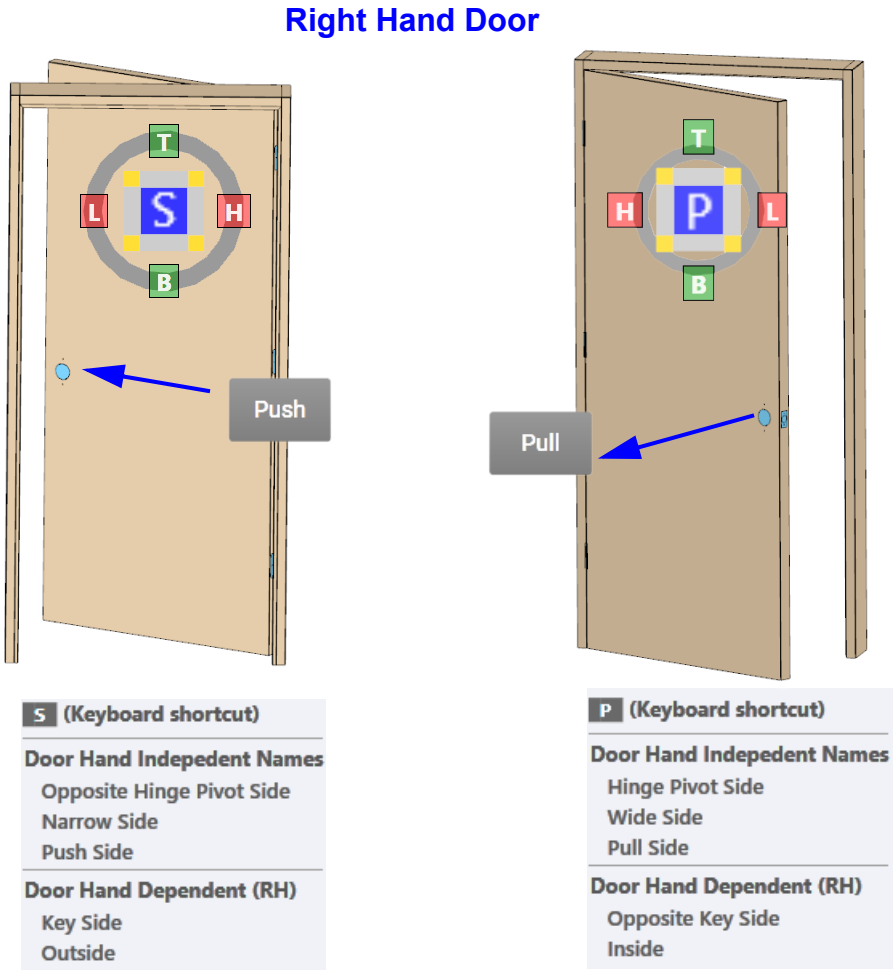


FIGURE 1- 33. Right Hand Door View

Push and Pull View: Left Hand Door

Figure 1- 34 shows a left hand door in the push and pull mode.

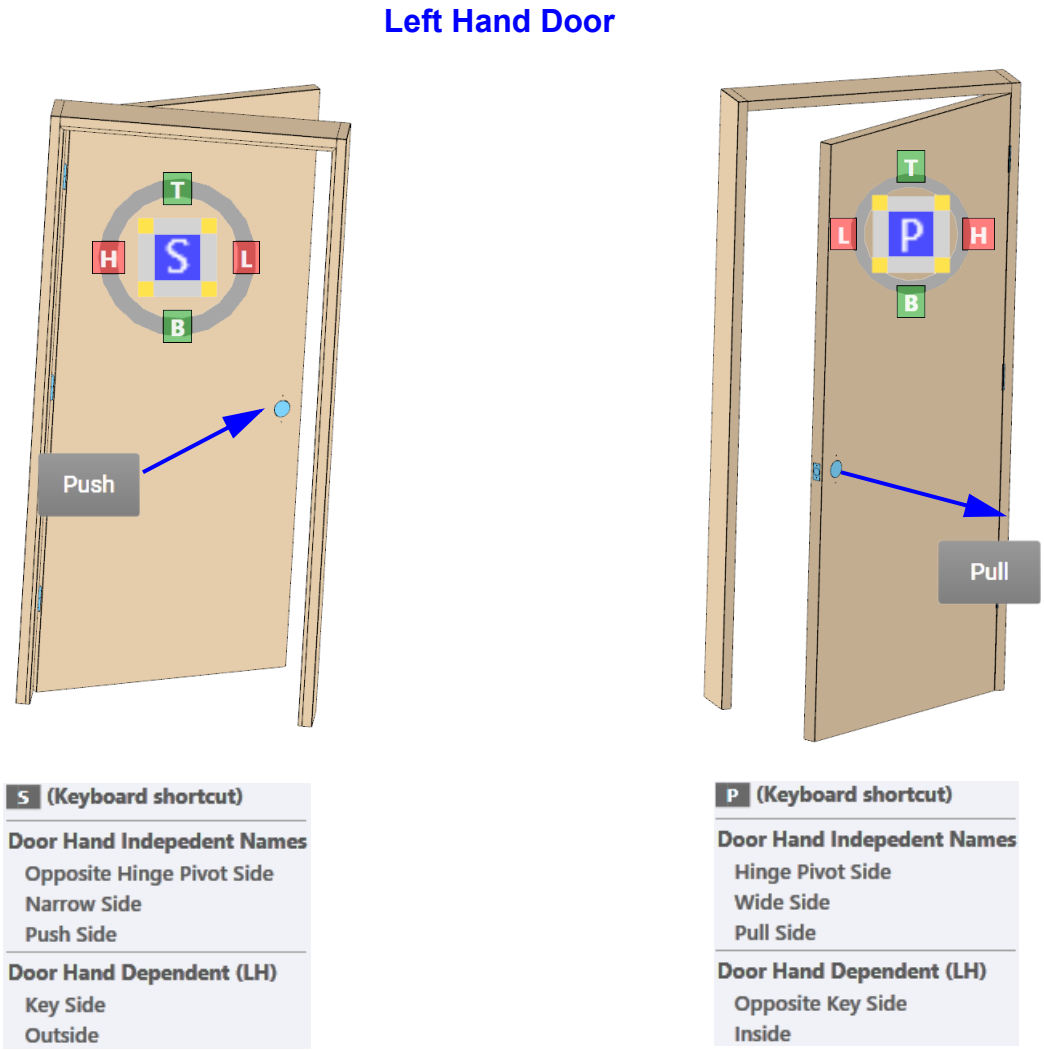
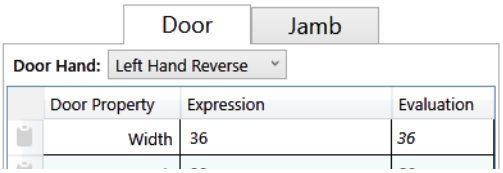


FIGURE 1- 34. Left Hand Door View

Push and Pull View: Left Hand Reverse Door

Figure 1- 35 shows a left hand reverse door in the push and pull mode.



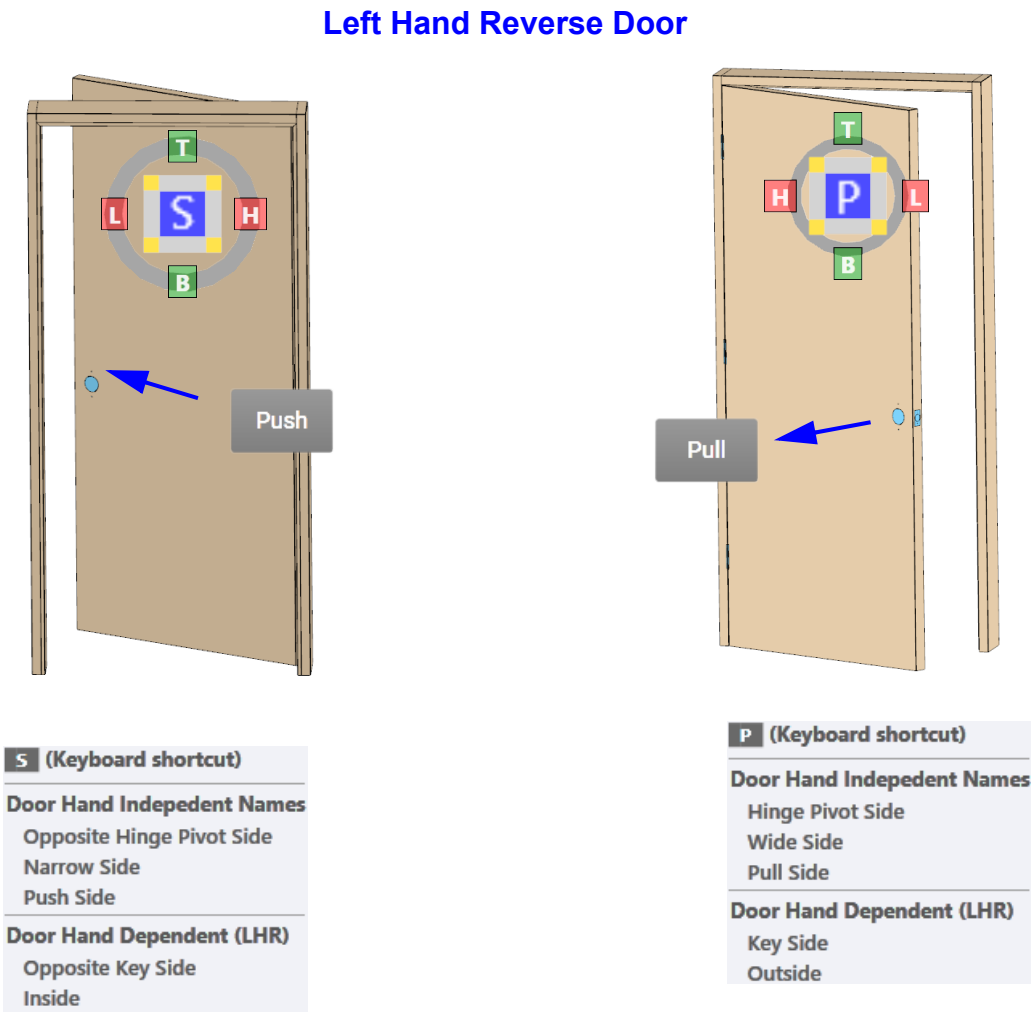
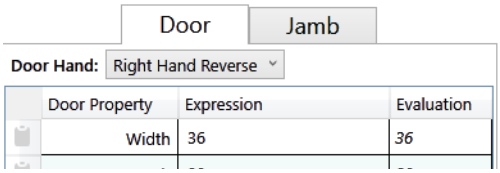


FIGURE 1- 35. Left Hand Reverse View

Push and Pull View: Right Hand Reverse Door

Figure 1- 36 shows a right hand reverse door in the push and pull mode.



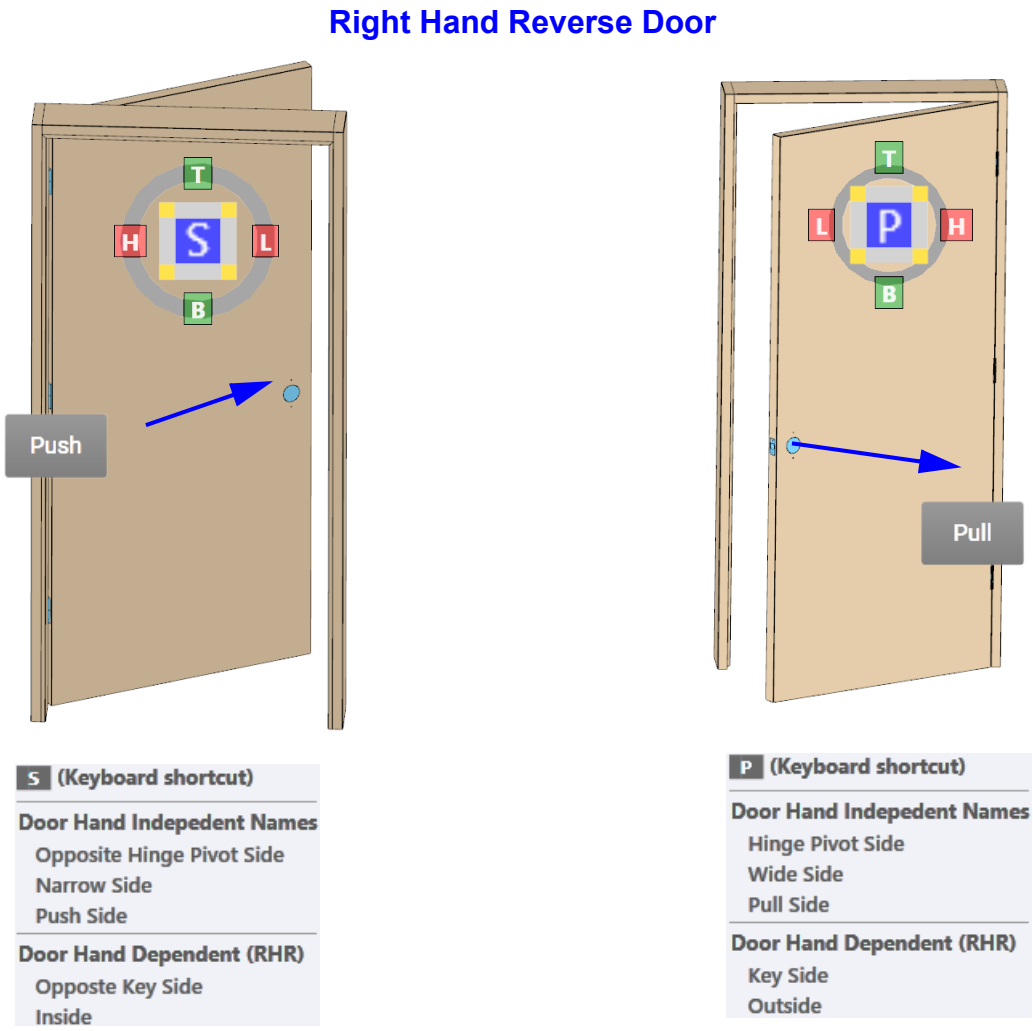


FIGURE 1- 36. Right Hand Reverse View

Mouse Operation

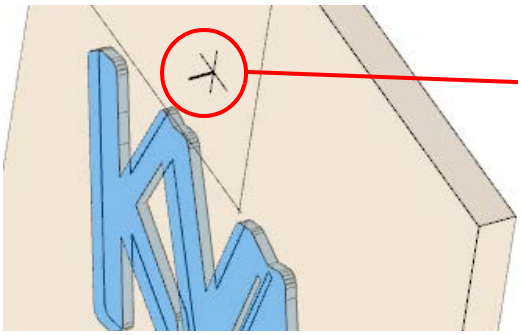
This section describes mouse operation.

Left-click and release: selects geometry and highlights it in the graphics area as well as highlights it in the feature tree.

Middle-click and drag: pans the model. Dragging in any direction will "pull" the model in that direction.

Mouse scroll-wheel roll: zooms in or out on the model. An upward scroll zooms in on the model and the center of zoom is on the cursor. A downward scroll zooms out on the model and the center of the zoom is on the cursor.

Right-click and drag: rotates the model. When right clicking in the target geometry or very close to the target, the closest point will become the center of rotation for the rotation. The center point will be identified by an axis marker.



If right clicking in the "whitespace" of the screen (not on the model), the system default will put the center of rotation at the center of the model.

Note: When 2D Lock mode is active, this gesture performs the same action and the middle-click and drag button.

Hold CTRL while left click and drag: creates a Zoom-to-Rectangle action, which lets the user zoom to a particular region very quickly.

Keyboard Shortcuts

This section describes shortcuts to use to navigate the 3d display.

- Hover over the shortcuts link to open a Pop-Up. Move off shortcuts ink to close the Pop-Up.
- Select the Shortcut link to open a Pop-Up window. Select the shortcut link again to close the Pop-Up

FIGURE 1- 37. Keyboard Short Cut Link

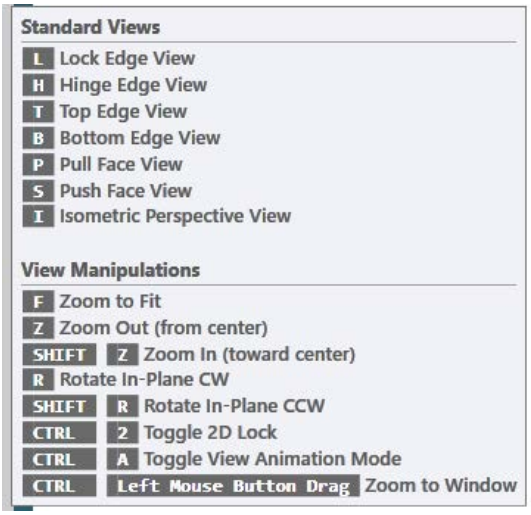


FIGURE 1- 38. Shortcut Pop-Up

Comparing the FaceProfile and LiteCutout Feature Types

The **FaceProfile Feature Type** and the **LiteCutout Feature Type** are similar in that **DXF** (Drawing Exchange Format) files can be uploaded, adjusted. and pulled into **KvalCAM** for processing.

KvalCAM Level

The figure and table below list the properties **FaceProfile** and **LiteCutout** details at K**valCAM** level.

Note: The **LiteCutout** Feature is used to create Door Lite Cutouts.The **FaceProfile** Feature adds depth control to allow the ability to engrave the shape on the face of the door.

FaceProfile Feature Details
Width, Length Location and Depth

LiteCutout Feature Details
Width and Length Location

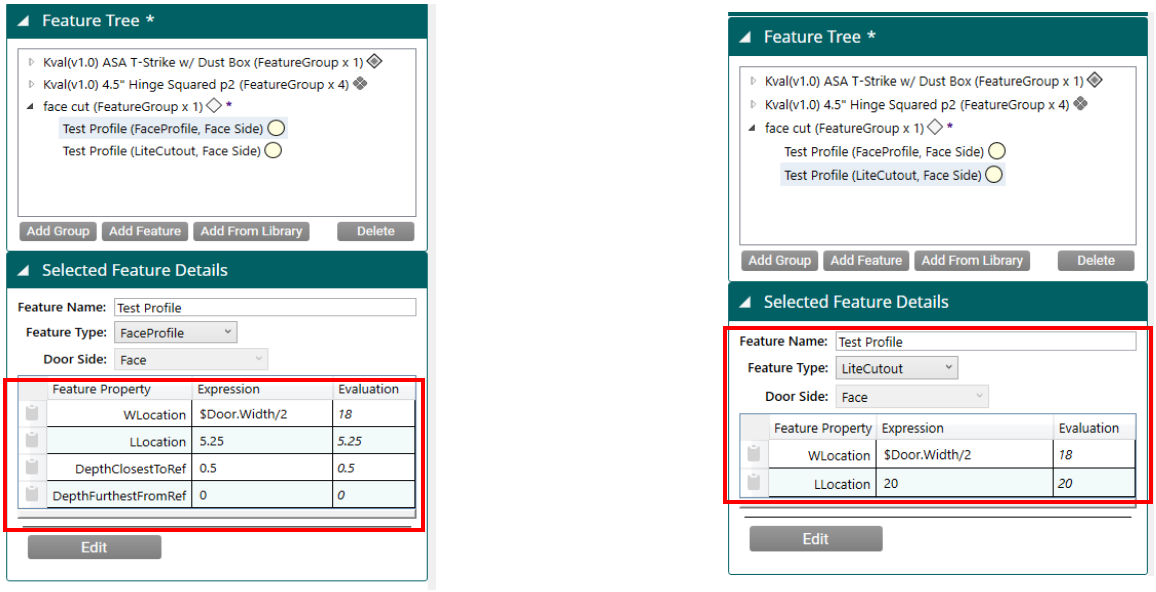


FIGURE 1- 39. KvalCAM FaceProfile Feature and LiteCutout Feature

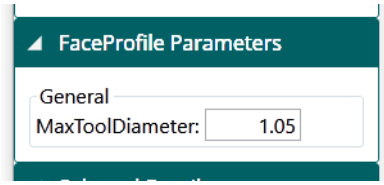
Property (KvalCam)	FaceProfile	LiteCutout
Length Location	Yes	Yes
Width Location	Yes	Yes
Depth	Yes	No

Editing Screen Comparison

The figure and table below list the **FaceProfile** and **LiteCutout** parameters at the editing screen level.

Note: The **FaceProfile** and the **LiteCutout** screen are similar except the **LiteCutout** screen includes control over through-cuts. **FaceProfile** is designed for engraving the face of the door, therefore through-cut controls are not needed.

FaceProfile Parameters



LiteCutout Parameters

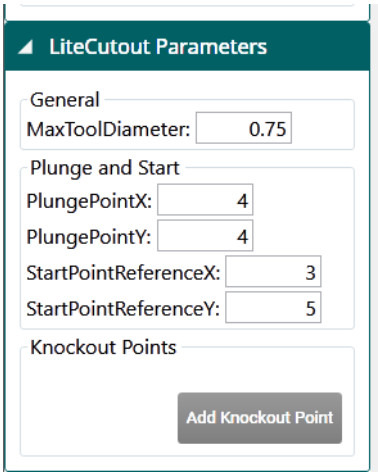


FIGURE 1- 40. Editing Screen FaceProfile and LiteCutout

Editing Screen	FaceProfile	LiteCutout
Error Checking	Yes	Yes
View and Adjust the Display Settings	Yes	Yes
Maximum Tool Diameter Adjustment	Yes	Yes
Plunge Point Adjustment	No	Yes
Start Point of Cut Adjustment	No	Yes
Add Knockout Points	No	Yes
View Plunge Point Parameters	Yes	Yes
Offset Profile	Yes	Yes
Weed out Vertex Points	Yes	Yes

About the Machine Line Screen

The **Machine Line Screen** displays a snapshot of the operation of the entire machine line. Select the **Machine Line Tab** on the left side of the screen to jump to this screen.

	Menu	Description
A	Machine Activity	For each machine, a table shows job name, quantity of remaining doors, doors being processed, and status of the machine.
B	Queued Jobs:	Shows a list of the upcoming jobs.
C	Line Controls:	Common operations to control the machine line

Machine Line Screen

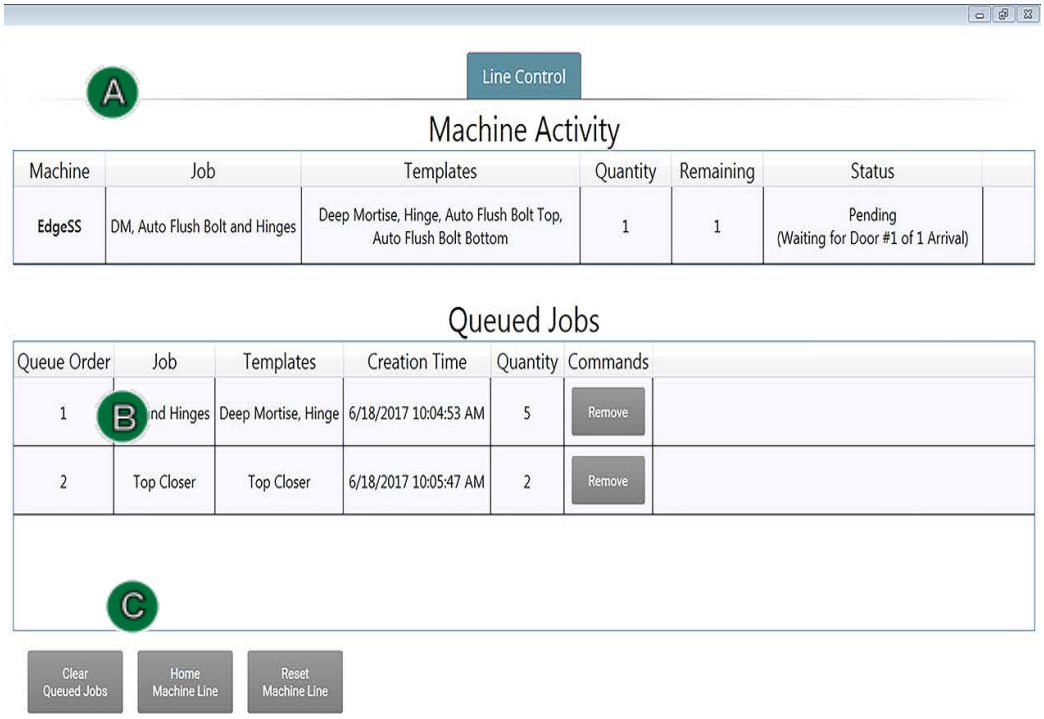


FIGURE 1- 41. Machine Line Screen View

About the Machine Activity Section

The **Machine Activity Section** shows the processing information of each machine. The rows are color coded.

- **Green:** Actively working on processing the door.
- **White:** Machine is idle.
- **Orange**: Machine is paused.

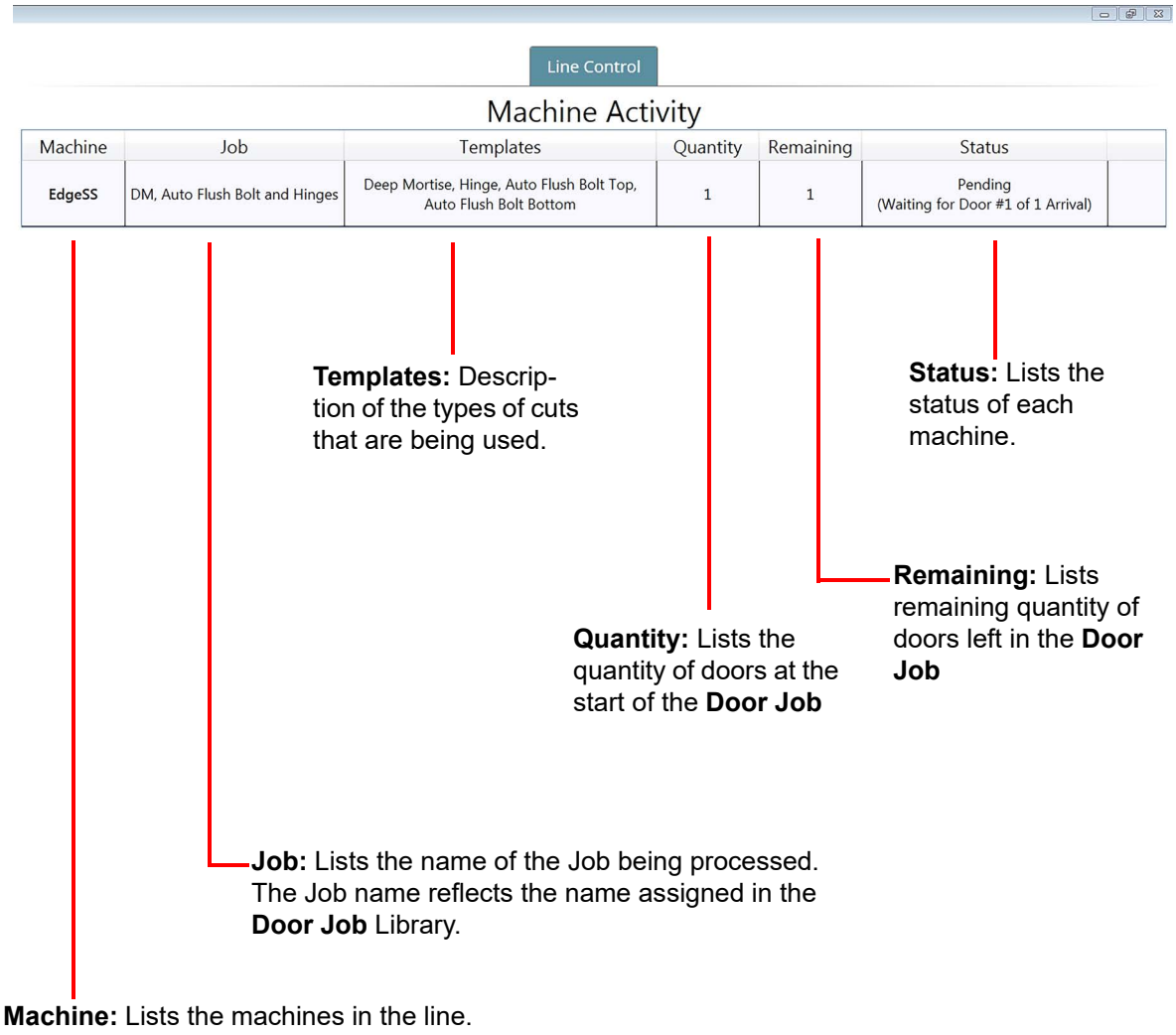


FIGURE 1- 42. Machine Activity Definitions

About the Queued Jobs Section

The **Queued Jobs Section** shows the door processing order. This table can be sorted by selecting the desired title.

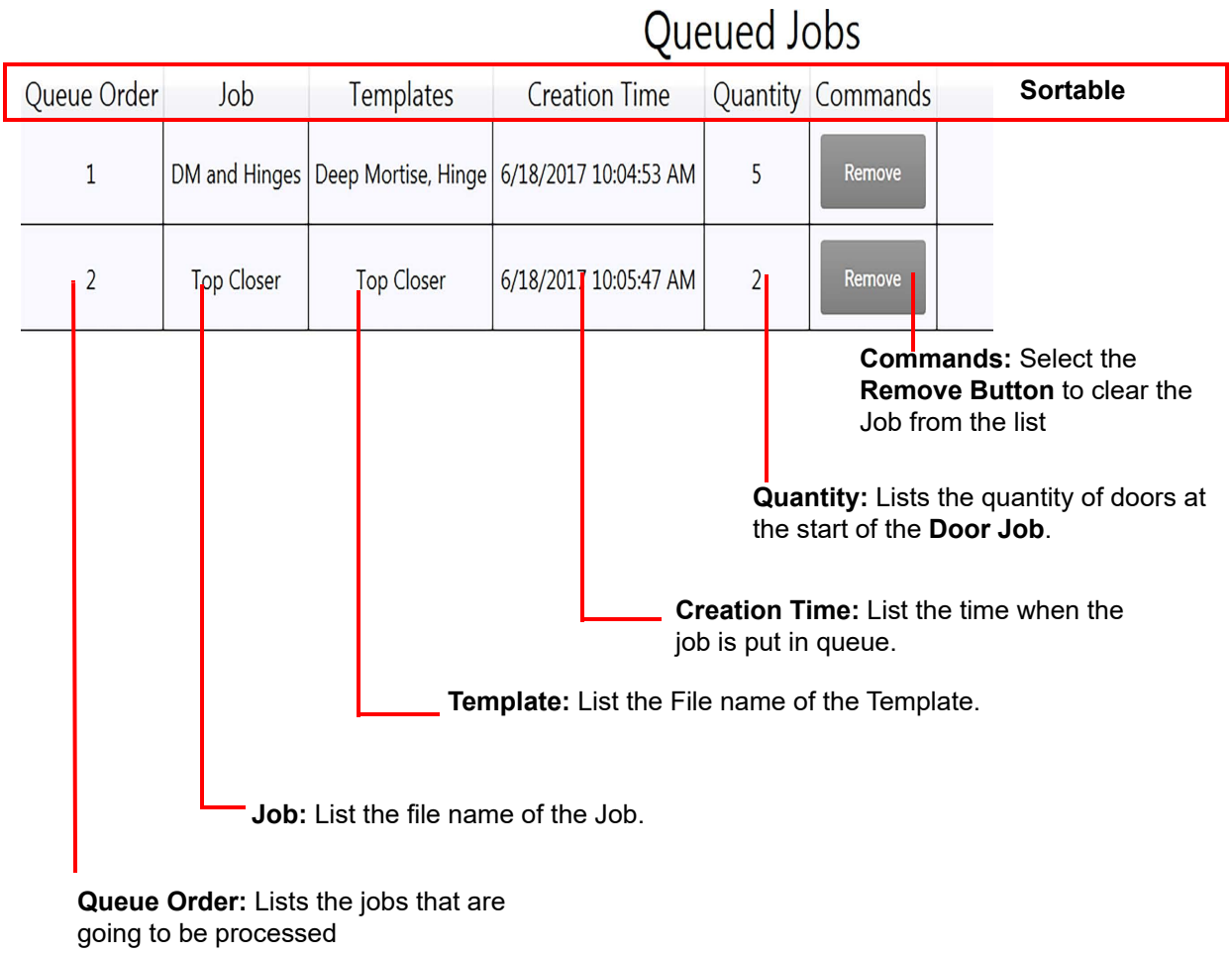


FIGURE 1- 43. About Queued Jobs

About the Line Control Buttons

The **Machine Activity Section** contains a table that shows the processing information of each machine. of each machine. The rows are color coded.

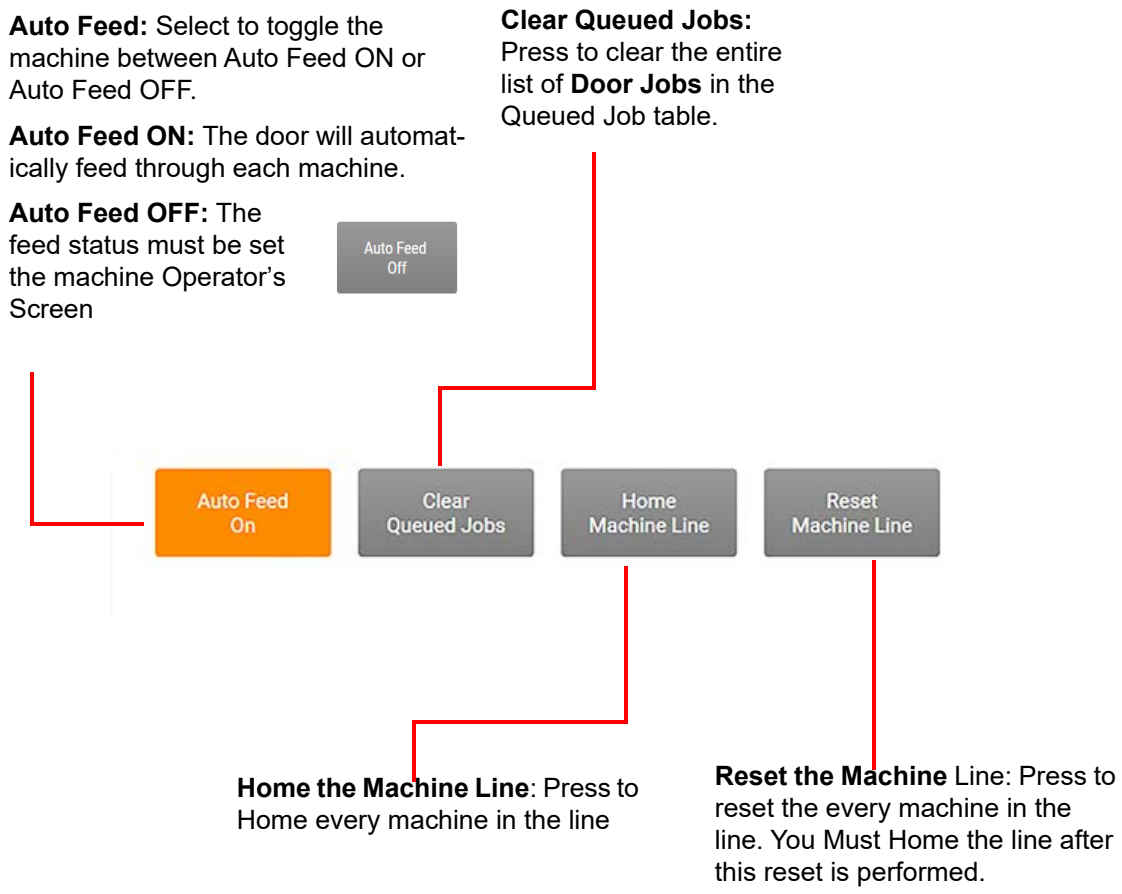
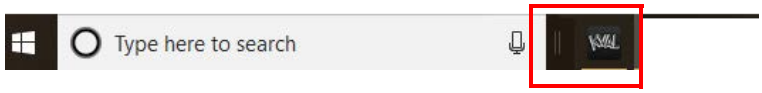


FIGURE 1- 44. Line Control Buttons

About Backing up Data and Checking the Revision Status

Right Click the Kval Icon at the Taskbar of the screen to display this Pop-Up.



Note: If icon is not in the Taskbar, select icon from the windows screen and drag to the favorites bar.

Exit: Select to close the running KvalCAM program.

Backup: Select to save to store all data from the machine operation. Notes may be added to describe the saved file.

Build Info: Select to view upper level notes about the current build.

Release Notes: Select to open a PDF of the history of release notes on this version of software.

Licenses: Select to see all third party licenses.

Kval Docs Website: Select to go to a see KvalCAM documentation. (Must have Internet connections)

KvalCAM: Select to open a closed **KvalCAM** window.

Close window: Select to close an open **KvalCAM** window. **KvalCAM** is still active.

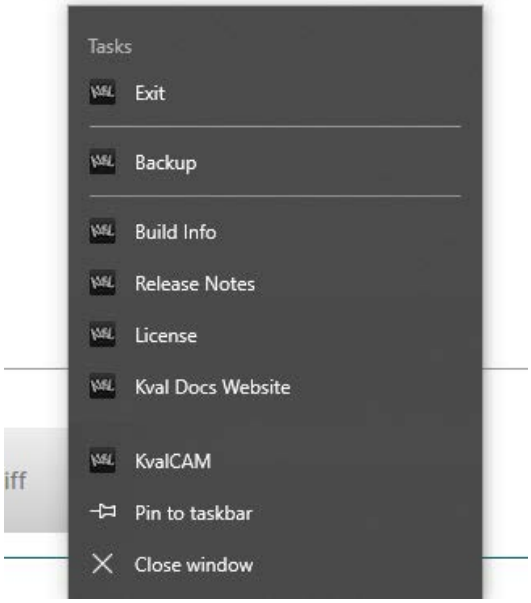


FIGURE 1- 45. Taskbar Pop Up

CHAPTER 2 KvalCAM Examples

This chapter provides examples of common **Feature Groups** in the **KvalCAM** software.

Chapter 2 at a Glance

Door Data Process Steps

The **Door Data** module contains all the properties of the raw door. Door properties can be inputted manually or transfered in by way of the **Door Data Library** to the **Door Job**. Expressions can be copied and pasted into the **Features** and **Feature Groups**.

For more in-depth descriptions, see the "KvalCAM Common Terms"section in this manual.

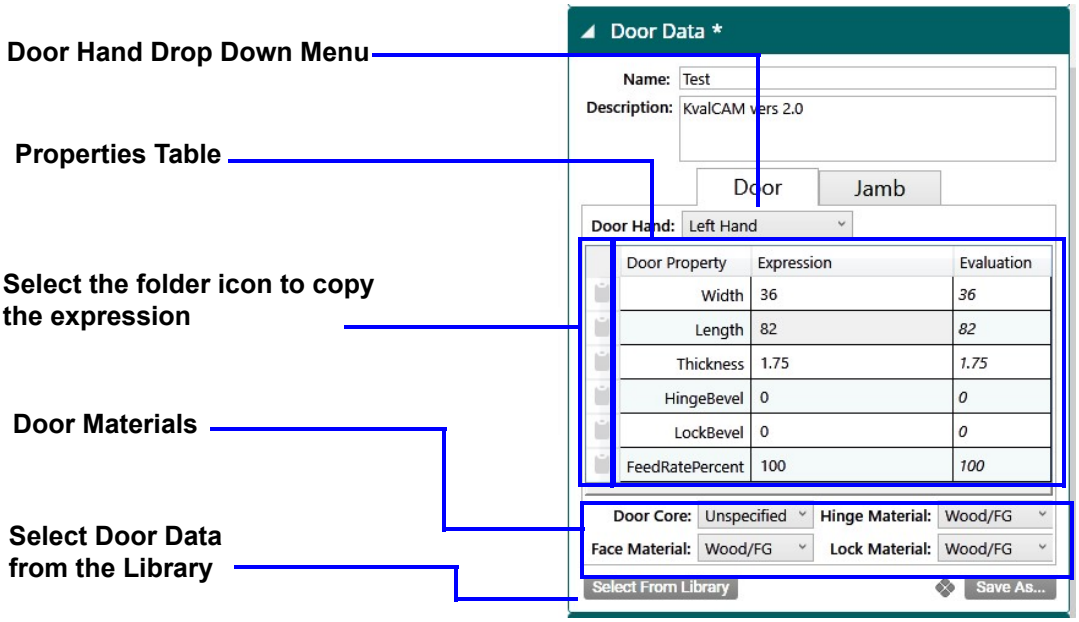


FIGURE 2- 1. Door Data Module

About the Door Data Process Steps

Have KvalCAM open.

1. Select the **Libraries Tab** at the **KvalCAM** screen.
2. Select the **Door Job Tab**.
3. From the **Door Job Table**, select the desired **Door Job**.
4. Within the **Door Job**, select the **Door Data Tab**.
5. At the **Door Job** section, the following is an example of processes that can be done:

- Load door data from the **Door Data Library**.
- Enter data in to the **Expression** column.
- Choose material make up for the door core, hinge, face and lock.
- Choose the door hand.
- If needed, select the folder icon in the table to copy the expression.

Jamb Data Process Steps

The **Jamb Data** module contains all the properties to process a jamb.The **Jamb Data Tab** is located in the **Door Data** section of the **Door Job**.

For more in-depth descriptions, see the “KvalCAM Common Terms”section in this manual.

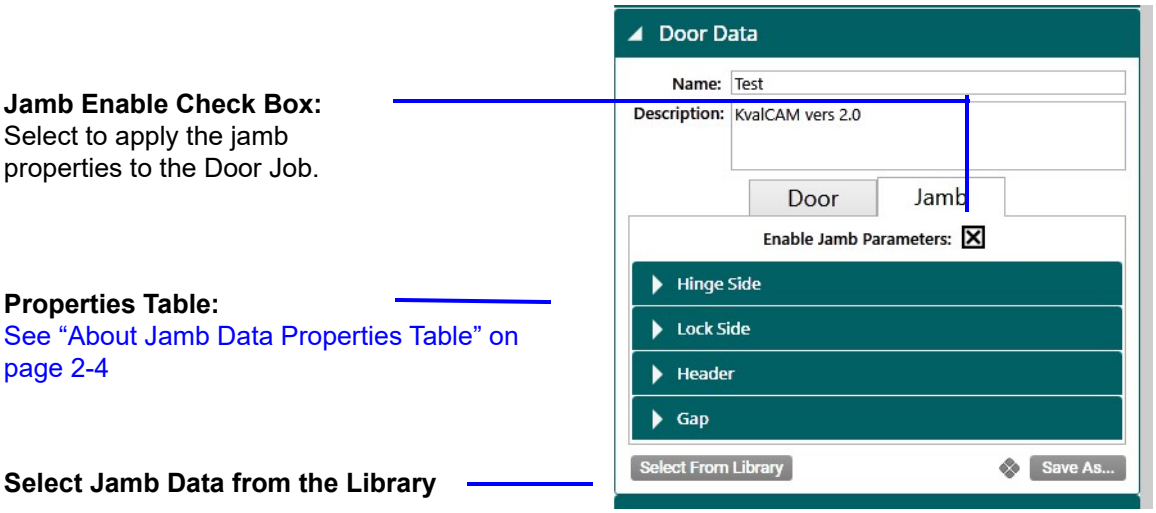


FIGURE 2- 2. **Jamb Data Module**

About the Jamb Data Process Steps

Have **KvalCAM** open.

1. Select the **Libraries Tab** at the **KvalCAM** screen.
2. Select the **Door Job Tab**.
3. From the **Door Job Table**, select the desired **Door Job**.
4. Within the **Door Job**, select the **Door Data Tab**.
5. At the **Door Job** section, select the **Jamb Tab.**
6. To enable the jamb properties to be used in the job, select the **Enable Jamb Parameters** check box.

About Jamb Data Properties Table

Properties of the jambs and headers are calculated in **KvalCAM** to create a precise cut. Jamb Properties include all the parameters to create a door frame. The data is normally created remotely and saved into the database. The properties are shown in the figure below.

Important: The jamb parameters must be as accurate as possible for cut quality to be maximized.

Note: To activate jamb data, the **Enable Jamb Properties** check box must be selected.

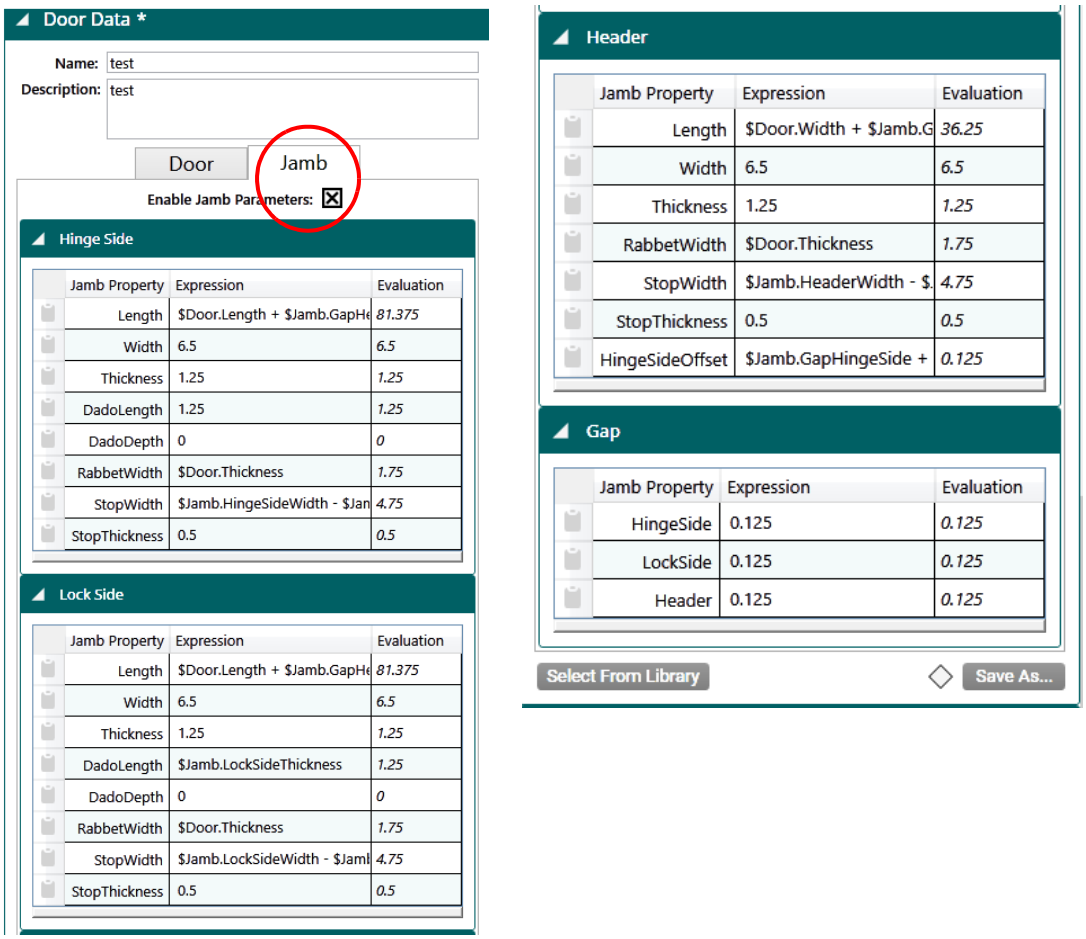


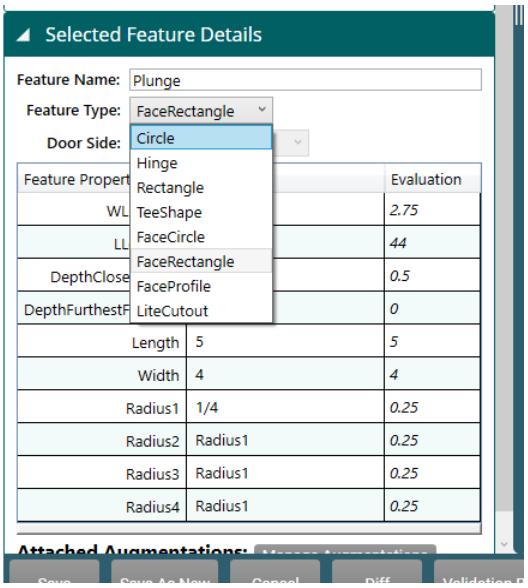
FIGURE 2- 3. Jamb Properties

About Feature Types

In this manual, examples of the **Feature Types** are depicted. **Feature Types** are predefined shapes located at the **Selected Feature Detail** section. The **Feature Type** selection will determine the types of **shapes** to apply to the door.

Feature Types are separated into shapes that can be applied to the edge, jamb, or the face of a door. The **Door Side** selections will determine the position of the shape on the door.

Feature Type Menu



Door Side Menu

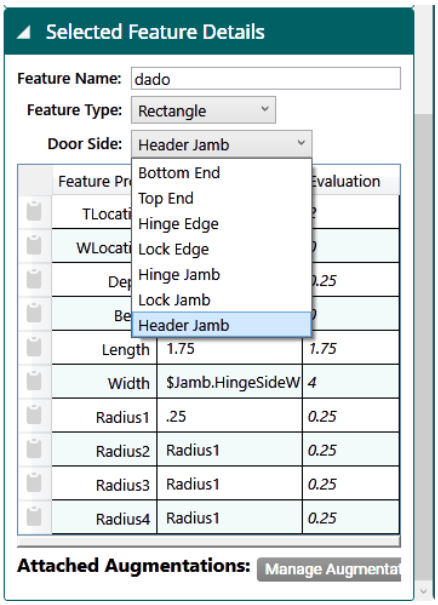


FIGURE 2- 4. Feature Types

About Edge Feature Types

The compatible **Edge Feature Types** and compatible **Door Side** locations are listed in the table.

Edge Feature Types	Door Side Drop Down Menu
Circle	Bottom End
Hinge	Top End
Rectangle	Hinge Edge
TeeShape	Lock Edge
	Hinge Jamb
	Lock Jamb
	Header Jamb

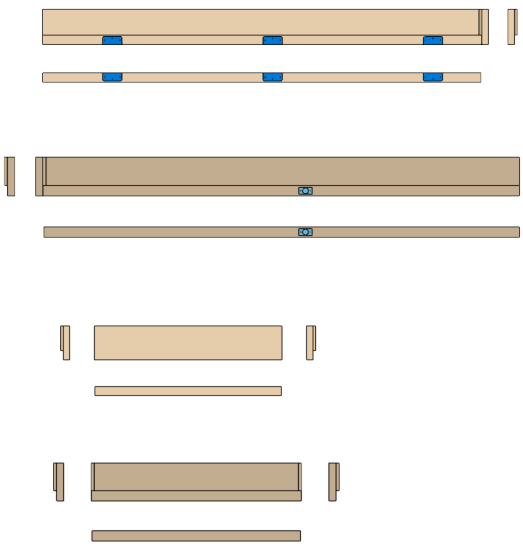
About Edge Feature Types

The **Edge Feature Types** include common edge shapes.

- See page 2-8 for an example using the circle and rectangle.
- See page 2-20 for an example of using the Tee Shape.
- See page 2-24 for an example using the hinge

About the Door Edge Sides

Apply the Feature Types to the door edges and jamb edges locations displayed in the Figure below.



About Face Feature Types

The compatible **Face Feature Types** and compatible **Door Side** locations are listed in the table below.

Face Feature Types	Door Side Drop Down Menu
FaceCircle FaceRectangle FaceProfile LiteCutout	Face (Only Selection)

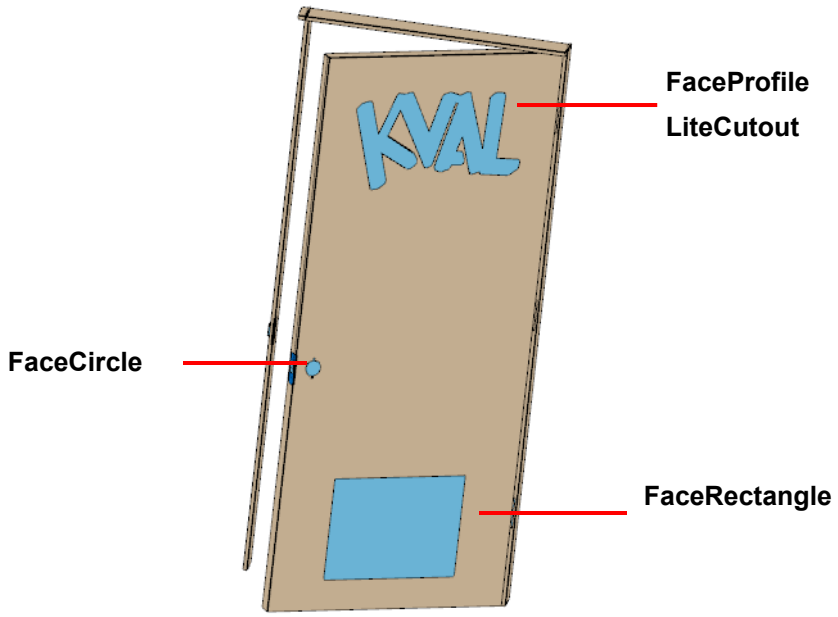
About Face Feature Types

The **Face Feature Types** include common edge shapes.

- See page 2-16 for an example using the FaceCircle.
- See page 2-29 for an example of using the FaceRectangle.
- See page 2-33 for an example of using the FaceProfile.
- See page 2-35 for an example of using the LiteCutout.

Face Features Overview

Apply the Feature Types to the door face locations displayed in the Figure below.



An Example of a Lock Feature Group

This section describes the **Feature Details** of a common **Lock Feature Group**. Feature details of the group are separated into sections. Each section includes feature detail descriptions of the edge lock and the face lock.

About Feature Group Parent and Children

Each shape is detailed in this section.

Below are the parent and child relationships.

Lock (FeatureGroup x1) Parent

- **Plate (Rectangle, Lock Edge) Child and Parent**
  - **Plunge (Circle, Lock Edge) Child of Plate**
  - **Predrill 1(Circle, Lock Edge) Child of Plate**
  - **Predrill 2(Circle, Lock Edge) Child of Plate**
- **Through Hole Face 1 (FaceCircle, Face Side) Child and Parent**
  - **Through Hole Face 2 (FaceCircle, Face Side) Child of Through Hole**
  - **Through Hole Face 3 (FaceCircle, Face Side) Child of Through Hole**

Example of the Lock Feature Group

Figure 2- 5 shows a example of a completed Feature Group and Features on a door.

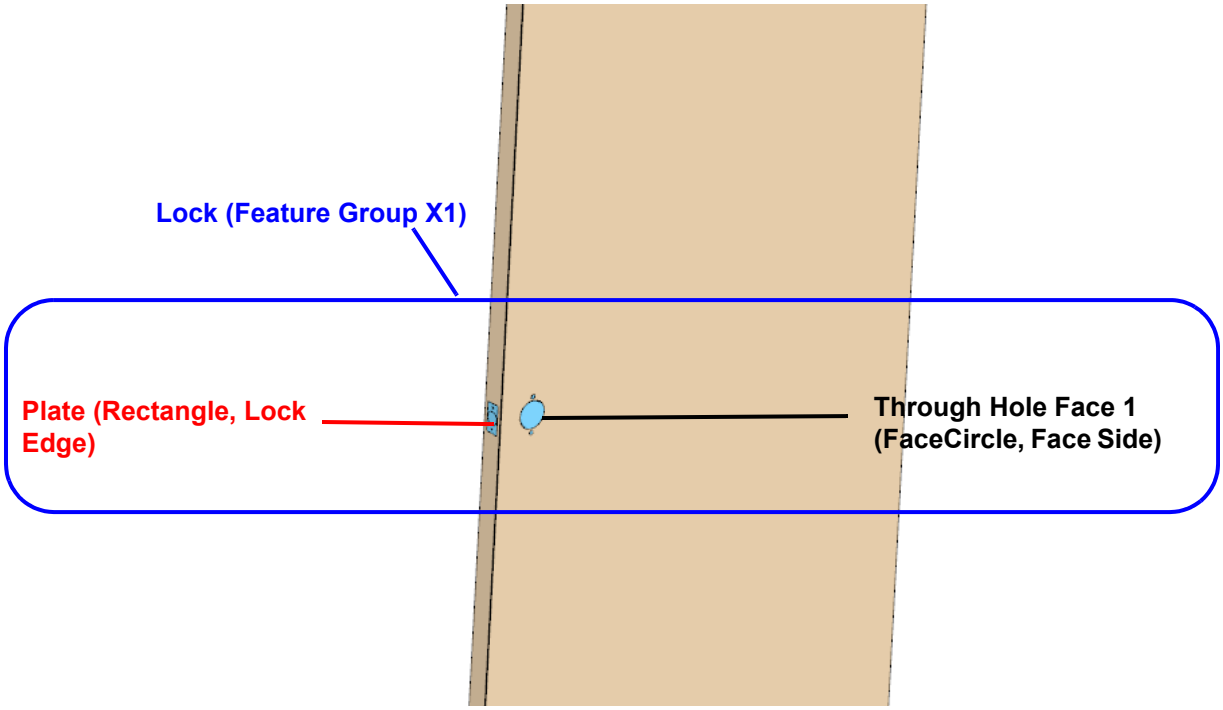


FIGURE 2- 5. Lock Feature Group

About the Lock Feature Group Properties

At the **Feature Group** level door coordinates and locations of the cut are defined. All features in this group will follow the references and locations determined at the group level.

- **Feature Group Name and Description:** Enter a descriptive name and description that represents the **Feature Group.**
- **Coordinate Preferences:** In this example, the L (length) is referenced from the **Top**, W (Width) from the **Lock** side, and the T (Thickness) from the **Key Face** side.
- **Locations:** The **Lock** is located 44.0 inches from the **Top**, and 2.75 inches from the **Lock** edge. The T Locations are set at Feature levels. **Note:** The center of the cut is the reference.

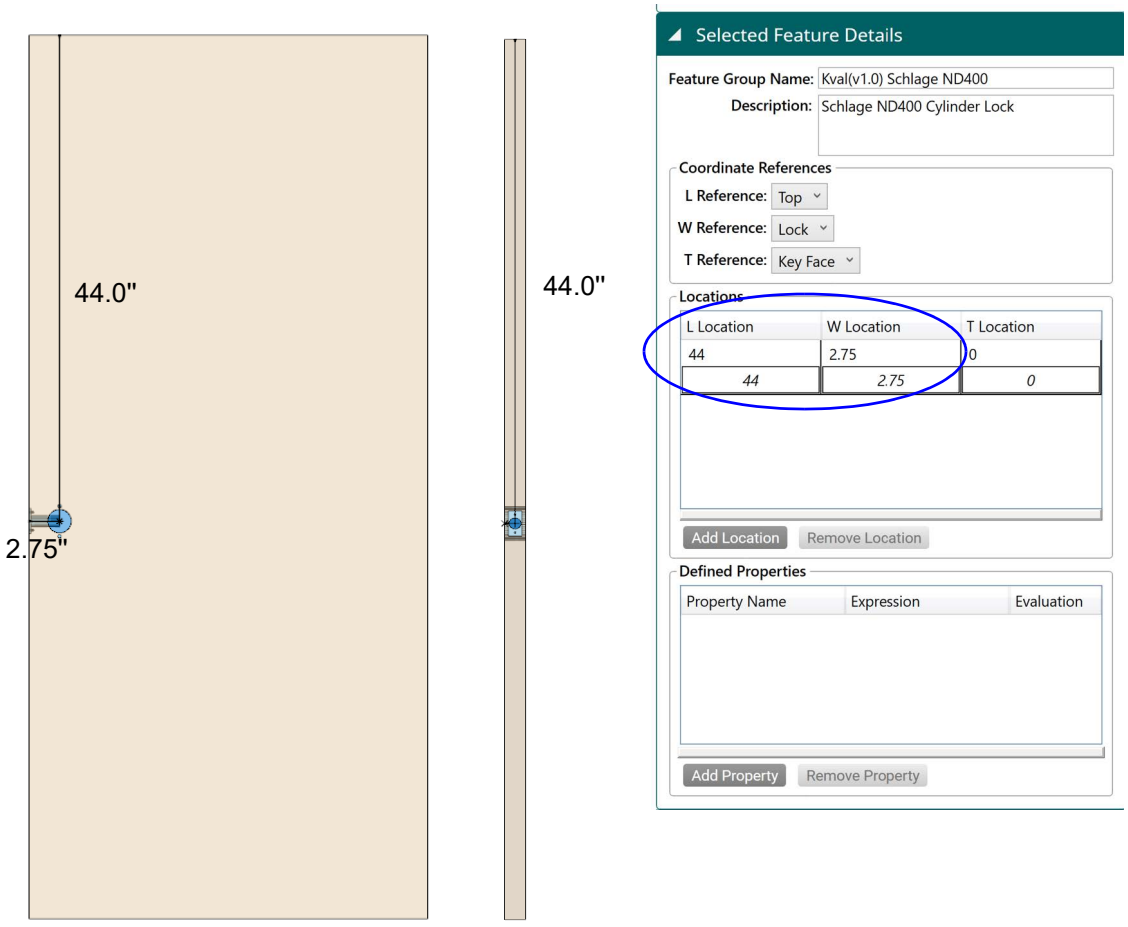


FIGURE 2- 6. Lock Group Properties

About the Lock Edge Rectangle Feature Type

The **Rectangle Feature** represents the **Lock Plate** on the edge of the door. For the location on the door, see Figure 2- 6 on page 2-9.

Lock (FeatureGroup x1) Parent

Plate (Rectangle, Lock Edge) Child

Plunge (Circle, Lock Edge)

Predrill 1(Circle, Lock Edge)

Predrill 2(Circle, Lock Edge)

Through Hole Face (FaceCircle, Face Side)

Through Hole Face 1 (FaceCircle, Face Side)

Through Hole Face 1 (FaceCircle, Face Side)

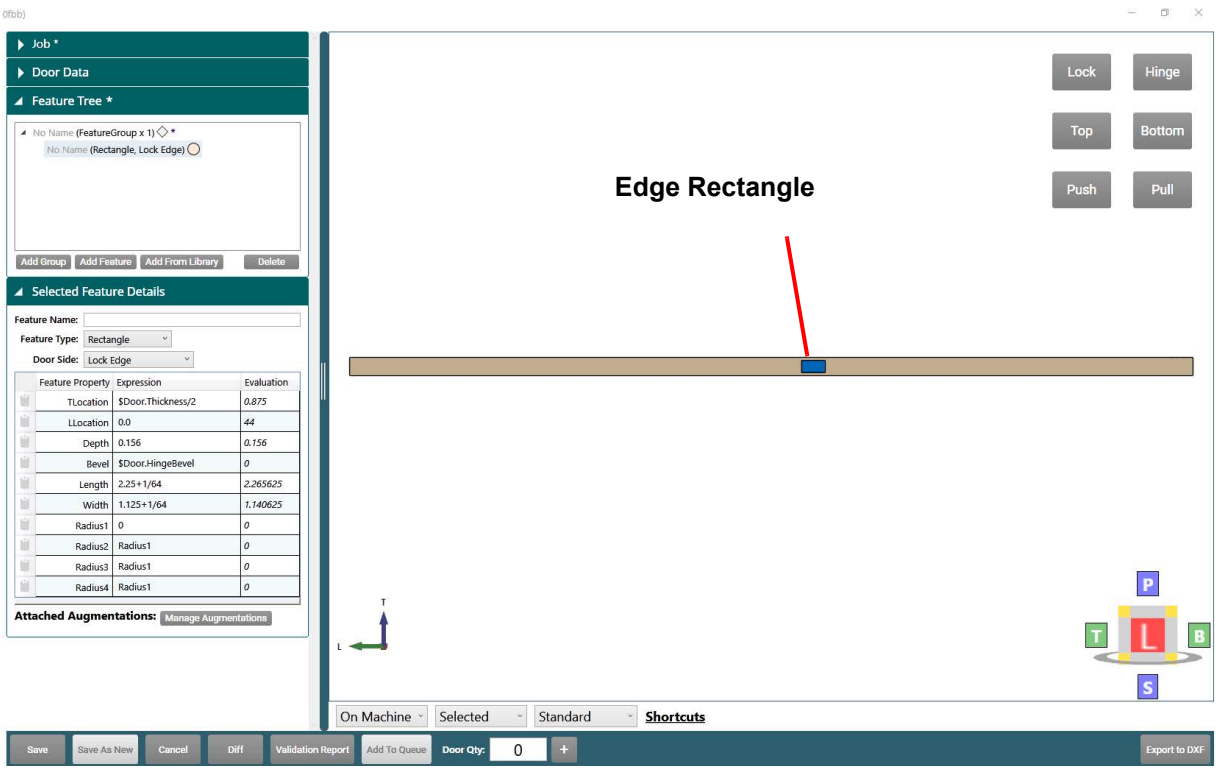


FIGURE 2- 7. Rectangle Feature Type

About the Lock Edge Plate Feature Details Descriptions

Lock edge plate properties are described below.

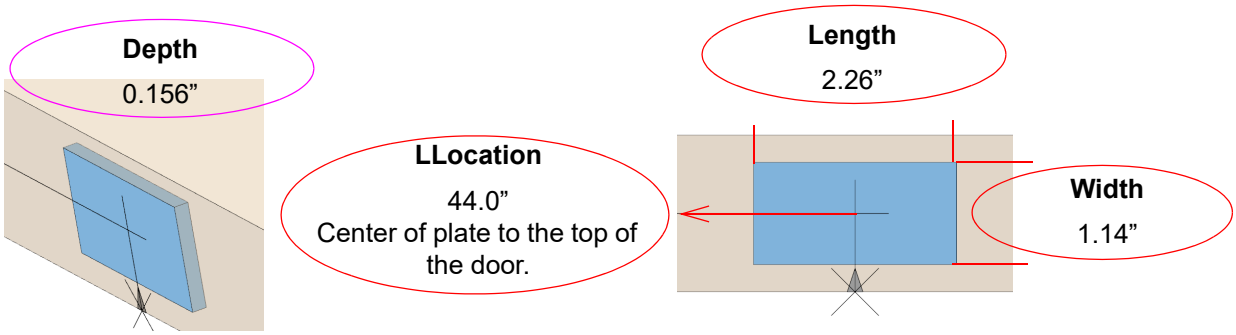
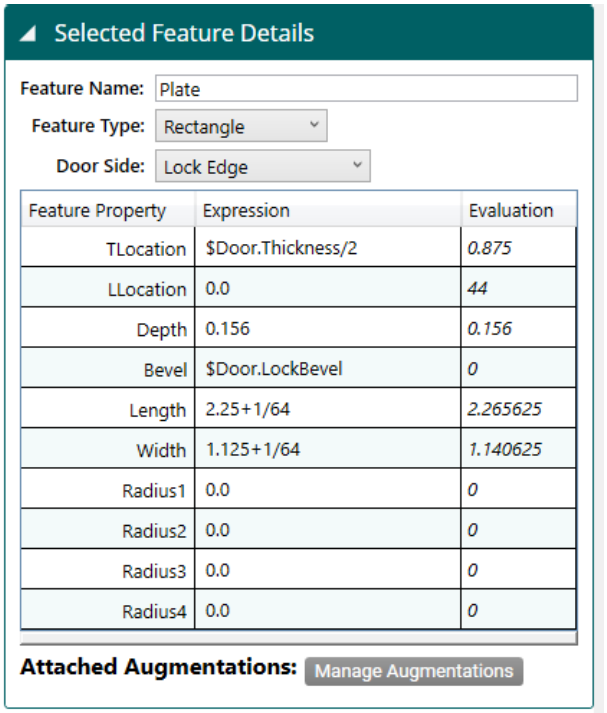


FIGURE 2- 8.

Property	Expression Description
TLocation	Expression loaded from pop-up menu.[1] Thickness set at the Door Data level. Thickness /2 centers the plate on the door edge.
LLocation	Value was set at the Feature Group level (44 " from top of the door).
Depth	Set depth of lock cut.
Bevel	Expression value is set at the Door Data Section.
Length	The length of the lock plate (Length+1/64).
Width	The Width of the lock plate (Length+1/64).
Radius1-4	The radius of each corner of the rectangle shape. [2]



1. To open the expression pop-up menu, left click within the table cell, choose the ellipsis (…), choose the expression from the menu. Modify as required.
2. See “About Radius 1-4 Properties” on page 2-8

FIGURE 2- 9. **Rectangle Properties**

About Radius 1-4 Properties

The radius cuts are located at each corner of the rectangle shape. A null (0) value indicates a squared cut which is available on machines with chisels. The figure below shows the radius corner designators.

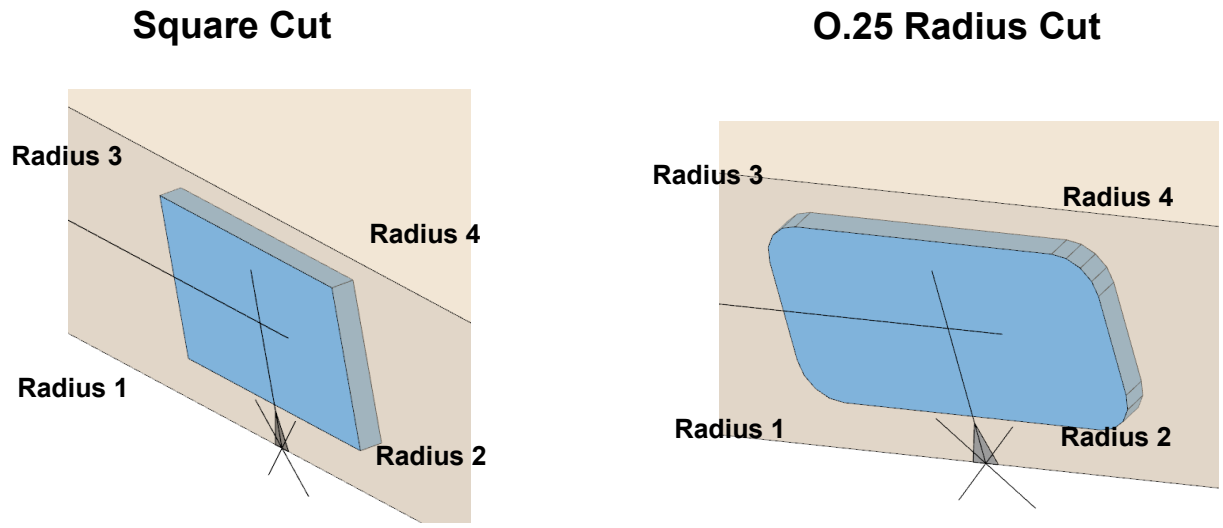


FIGURE 2- 10. Radius Locations

About the Lock Edge Circle Feature Types

The **Circle Features** include an edge plunge and lock predrill holes. The plunge and the predrills are children of the **Lock Plate Feature.** For the location on the door, see Figure 2- 6 on page 2-9.

Lock (FeatureGroup x1) Parent

Plate (Rectangle, Lock Edge)

Plunge (Circle, Lock Edge) Child
Predrill 1(Circle, Lock Edge) Child
Predrill 2(Circle, Lock Edge) Child

Through Hole 1 Face (FaceCircle, Face Side)

Through Hole Face 2 (FaceCircle, Face Side)
Through Hole Face 3 (FaceCircle, Face Side)

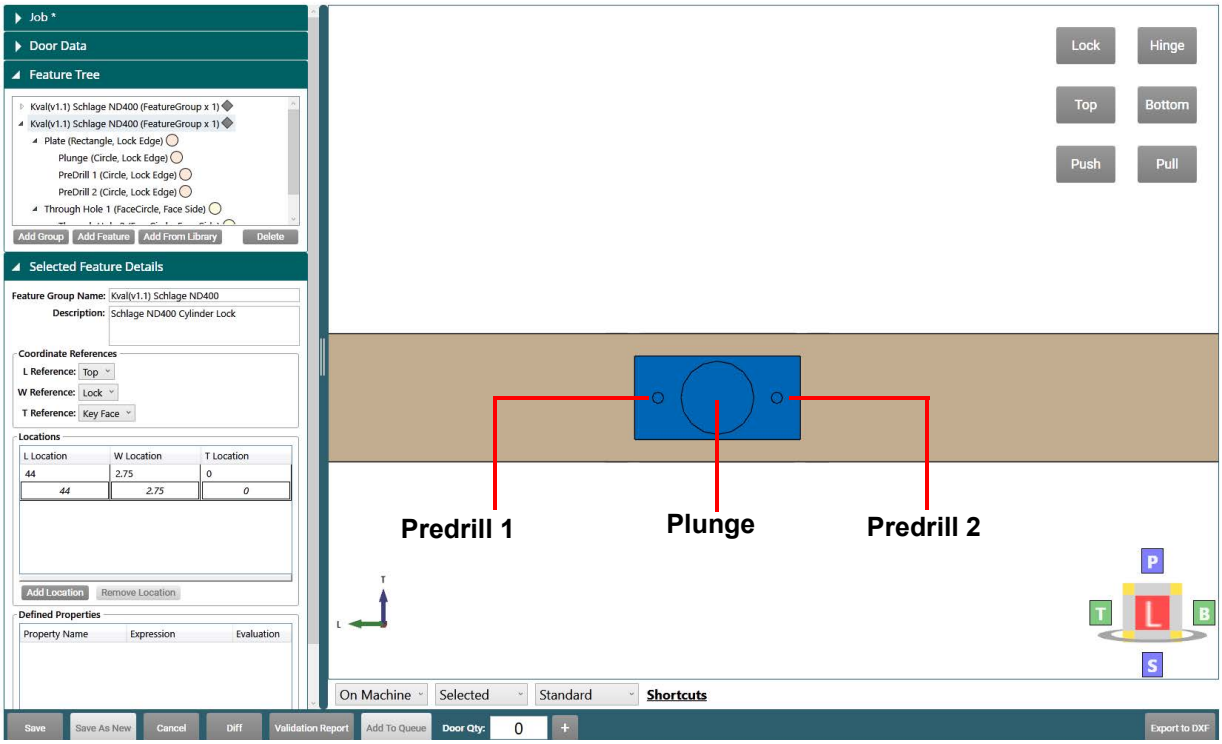
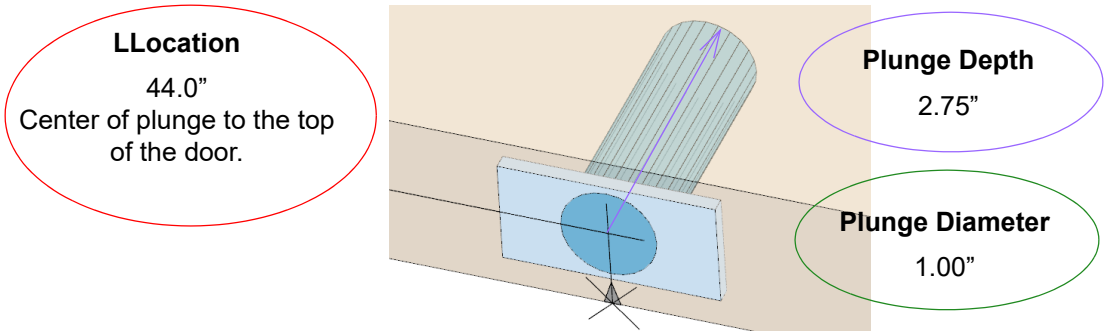


FIGURE 2- 11. Circle Type Feature

About the Lock Edge Plunge Circle Feature Detail Table

The properties of the plunge circle are described below.



Property	Expression Description
TLocation	Enter 0 to use the reference value. Value was set at the Plate level (Parent).
LLocation	Enter 0 to use the reference value.
Depth [1]	WLocation value is set at the Lock Feature Group (Parent of Parent).
Bevel	0 degree Bevel.
Diameter	Enter Value (1.0 ").
DiameterMin.[2]	Auto filled with the set Diameter value.
DiameterMax.	Auto filled with the Diameter value.
DepthMin.[3]	Auto filled with the Depth value.
DepthMax.	Auto filled with the Depth value.

1. Using the WLocation, the depth of the cut will center to the Face Plunge cut.
2. DiameterMaximum and DiameterMinimum are used to allow for a wider range of tools to be selected.
3. DepthMaximum and DepthMinimum are used to allow for a wider range of tools to be selected.

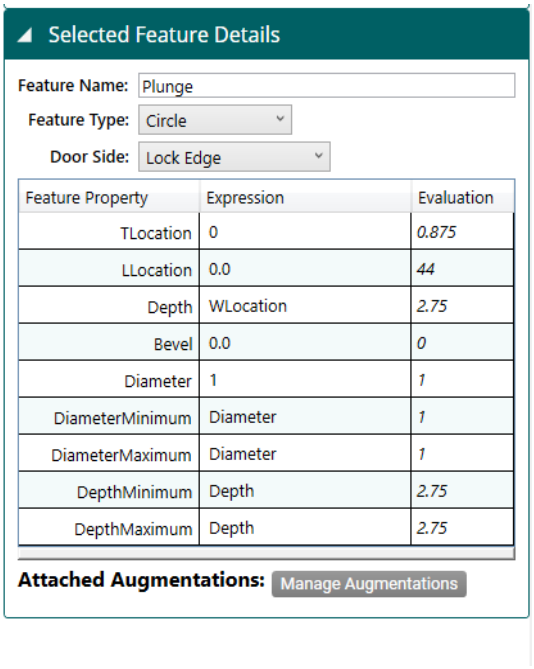
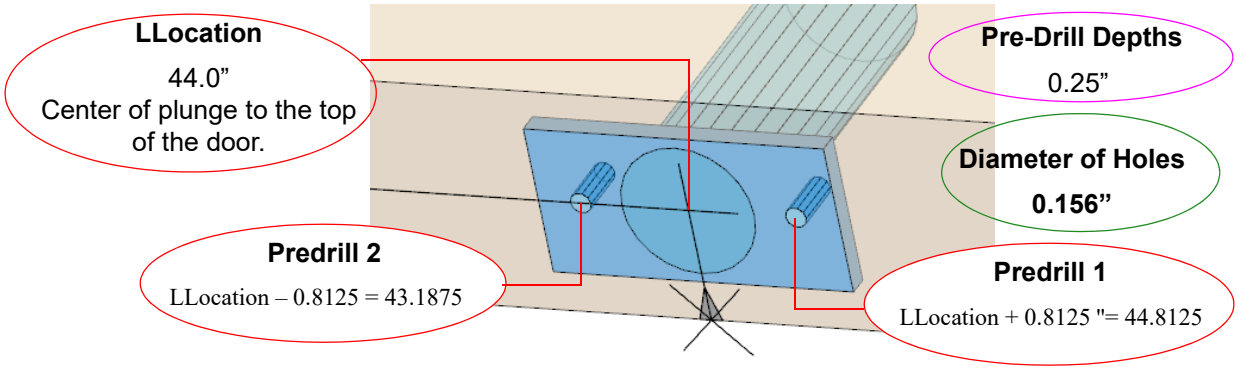
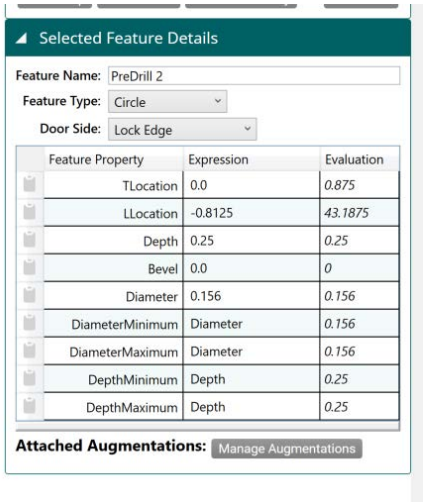


FIGURE 2- 12. Circle Feature Type Details

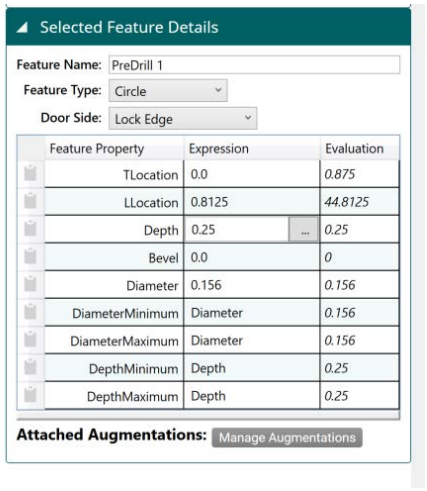
About the Lock Predrill Hole Locations and Dimensions

The predrill holes are children of the Plunge cut. The **LLocation** of the **Predrill 1** and **Predrill 2** holes are referenced from the middle of the **Lock Plate**. For a list of properties, see **Features Details** table in Figure 2- 13 below.





Predrill 2



Predrill 1

Property	Expression
LLocation[1]	-0.8125
Depth	0.25
Diameter	0.156

1. LLocation(44.0’) – 0.8125 = 43.1875

Property	Expression
LLocation[1]	0.8125
Depth	0.25
Diameter [2]	0.156

1. 0.8125 " + LLocation(44.0”) = 44.8125
2. Diameter of the predrill.

FIGURE 2- 13. Predrill Holes

About Lock FaceCircle Feature

The **Circle Features** include an edge plunge and lock predrill holes. The plunge and the predrills are children of the **Lock Plate Feature.** For the location on the door, see Figure 2- 6 on page 2-9.

Lock (FeatureGroup x1) Parent

Plate (Rectangle, Lock Edge)

Plunge (Circle, Lock Edge)

Predrill 1(Circle, Lock Edge)

Predrill 2(Circle, Lock Edge)

Through Hole Face 1 (FaceCircle, Face Side) Child

Through Hole Face 2 (FaceCircle, Face Side) Child

Through Hole Face 3 (FaceCircle, Face Side) Child

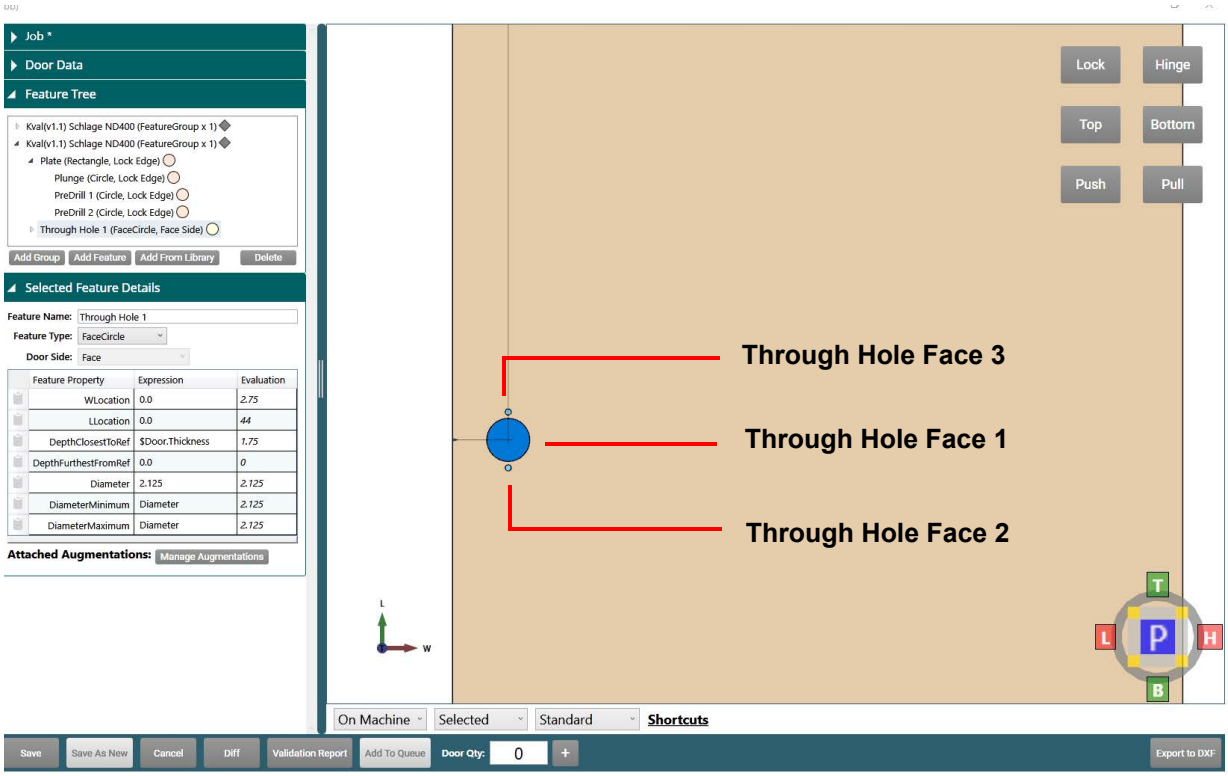
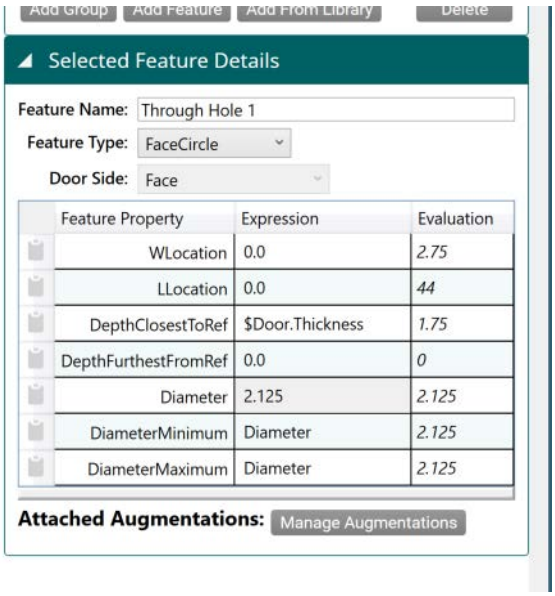


FIGURE 2- 14. Face Circle Feature Type

About the Lock Face Circle Feature Details Description

Table properties are described below.



Property	Expression Description
WLocation	Value was set at the Feature Group level (2.75 " from the lock edge of the door).
LLocation	Value was set at the Feature Group level (44.0 " from top of the door).
DepthClosestToRef [1]	*$Door.Thickness*. (Cut will go through the door.)
DepthFurthestFromRef [2]	0
Diameter	Enter Value (2.125 ")
DiameterMin. [3]	Auto filled with the Diameter value.
DiameterMax.	Auto filled with the Diameter value.

1. The door side (T Reference) that is selected at Feature Group Level.
2. Opposite Door side of the DepthClosestoRef
3. DiameterMaximum and DiameterMinimum are used to allow for a wider range of tools to be selected.

FIGURE 2- 15. Face Circle Feature Details

About the Face Circle Through Hole 1

The figure below shows the diameter of Through Hole 1 of the Face Lock. The depth of the rout is set to thickness of the door by way of the expression (*$Door.Thickness)*. The door thickness value is set at the **Door Data** section at the **Door Job.** This ensures the rout will be cut through the door.

For a list of properties, see **Features Details** table in Figure 2- 15 on page 2-17.

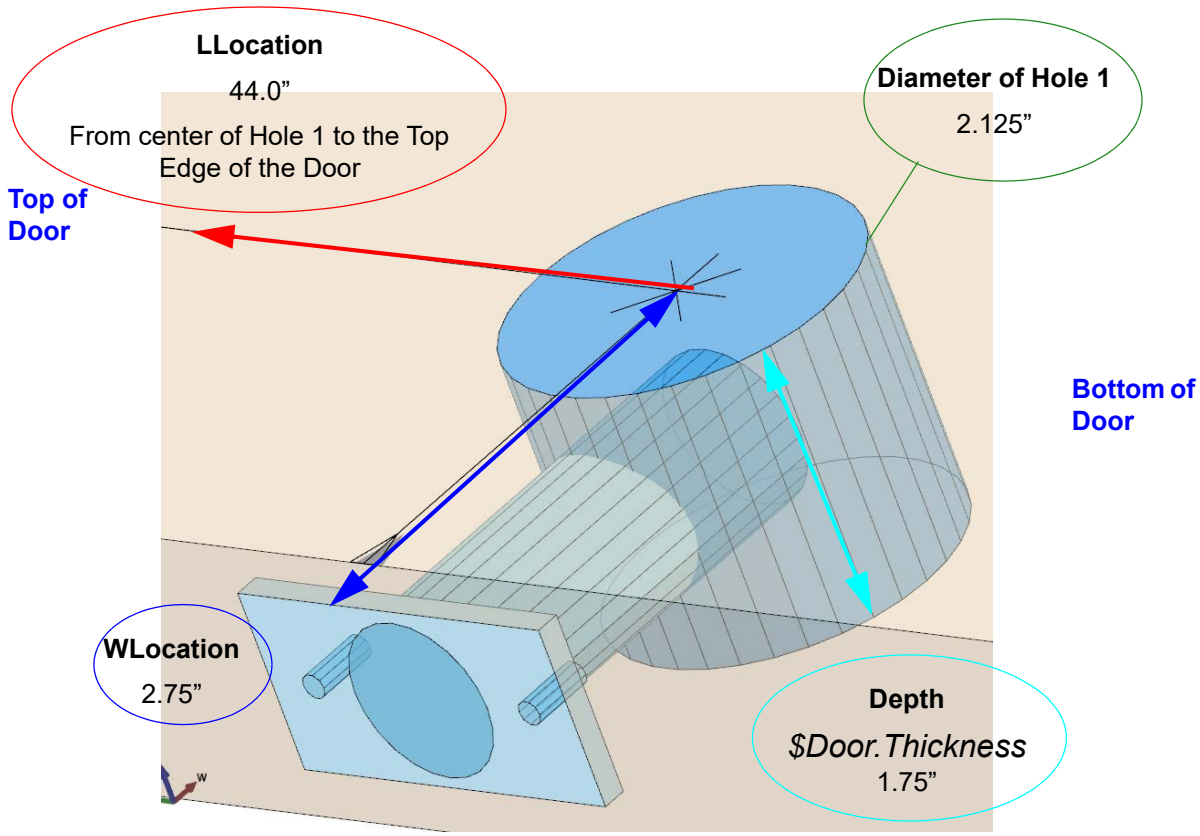
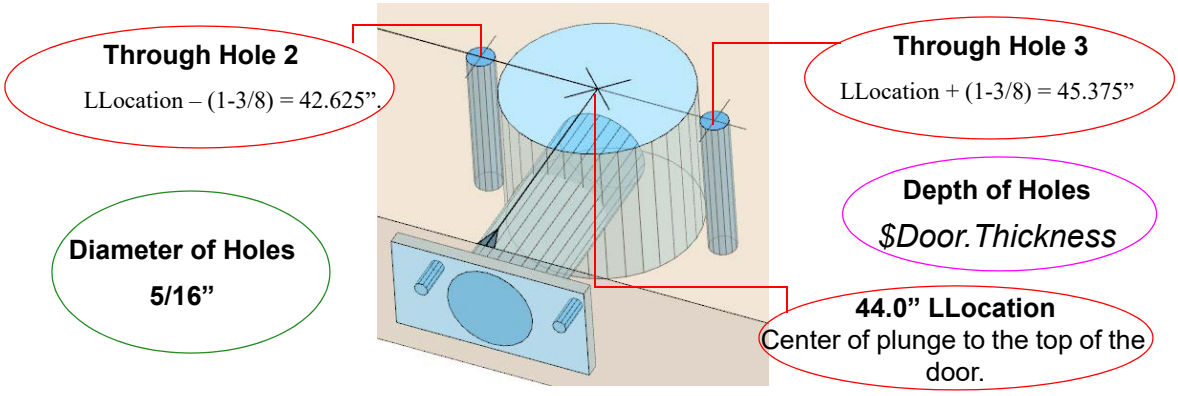


FIGURE 2- 16. Through Hole 1 Diameter

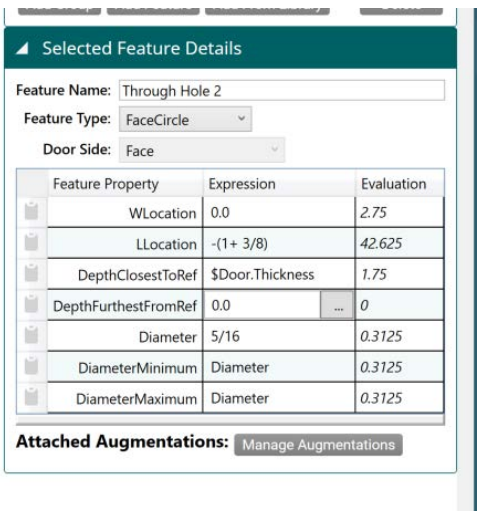
About the Face Circle Through Holes 2 and 3

Through Holes 2 and **3** are children of the **Through Hole 1** cut. The **LLocations** of **Through Hole 2 and Through Hole 3** are referenced off the center of **Through Hole 1.** The figure below shows the diameters, locations, and depths of **Through Holes 2 and 3** of the Face Lock. For a list of properties, see **Features Details** table in Figure 2- 17 on page 2-19.

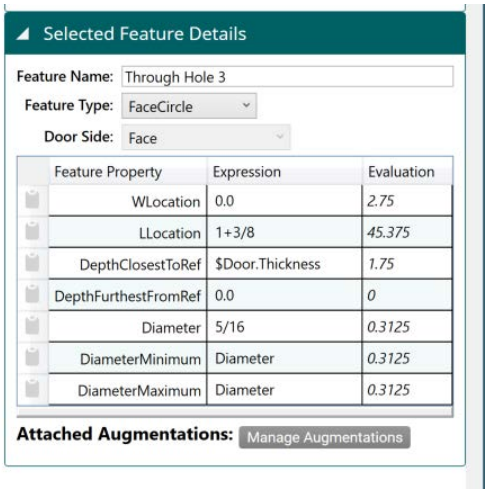
.



.



Through Hole 2



Through Hole 3

Property	Expression
LLocation[1]	-(1+3/8)
DepthClosetToRef [2]	*$Door.Thickness*
Diameter	5/16"

1. 44.0 – (1-3/8) = 42.625. LLocation value set at the Feature Group level.
2. Depth equals the door thickness.

Property	Expression
LLocation[1]	1+3/8
DepthClosetToRef [2]	*$Door.Thickness*
Diameter	5/16"

1. 44.0 + (1-3/8) = 45.375. LLocation value set at the Feature Group level.
2. Depth equals the door thickness.

FIGURE 2- 17. Face (Predrill holes)

An Example of a Tee-Shape Feature

The **Tee-Shape** cut is represented by its own **Feature Group**. The **Tee-Shape** combines two rectangle shapes to form the **Tee** and the **Main** body.The figure below shows a Tee-Shape Lock.

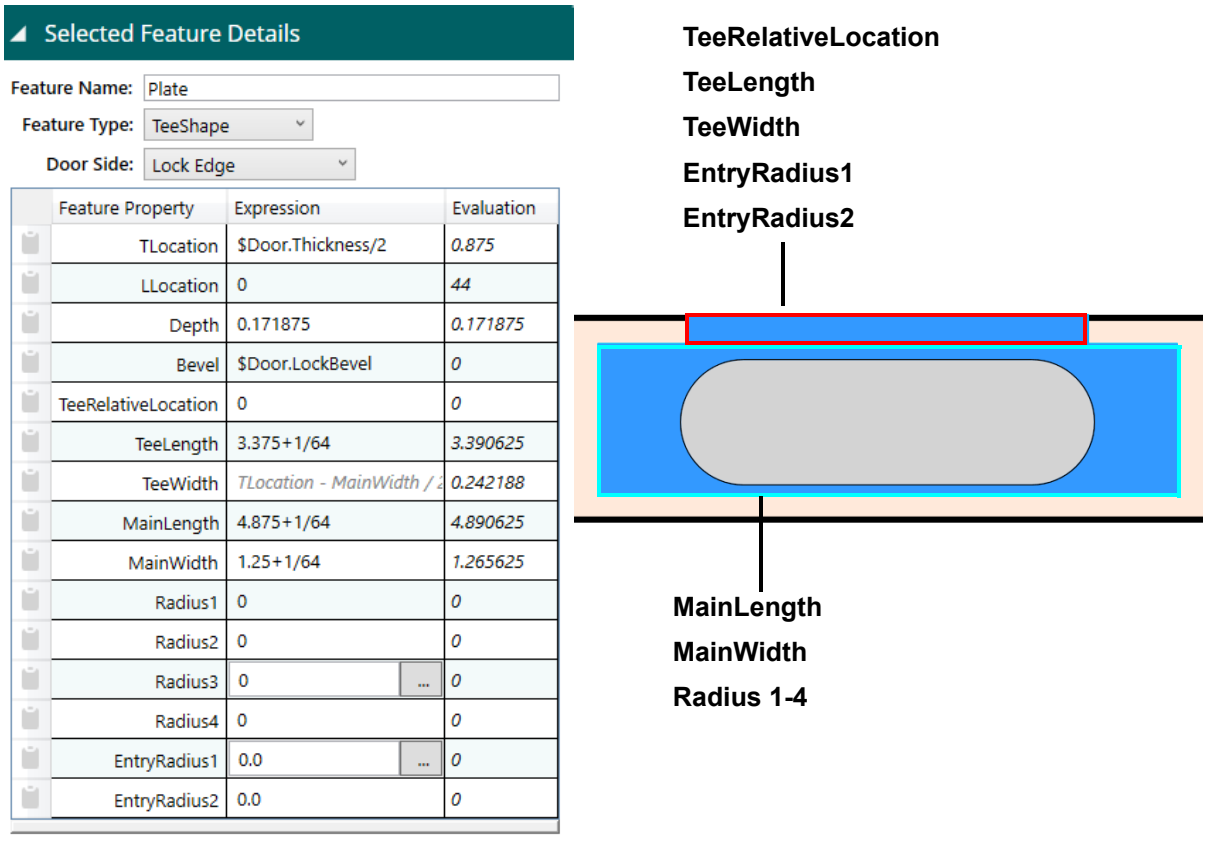


FIGURE 2- 18. Tee shape feature

About the TeeRelativeLocation

The **TeeRelativeLocation** is referenced to the center of the **MainLength** property. A value entered here will move the Tee cut location toward the Top End or Bottom End. This may be used in an Olive Hinge Feature.

.

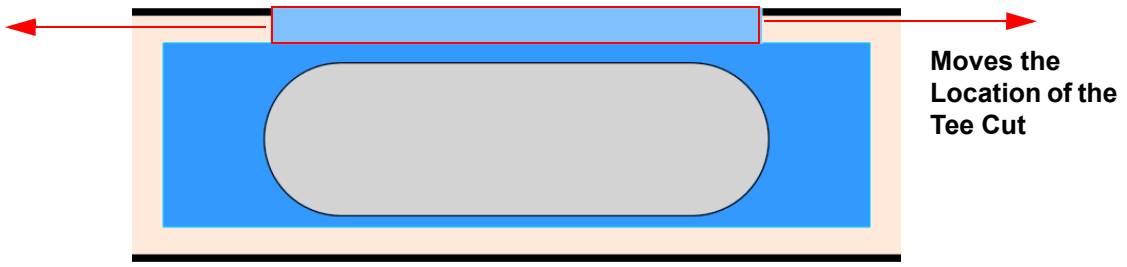
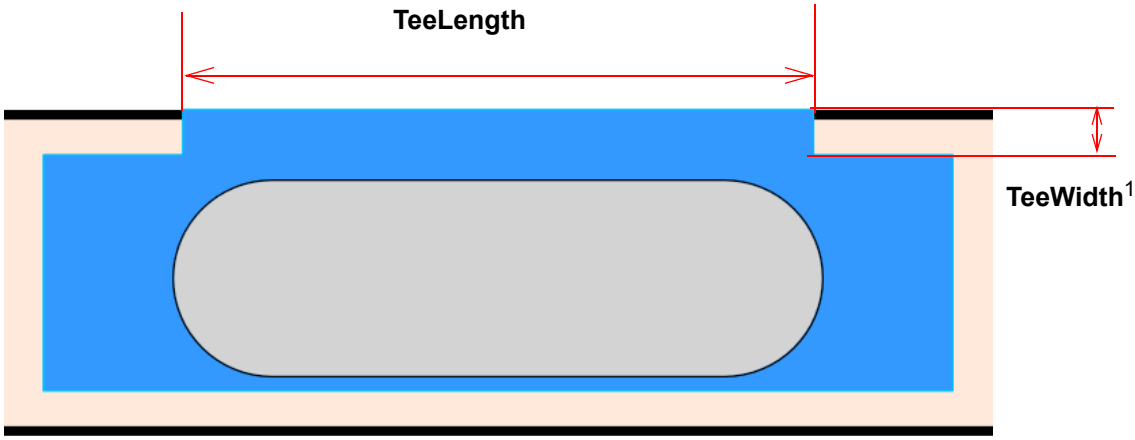


FIGURE 2- 19. Tee Location

About the TeeLength and TeeWidth

The length and width of the Tee cut are determined by these properties. The width is hard-coded to use this formula: *TLocation - MainWidth / 2.0.*

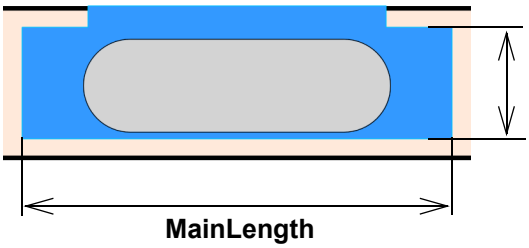


1. Value determined by formula.

FIGURE 2- 20. Tee Length and Width

About the MainLength and MainWidth

Changing these values will alter the length and the width of the lower (Main) cut of the feature.



1. Changing the MainWidth will change the TeeWidth Value. TeeWidth = (*TLocation - MainWidth / 2.0)*

FIGURE 2- 21. Main Rectangle Length and Width

About the Radius1 through Radius4

These radius cuts are applied to the main portion cut only. The figure below illustrates the main cut with each radius cut to 0.25".

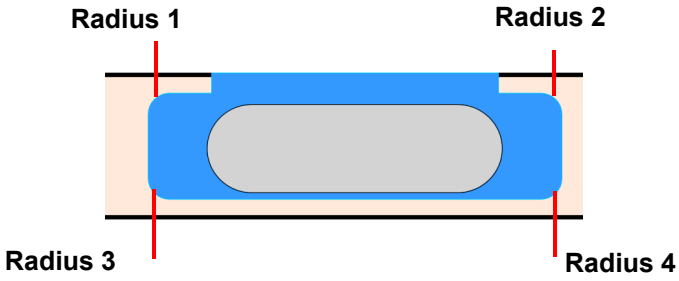


FIGURE 2- 22. Location of Radiuses

About the EntryRadius1 and EntryRadius2

These radius cuts are applied to the Tee portion of the cut only. The figure below illustrates a Tee cut with each radius cut to 0.25".

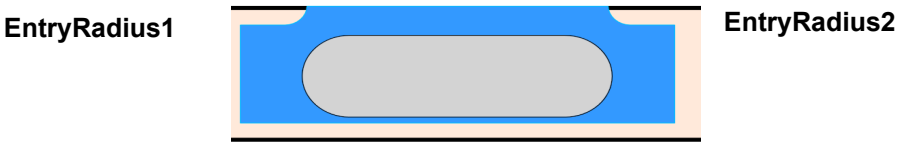


FIGURE 2- 23. Location of Entry Radiuses

An Example of 3.5" Hinges with Predrills

This section describes the **Feature Details** of a common **Hinge Feature Group**. Feature details of the group are separated into sections. Each section includes feature detail descriptions of hinge cuts.

About Feature Group Parent and Children

3.5" Hinge with Predrill (FeatureGroup x 3) Parent

Door Hinge (Hinge, Hinge Edge) Child

Jamb Hinge (Hinge, Hinge Jamb) Child

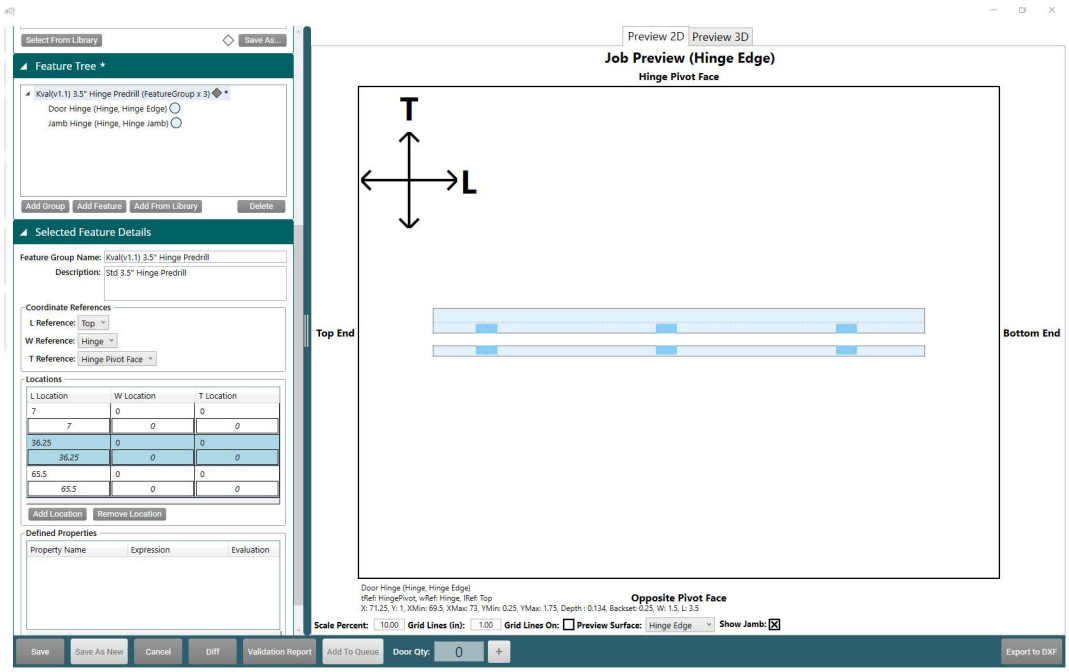


FIGURE 2- 1. Hinges

About the Hinge Feature Group

At the **Feature Group** level door coordinates and locations of the cut are defined. All features in this group follow the references and locations determined at this top level. For more information about the **Group Feature Details,** in the "KvalCAM Reference Guide".

- **Feature Group Name and Description:** Enter a descriptive name and description that represents the Feature Group.
- **Coordinate Preferences:** In this example, the L (length) is referenced from the **Top**, W (Width) from the **Hinge** side, and the T (Thickness) from the **Hinge Pivot Face** side.
- **Locations:** Hinge cut will be repeated at the locations listed in this table.

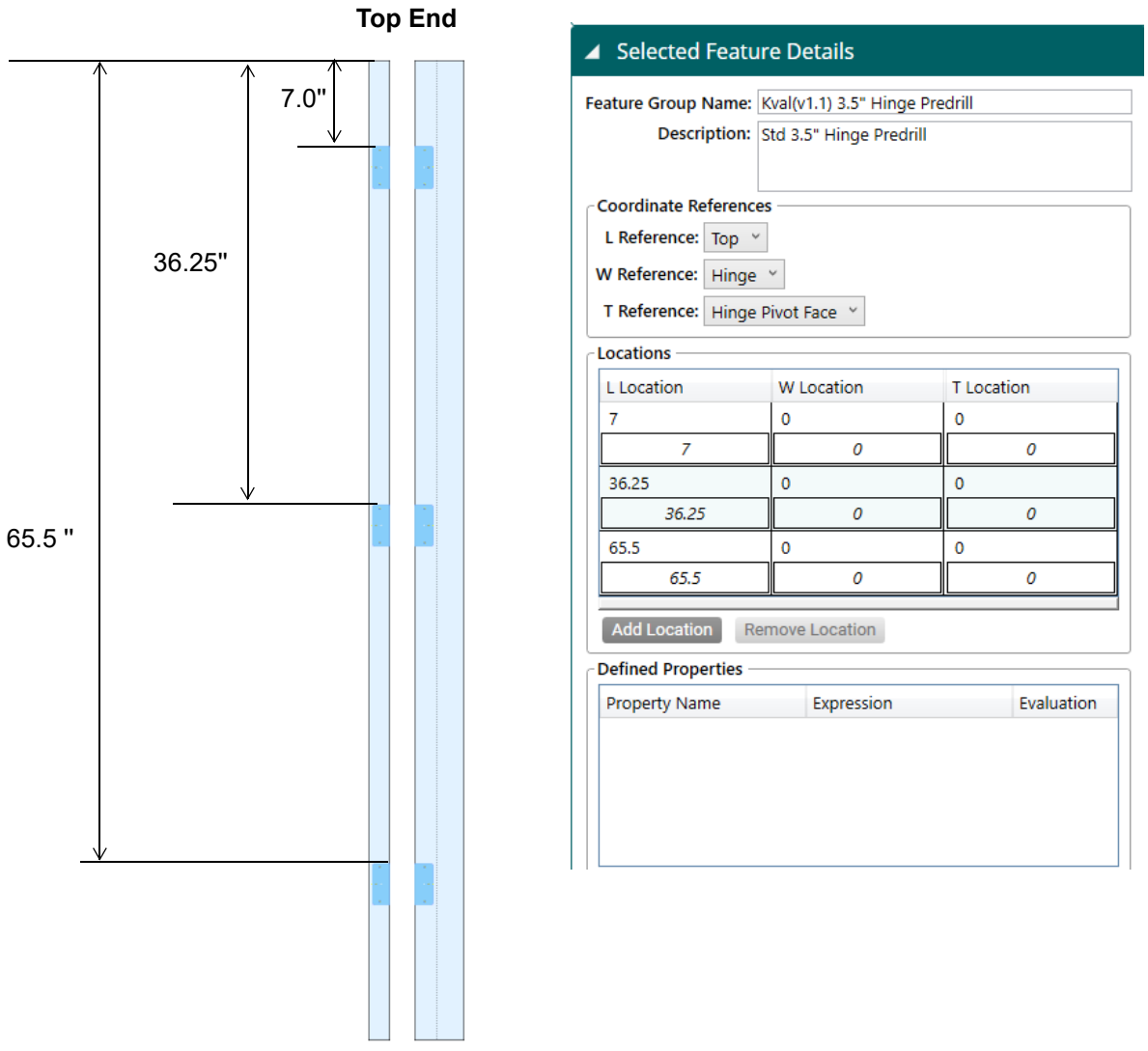


FIGURE 2- 2. Hinge Feature Group

About the Hinge Feature Details

The properties of a circle are described below.

Property	Description
TLocation	Auto calculated. Puts hinge in the middle of the edge of the door.[1]
LLocation	Start center location of the first Hinge.[2]
Depth	Depth of the hinge cut
Bevel	Set at the Door Data level
Backset	Backset of hinge from edge of door
Width	Auto calculated
Length	Length of the hinge cut.
PredrillDepth	Depth of the predrill holes
PredrillDia.	Diameter of the predrill holes.
Radius1 and 2	The radius of each corner of the hinge cut

1. TLocation = Width / 2.0 (1.75" / 2' = 0.75 "). Width = Door Thickness - Backset (1.5"). Door Thickness set at Door Data. Backset set in the properties table.
2. LLocation = Length / 2. (7.0"+ (3.5" / 2) = 8.75")
   Length = length of hinge.(3.5"). Top edge of hinge (7.0")

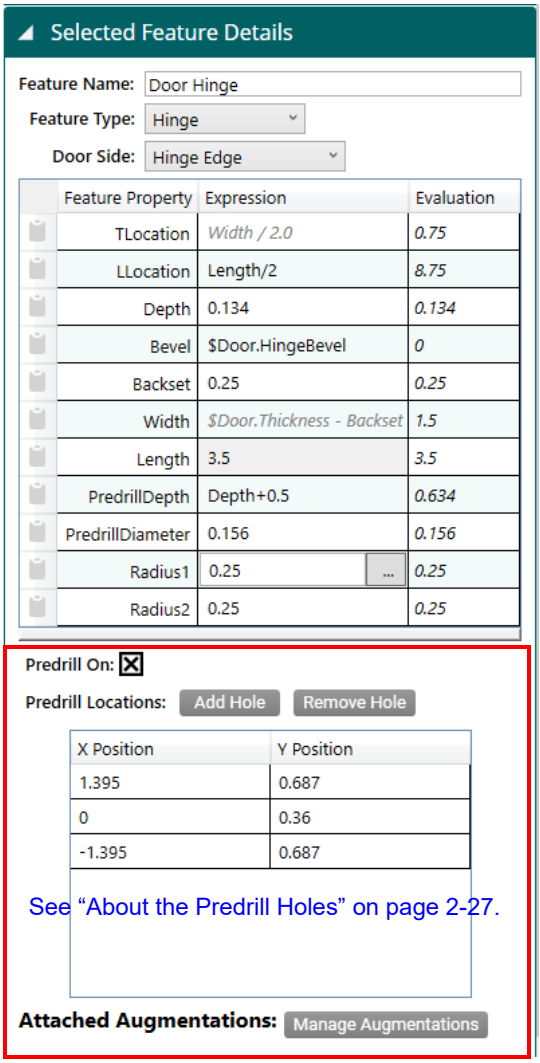


FIGURE 2- 3. Hinge Feature Details

About the Hinge Properties

The figure below illustrates the parameters set in the **Features Details** table.

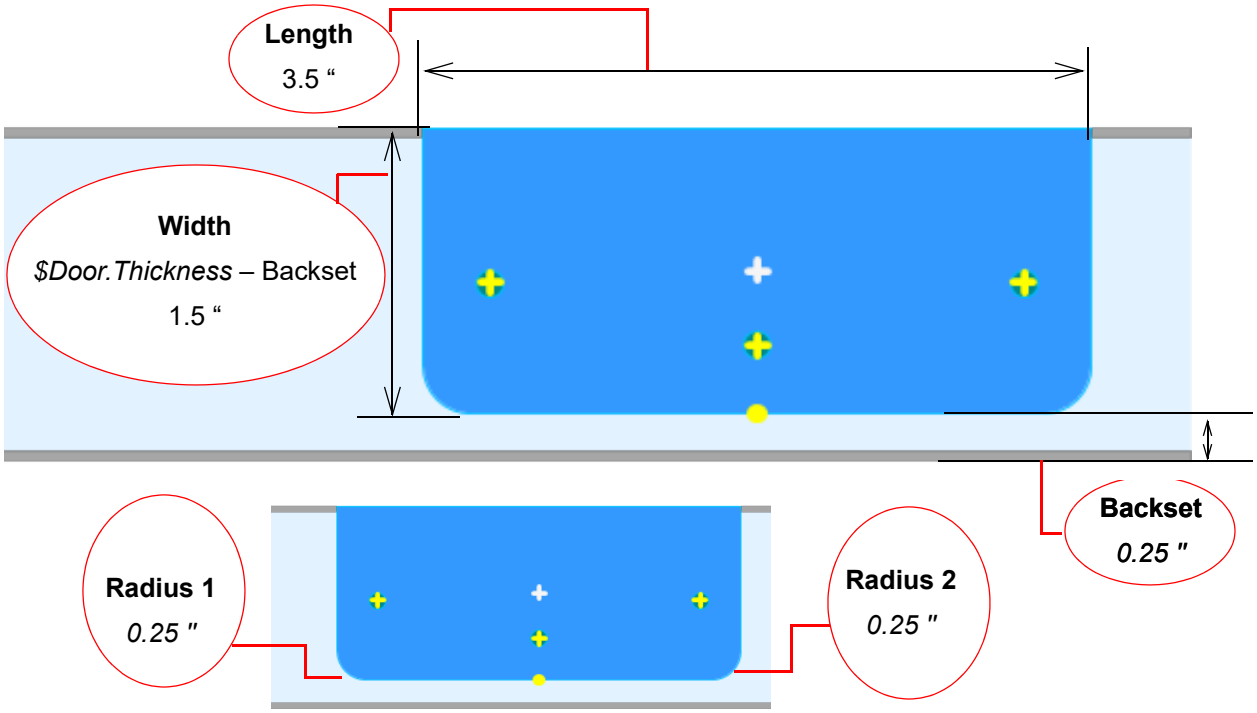


FIGURE 2- 4. Hinge Dimensions

About the Hinge Locations

The figure below shows the locations of the hinges set in the **Features Details** table.

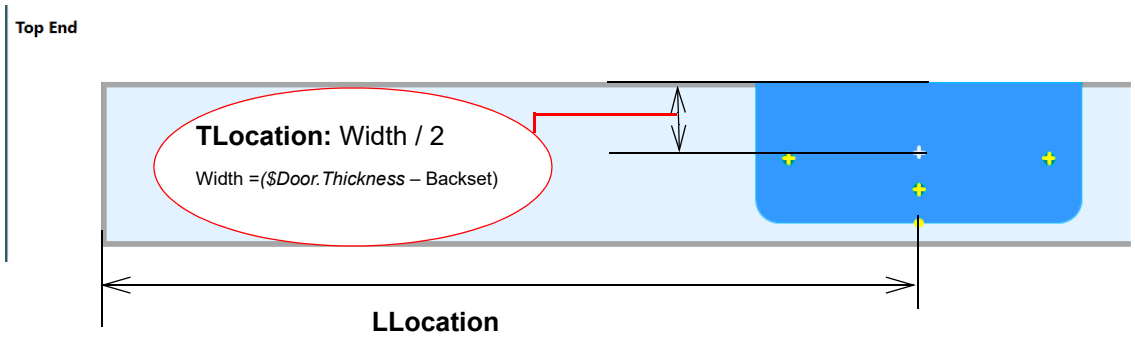


FIGURE 2- 5. Hinge Locations

About the Predrill Holes

Select the **Predrill On** check box to turn on the predrill.

Note: The jamb pre-drill holes are equal to the mirror image of the parameters entered.

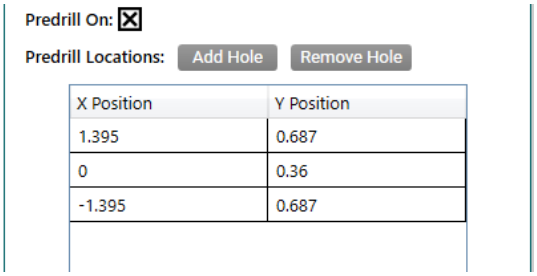


FIGURE 2- 6. Hinge Predrill Holes

About the Predrill Locations on the Hinge

The figure below shows the predrill locations that are listed in the **Predrill Locations** table above. The X and Y position values are referenced off the bottom of the hinge. The yellow cross-hairs represent the predrill location.

The **X** zero reference is located at the bottom middle of the hinge and can have positive or negative values. The Y zero reference is located at the bottom of the hinge and can **only** have a positive value.

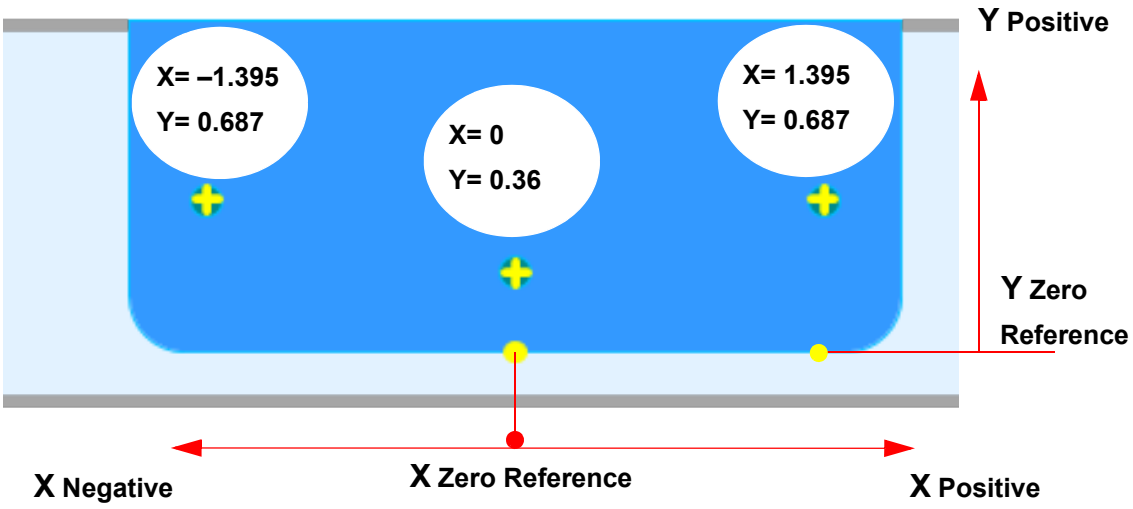


FIGURE 2- 7. Example of Predrill Locations

About the Jamb Hinge Properties

To create a jamb with hinge properties:

1. Right click to highlight the **Door Hinge** feature.
2. From the Pop-Up window, select **Copy Selected**.
3. Right click to highlight the **Hinge Feature Group.**
4. At Feature Details, change **Feature Type Name** to **Door Hinge Jamb**.
5. The **Feature Details** auto fills to represent the jamb.

An Example of a Face Rectangle with Round Top

This section describes a common method to use a **FaceRectangle Feature.**

About Feature Group Parent and Children

Rectangle Round Top Lite (FeatureGroup X1) Parent

Lite Cutout (FaceRectangle, Face Side) Child

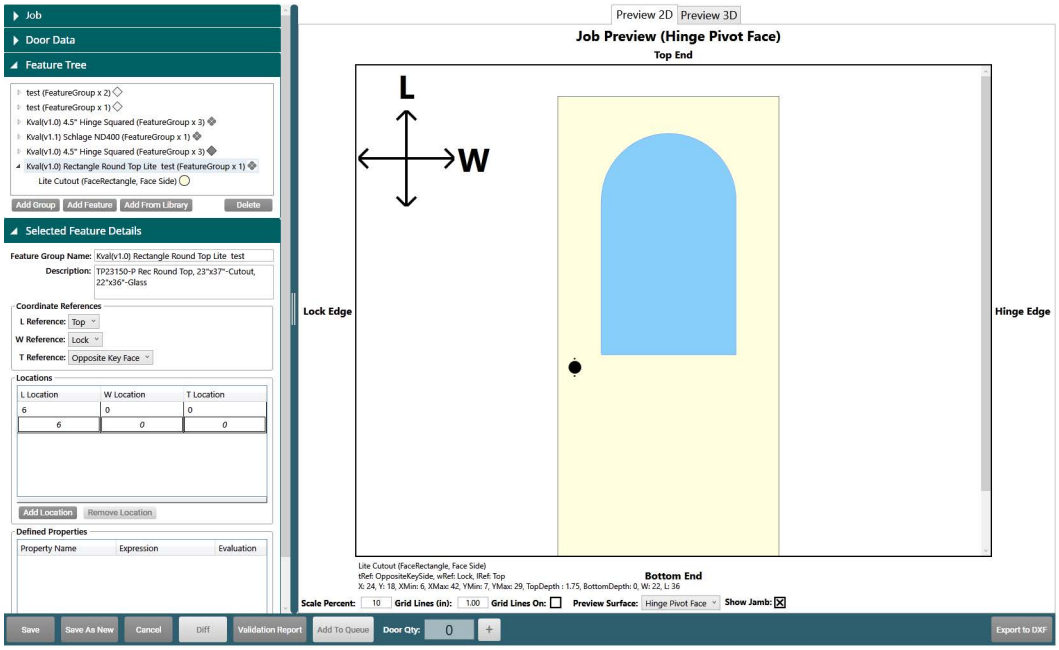


FIGURE 2- 8. Face Rectangle Cut

About Face Rectangle Coordinate References

At the **Feature Group** level door coordinates and locations of the cut are defined. All features in this group follow the references and locations determined at this top level. For more information about the **Group Feature Details,** in the “KvalCAM Reference Guide”.

- **Feature Group Name and Description:** Enter a descriptive name and description that represents Feature Group.
- **Coordinate Preferences:** In this example, the L (length) is referenced from the **Top**, W (Width) from the **Lock** side, and the T (Thickness) from the **Hinge Pivot Face** side.
- **Locations:** The start of the cut will be 6.0" from the top of the door.

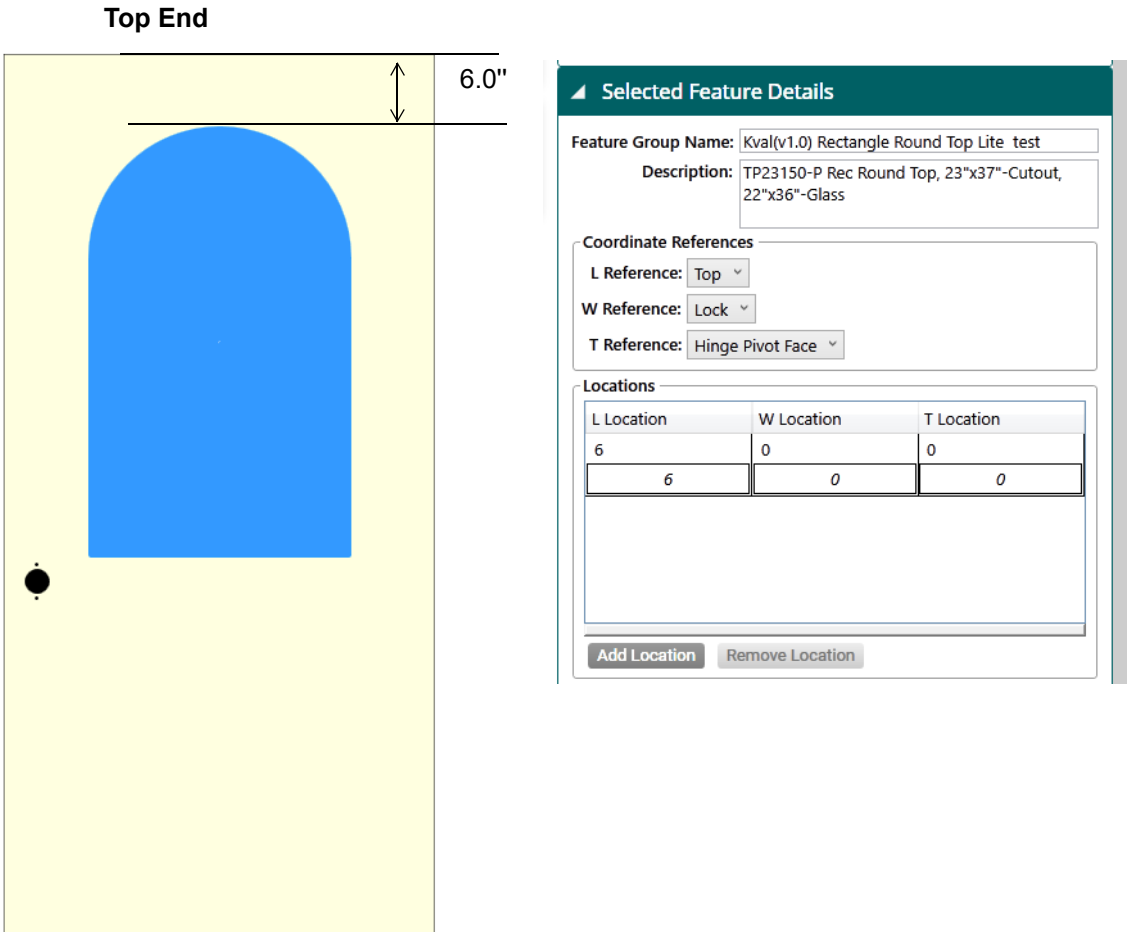
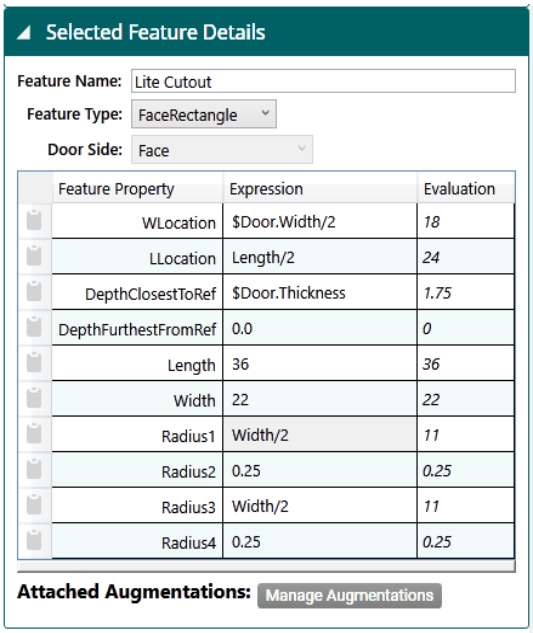


FIGURE 2- 9. Face Rectangle Dimensions

About the FaceRectangle Details

The properties of a **FaceRectangle Feature** are described below.



Property	Expression Description
WLocation	*$Door.Width/2*, puts cut in the middle of the width of the door.
LLocation	*Length/2* sets the location of the cut on the length of the door.[1]
DepthClosestToRef	*$Door.Thickness*. Cut will go through the door.
DepthFurthestFromRef	0
Length	Length of the rectangle cut. (36.0").
Width	Width of the rectangle cut. (22.0").
Radius1	Width/2, Creates 1/2 of the round top.
Radius2	Radius of corner (0.25").
Radius3	Width/2, Creates 1/2 of the round top.
Radius4	Radius of corner (0.25").

1. LLocation = 24.0" Where Length = 36.0" / 2 = 18.0". LLocation = 18.0" + 6.0" (Location set at Feature Group Level) = 24.0"

FIGURE 2- 10. Face Rectangle Details

About Shape Location Information

The figure below shows the shape location determined in Properties Table on page 2-31.

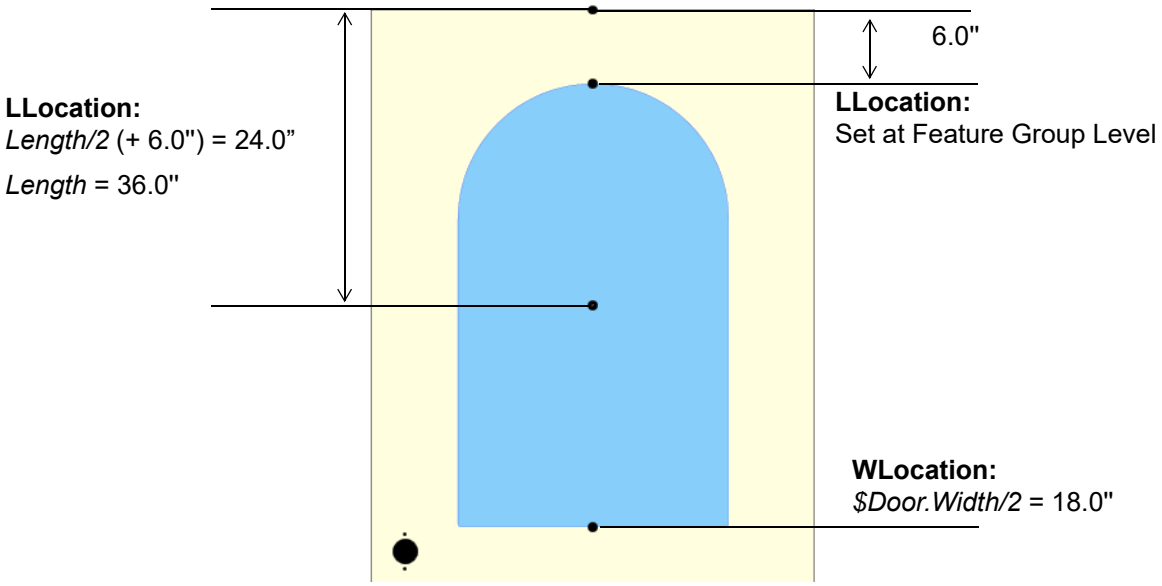


FIGURE 2- 11. Rectangle Shape Locations

About Shape Parameter Information

The figure below shows the shape parameters determined in **Properties Table** on page 2-31.

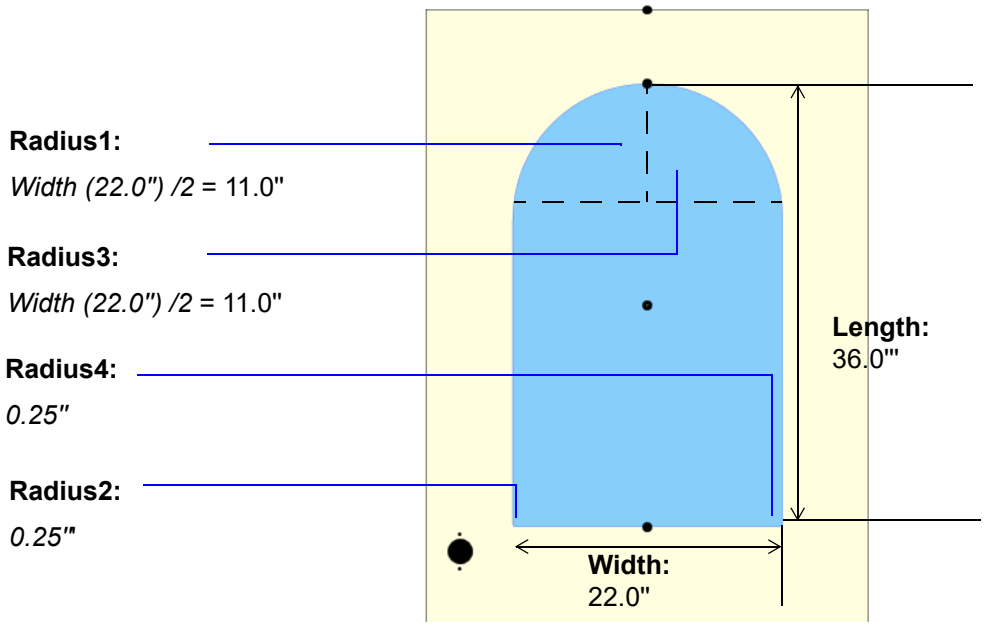
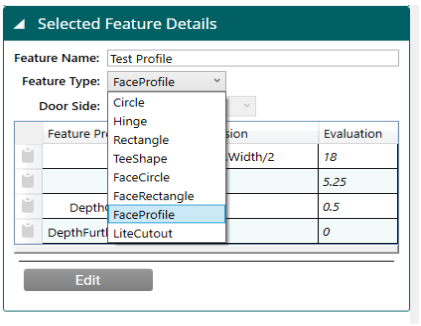


FIGURE 2- 12. Shape Dimensions

Process to Create a FaceProfile Feature Type

Note: For descriptions and comparisons of the **FaceProfile Feature Type** and the Lite-Cutout Feature Type, see "Comparing the FaceProfile and LiteCutout Feature Types" on page 1-44.

This procedure shows the steps to create a new **FaceProfile Feature**.



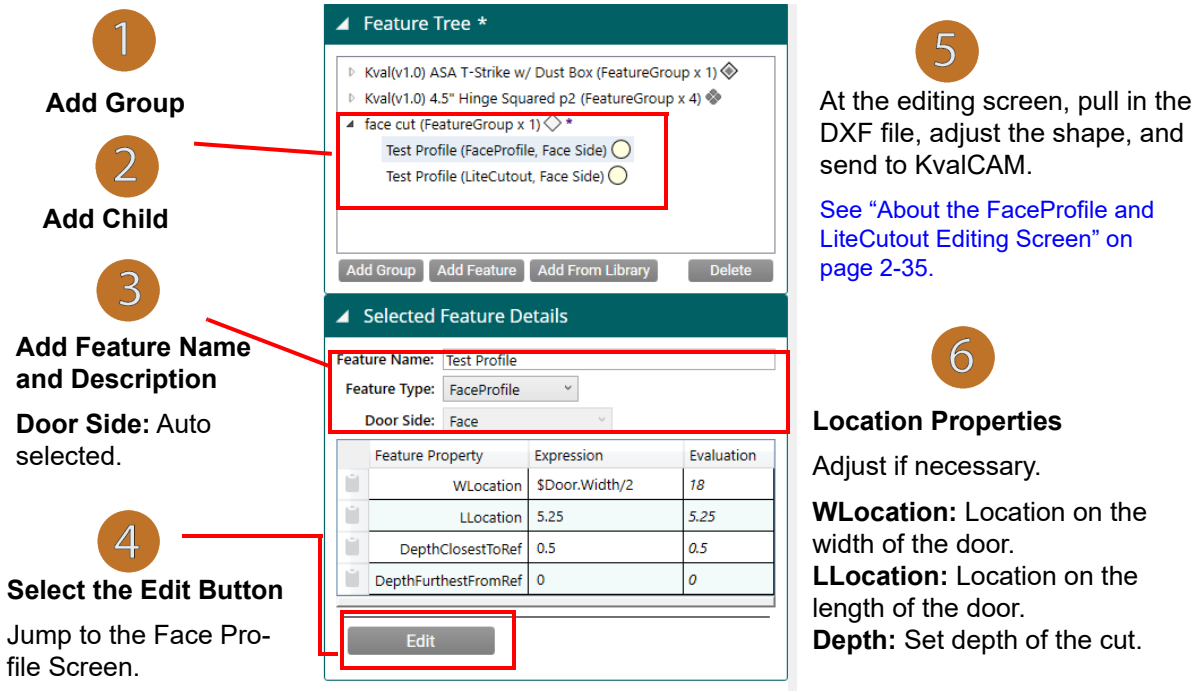
Note: The **FaceProfile Feature** uses a DWF file as a reference to engrave a shape on the face of the door.

Process

To add a new **FaceProfile**:

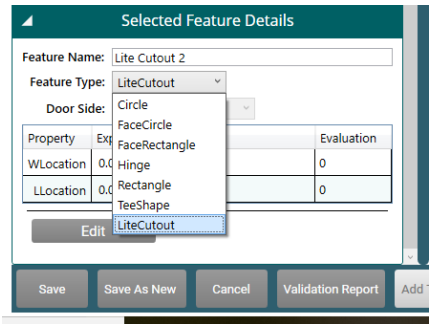
1. If needed, add a **Feature Group.**
2. Add a **Child** to the **Feature Tree**.
3. Select **FaceProfile** from the **Feature Type** drop down menu and add a **Feature Name**.
4. Select the **Edit Button** to jump to the **FaceProfile** editing screen.
5. Select the **Import DXF Button** and select the desired file from your directory. If needed, edit the shape. Select **OK** to return to **KvalCAM** menu. See "About the Face-Profile and LiteCutout Editing Screen" on page 2-31.
6. At the **KvalCAM** screen make adjustments if necessary

FaceProfile Process Summary



Process to Create LiteCutout Feature Type

This procedure details the steps to create a new **LiteCutout** Feature.



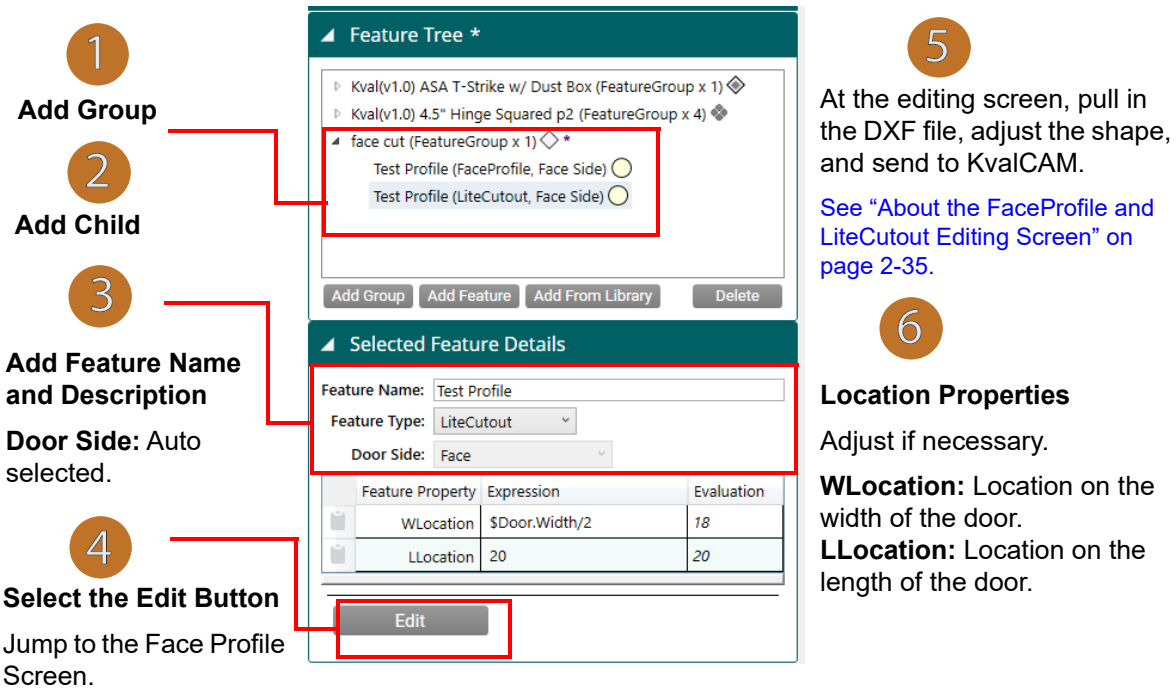
Note: The **LiteCutout Feature** is uses a DWF file as a reference to create a Door Lite Cutout.

Process

To add a new **LiteCutout**:

1. If needed, add a **Feature Group.**
2. Add a **Child** to the **Feature Tree**.
3. Select **LiteCutout** from the **Feature Type** drop down menu and add a **Feature Name**.
4. Select the **Edit Button** to jump to the **LiteCutout** editing screen.
5. Select the **Import DXF Button** and select the desired file from your directory. If needed, edit the shape. Select **OK** to return to **KvalCAM** menu. See “About the Face-Profile and LiteCutout Editing Screen” on page 2-31.
6. At the **KvalCAM** screen may adjustments if necessary

LiteCutout Process Summary



About the FaceProfile and LiteCutout Editing Screen

These screens are automatically opened when the **Edit** button is selected when the **FaceProfile** Feature or **LiteCutout** Feature selected.

Note: The **FaceProfile** and the **LiteCutout** screen are similar except the **LiteCutout** screen includes control over through-cuts. **FaceProfile** is designed for engraving the face of the door, therefore through-cut controls are not needed. To see a comparison of the two screens, see “Comparing the FaceProfile and LiteCutout Feature Types” on page 1-43.

About the Editing Screen

The editing screen can be separated into three sections.

1. Located at the right side of the screen is a **Control Panel** to manage the cutting process, error check, and adjust view settings.
2. The **Work Area** dominates the screen. View, adjust shape, and adjust cutting process of the DXF file.
3. Located at the bottom of the screen is a **Tool Bar** to perform varied tasks on the **DXF** file.

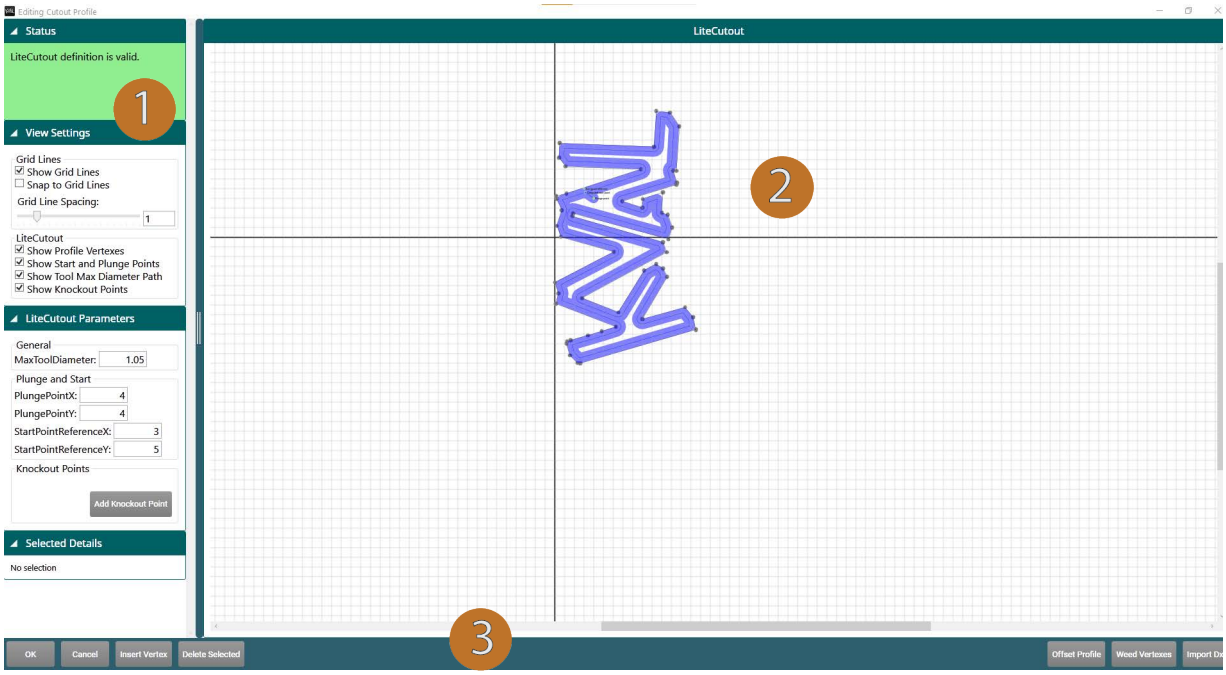
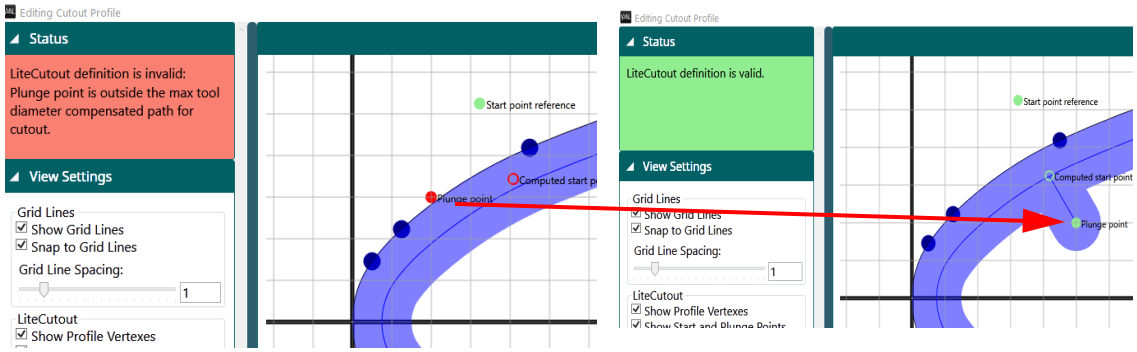


FIGURE 2- 13. Opening Editing Screen (LiteCutout)

About the Status Panel

The **Status** area shows errors in the displayed model. A green background indicates a valid model. A red background indicates an error.

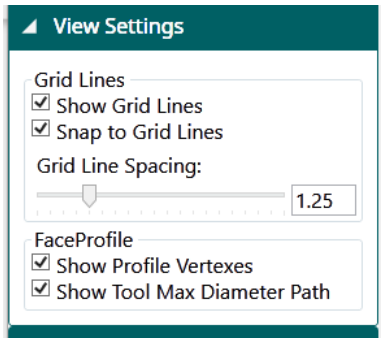
The example below shows an error with the placement of the **Plunge Point** and is corrected by moving it to within the boundaries of the cut.



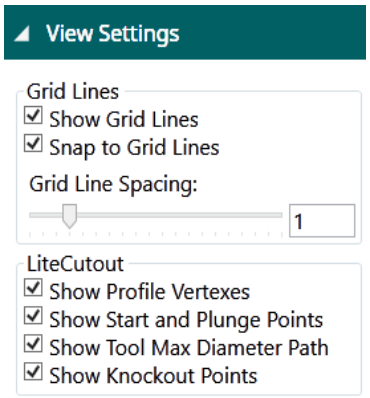
About the View Settings Panel

At the **View Settings** panel, the work area can be visually altered to your desired viewing experience.

FaceProfile Settings



LiteCutout Settings



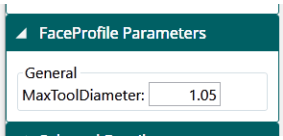
About the Parameters Panel

At the **Parameters** panel, control the specifications and shape of the displayed model.

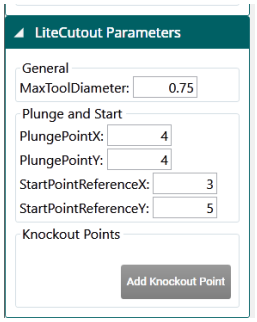
At the **FaceProfile** panel, maximum tool diameters can be entered and viewed.

At the **LiteCutout** panel, maximum tool diameters and more control of the machine cutting process is offered. See Figure 2- 14 below.

FaceProfile Parameters



LiteCutout Parameters



The figure below shows the display of model from a **LiteCutout** editing screen. Parameter types that can be altered are identified.

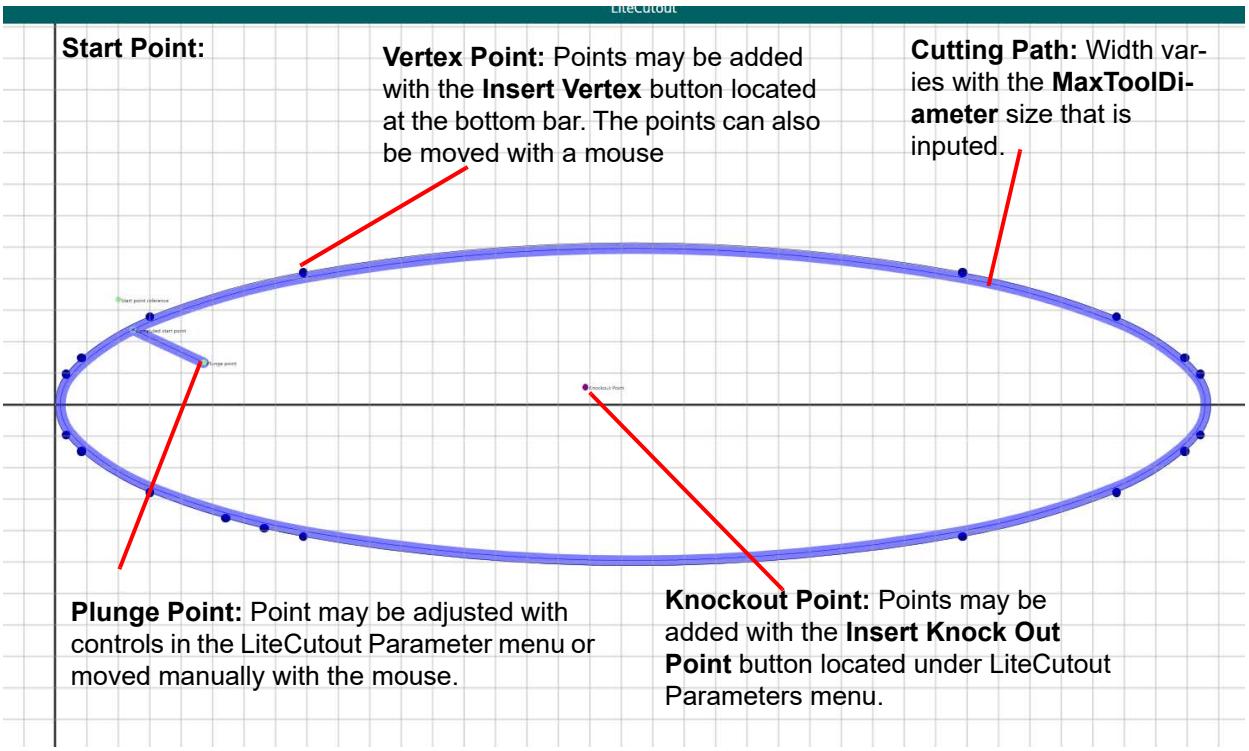
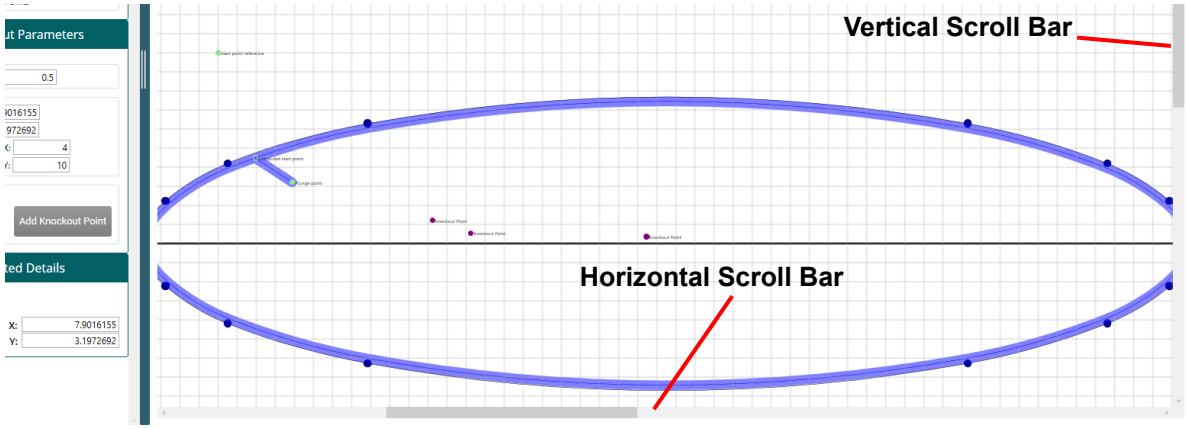


FIGURE 2- 14. Samples of Parameters

About the Work Area

The **Work Area** displays the imported **DXF** file. Actions that can be done are:

- Zoom In and Out with Mouse.
- Move shape vertically and horizontally with scroll bars.
- Select a vertex (point on the cutting path) and manipulate the shape.



About the Work Area Coordinates

The coordinates will adapt to all door types: LH (left-hand), RH (right-hand), LHR (left-hand reverse), RHR (right-hand reverse). This feature can be shared across all face cutting machines and doors.

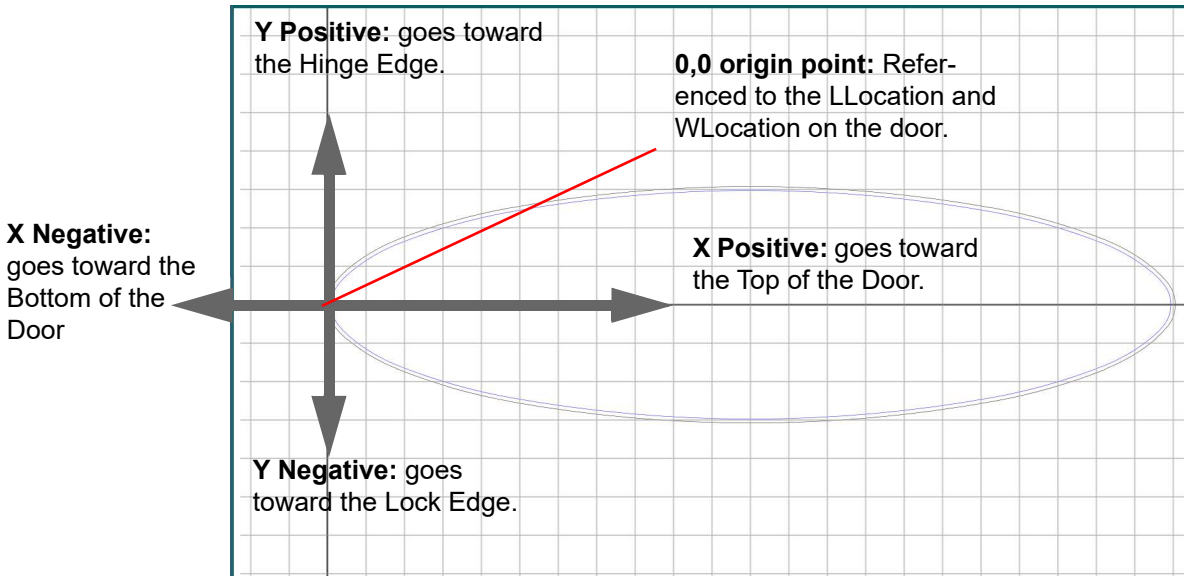


FIGURE 2- 15. Coordinates as related to KvalCAM

About the Task Bar

The Task Bar is located at the bottom of the editing screen. The section below describes the actions of each button.

The Import DXF Button

The first action to take. Import a DXF file from a predetermined directory to edit.

The OK Button

Select the **OK** button to complete the editing process. The editing screen closes and the DXF is displayed in the **KvalCAM Preview** screen.

The Cancel Button

Stop work and go back to **KvalCAM**. The Editing screen closes, changes are not saved and the DXF is not transferred to **KvalCAM**.

The Insert Vertex Button

Select any **Vertex Point** along the cutting path and then select **Insert Vertex** button to add a point next the selected point.

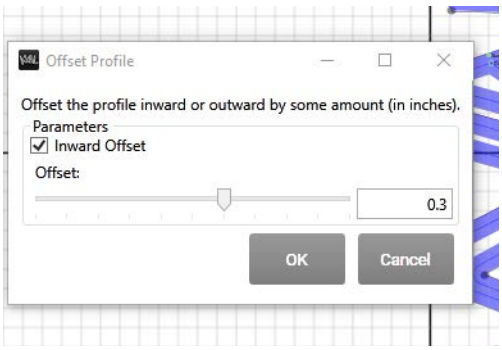
The Delete Selected Button

Select any **Vertex Point** or **Knockout Point** along the cutting path to delete it from the shape.

The Offset Profile Button

If an offset is needed for the cutting path, select the **Offset Profile** button. The offset can be in an inward direction or outward direction. The range that can be selected is 0.0 " to 0.5".

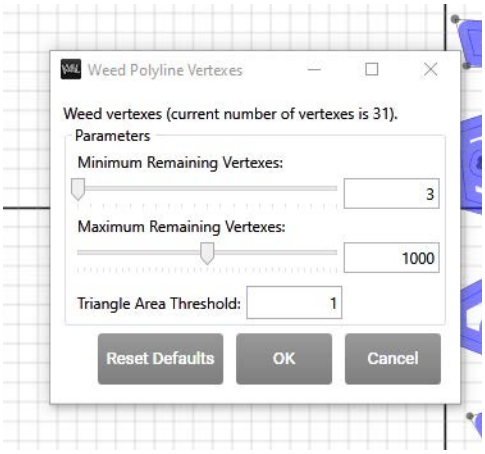
1. Select the **Offset** button
2. At the Pop-Up window, select the Inward **Offset** check box to have an inward offset. Deselect the box to have an outward offset.
3. Use the slide bar or enter the value in the text box to increase or decrease the size of the offset.
4. Select **OK** to finish the offset change.



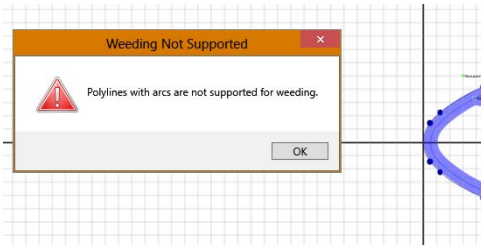
The Weed Vertexes Button

Occasionally DXF files that are imported may have too many vertex points. This button deletes some of the vertex points.

1. Select the **Weed Vertexes** button.
2. Use the slide bar or text boxes to weed out the vertex points.
   - **Minimum Remaining Vertexes:** The lower boundary for the remaining vertexes, the vertex count does not go below this value.
   - **Maximum Remaining Vertexes**: The upper boundary for remaining vertexes. The vertex count will be less or equal to this value.
   - **Triangle Area Threshold:** The threshold for which a vertex is weeded, measured as the area of a triangle (inches) formed by the vertex to be weeded and its neighbors. Triangles formed with areas less that this value cause the vertex to be removed.
3. Select the **OK** button to confirm the weeding, the **Cancel** button to stop, or the **Reset Default** to go back original vertex count.



Note: The weeding process does not support shapes with polylines with arcs. An error pop-up will be displayed. Select the OK box to close the box.



CHAPTER 3 KvalCAM Common Terms

This chapter describes common **KvalCAM** terms.

Chapter 3 at a Glance

Summary	
A	Ad Hoc-- page 3-2 Axis-- page 3-2
C	Cube Icon-- page 3-4
D	Dado-- page 3-5 Diff -- page 3-6 Door Data -- page 3-6 Door Data Library -- page 3-7 Door Job -- page 3-8 Door Job Library -- page 3-8
E	Expressions -- page 3-9 Common Door Expressions -- page 3-9
F	Feature-- page 3-10 Feature Group -- page 3-10 Feature Group Library-- page 3-11
H	Handing-- page 3-12 Left Hand Door-- page 3-13 Right Hand Door-- page 3-13
J	Jamb Data Table-- page 3-14 Jamb Data Table Content-- page 3-15
L	Library Principle Variant 3-15
R	Rabbet-- page 3-18 Right Hand Doors and Right Hand Reverse Doors-- page 3-19
V	Validation-- page 3-20 Validation Report-- page 3-20 Variant--page 3-22
Table of Symbols and Keywords -- page 3-23	
Common Door and Jamb Properties-- page 3-24	
Supported Math Constants-- page 3-26	

A

Ad Hoc

Ad Hoc is **Door Data** or a **Feature Group** that is part of a **Door Job** that is not associated with any **KvalCAM Revision**. This allows a **Door Job** to be created or edited independently of the **Feature Groups** and/or **Door Data** in the **KvalCAM Library**. The figure below shows a **Feature Group** created **Ad Hoc**.

In this example, a test **Feature Group** was created from scratch within the **Door Job**. The light-colored diamond icon indicates that the **Feature Group** or **Door Data** is **Ad Hoc**. **Note:** The asterisk indicates that the **Door Job** has not been saved.

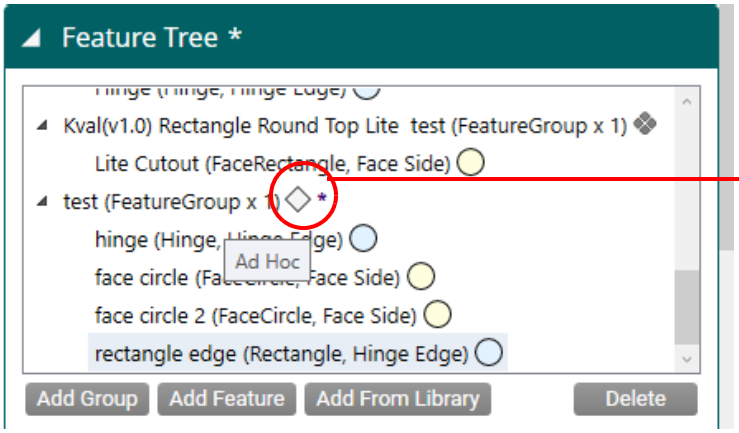


FIGURE 3- 1. Ad Hoc Icon

Axis

An axis icon is located on the **Door Preview Screen** to visually represent the door reference. Figure 3- 2 below shows the axis icons. Note the icon relationship to the door graphic.

L	Represents the Length axis
W	Represents the Width Axis
T	Represents the Thickness Axis

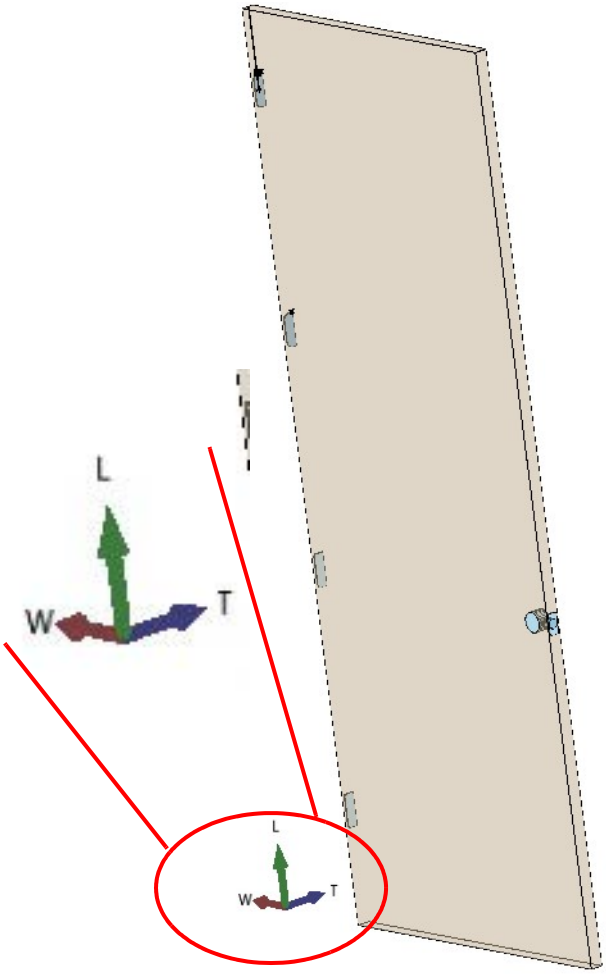


FIGURE 3- 2. Axis Icons in Job Preview

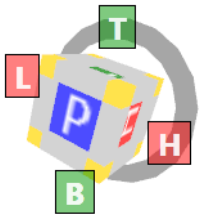
C

Cube Icon

Any of the faces can be clicked on to orient the camera to that standard view. In addition to this, any edge or corner of the view cube can be clicked on to get a corresponding camera position. The view cube has a ring and adjacent articles around one face. This ring is designed as a visual indicator of the "bottom" of the cube, or what would be considered the lower side of the "T" dimension.

The view cube is located in the lower-right corner of the screen. This cube has 6 sides, and the corresponding edges and borders or a normal cube. On every face of the cube, there is a single letter that corresponds to the standard view in which that view is oriented. Letters to the side identify adjacent views.

- **H** - Hinge edge
- **L** - Lock edge
- **T** - Top edge
- **B** - Bottom edge
- **P** - Pull face
- **S** - Push face



The Icon is Active: Select the large center square, the smaller outer squares, or the yellow corners to jump to the corresponding position.

D

Dado

A dado is a slot or trench cut into the surface of a jamb. A dado is cut across, or perpendicular to, the grain and is thus differentiated from a groove which is cut with, or parallel to the grain.

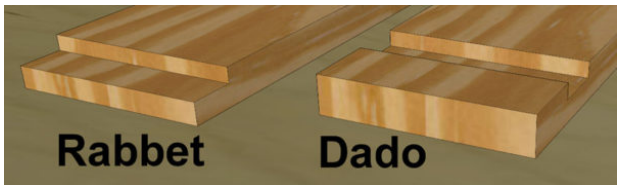


FIGURE 3- 3. Dado Cut

In **KvalCAM**, the dado cut length and depth are used in the processing of a jamb. The dado parameters are **Jamb Properties** in both the **Hinge Side** and **Lock Side** data tables.

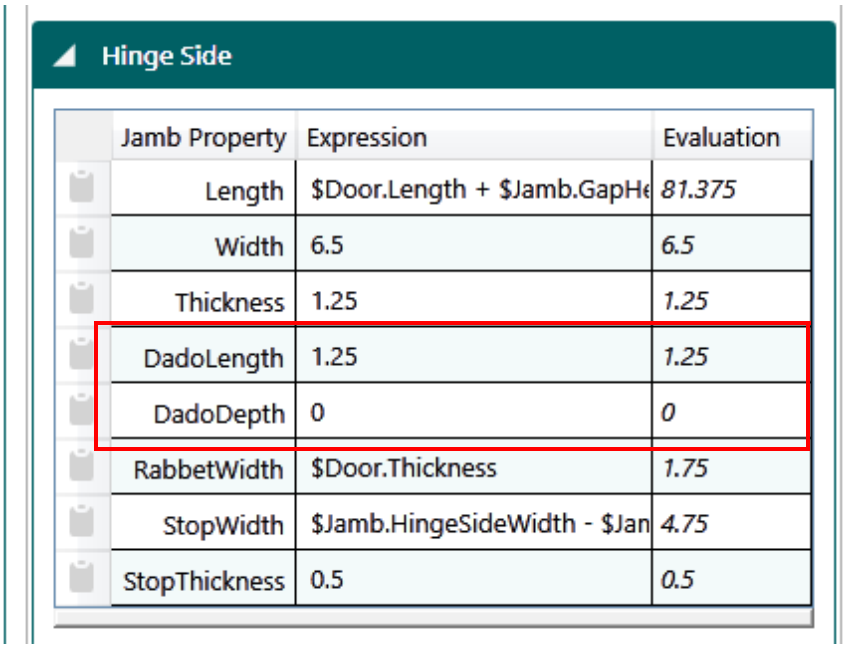


FIGURE 3- 4. Dado Parameter Data

Diff

The **Diff** function compares two files and identifies differences between them. The **Diff Button** is located at the following **Screens:**

- Door Data
- Door Job
- Feature Group
- Revision

The figure below shows the display associated with a **Diff** function.

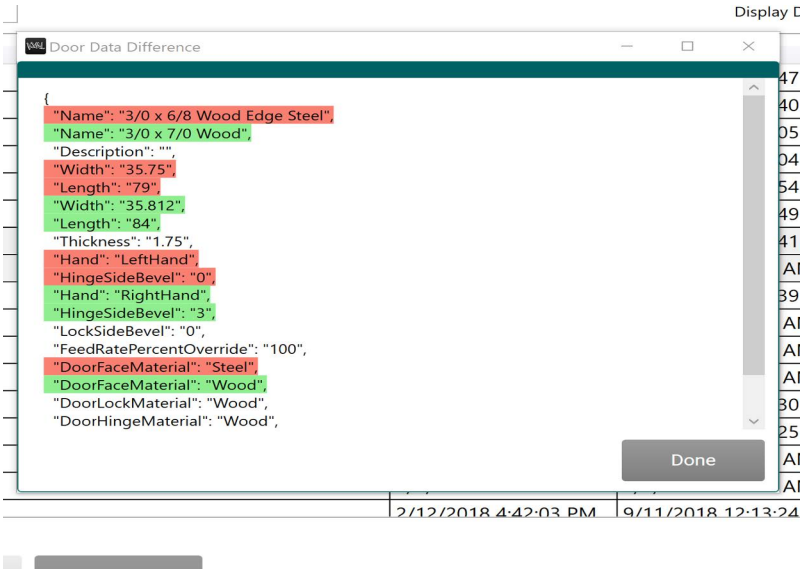


FIGURE 3- 5. Diff Pop-Up Screen

Door Data

Door Data represents all the information for a door slab and/or jamb. **Door Data** can be created and edited in the **KvalCAM Door Data Library** to later be added as part of a **Door Job**. Figure 3- 7 on page 3-7 shows an example of the information in **Door Data**.

More information about **Door Data** can be found in the “KvalCAM Reference Manual.”

Door Data Properties includes:

- **Door Hand** (Left Hand, Right Hand, Left Hand Reverse, Right Hand Reverse)
- **Door Width**
- **Door Length**
- **Door Thickness**
- **Hinge Bevel**
- **Lock Bevel**
- **FeedRate Percent** (Adjust tool feed-rate 100% to 5%)
- **Door Core** (Unspecified, Hollow, Foam)
- **Face Material** (Wood, Fiberglass, Steel)
- **Hinge Material** (Wood, Fiberglass, Steel)
- **Lock Material** (Wood, Fiberglass, Steel)

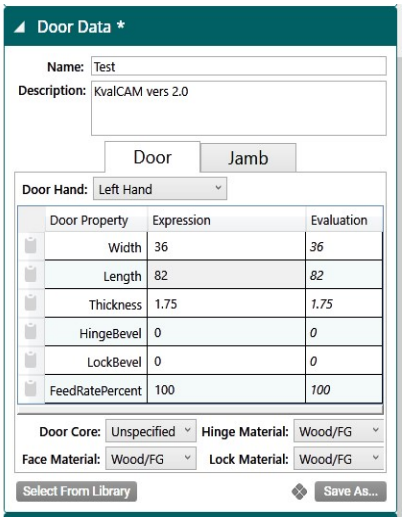


FIGURE 3- 6. Door Data Properties

Door Data Library

Below is a list of highlights about this screen.

- Selecting a file from the table leads into the **Door Data Creation** screen
- The **Door Data Library** contains the specifications about an unprocessed door.
- No shape-cutting information is at this screen.
- Files can be saved and be attached to the many **Door Job** files.
- Files support revisions.

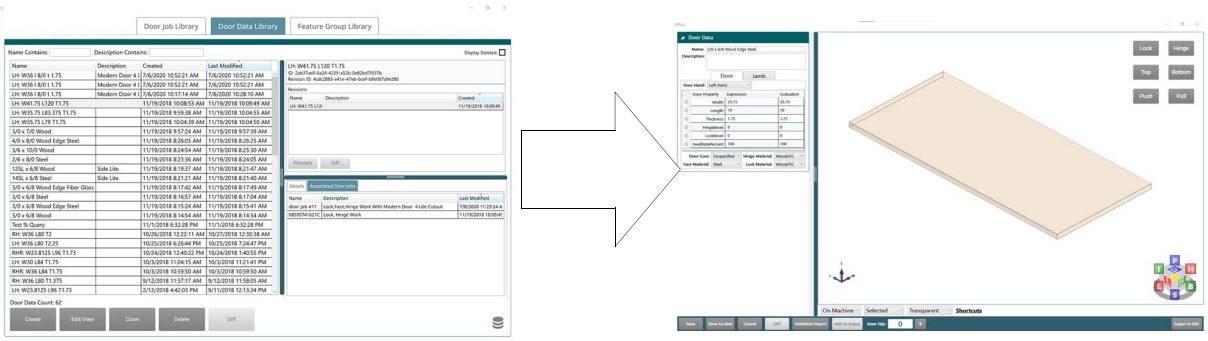


FIGURE 3- 7. Door Data Library

Door Job

A **Door Job** represents all the information required to process a door and/or jamb on a **KvalCAM** machine. **Door Jobs** can be created and edited within the **KvalCAM Door Job Library** and added to the **Door Job Queue.** Once in the queue, the door can be processed. A **Door Job** has one **Door Data** and a collection of **Feature Groups** within it that describe the work to be done. Figure 3- 8 on page 3-8 shows the building blocks of a **Door Job**.

- **Job:** Door assigned file name.
- **Door Data:** Door slab specifications.
- **Feature Tree:** A collection of **Feature Groups**.
- **Selected Feature Details:** Shapes, locations, and cut information of the features that are part of the **Feature Group.**

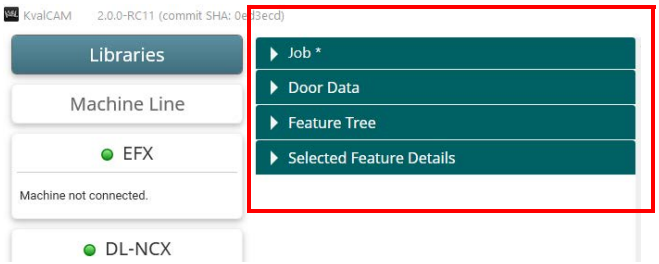


FIGURE 3- 8. Door Job Parts

Door Job Library

Below is a list of highlights about this screen.

- Selecting a file from the table leads to the **Door Job Creation** screen.
- The **Door Job Library** contains all the files in the selected database.
- The **Door Job Files** contain all the information to create a door.
- Files support revisions.

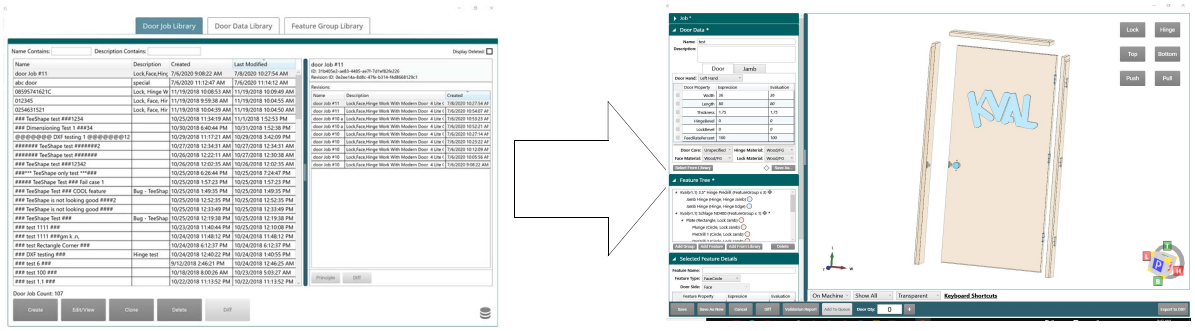


FIGURE 3- 9. Door Job Library

E

Expressions

Every feature type has a set of properties that represent its milling shape. These properties are represented as expressions in the form of strings.

Example: *5 + 3.5 or 4 + (1/8 * 2)*

The expressions are persistently saved and loaded for each property of a feature. At run time the user previews, validates, or runs a door job containing features. At this time the expressions are also evaluated to a final numeric form,

Example: *5 + 3.5 = 8.5, or 4 + (1/8 * 2) = 4.25*

The numeric form is shown and then used to preview, validate, and ultimately run a milling routine on the door. Expressions can reference other properties, the door parameters, or even other features in the tree.

Example: *5 + Length / 2,1 + $Parent.Length / 2, or $Door.Thickness/2 + Width*

Common Door Expressions

Parameter	Description	Expression Description
Length	Length of Door	*$Door.Length*
Width	Width of Door	*$Door.Width*
Thickness	Thickness of Door	*$Door.Thickness*
HingeBevel	Bevel defined for the hinge edge of the door in degrees	*$Door.HingeBevel*
LockBevel	Bevel defined for the lock edge of the door in degrees	*$Door.LockBevel*
FeedRatePercent	Feed rate percent defined for the door	*$Door.FeedRatePercent*

F

Feature

A **Feature** represents a particular cut or operation to be performed on a door and/or a jamb, for example, cut a rectangular plate with a set of properties (width, length, depth, etc.) at a particular location on a door. There are many different feature types to perform different operations. Each **Feature** can have a collection of **Features** as children. The children inherit the parent feature's location on the door and/or jamb. Figure 3- 10 below shows the properties of a Feature in a Feature Group.

More information about **Feature**, see “Summary of a Feature Group and Features” on page 1-24.

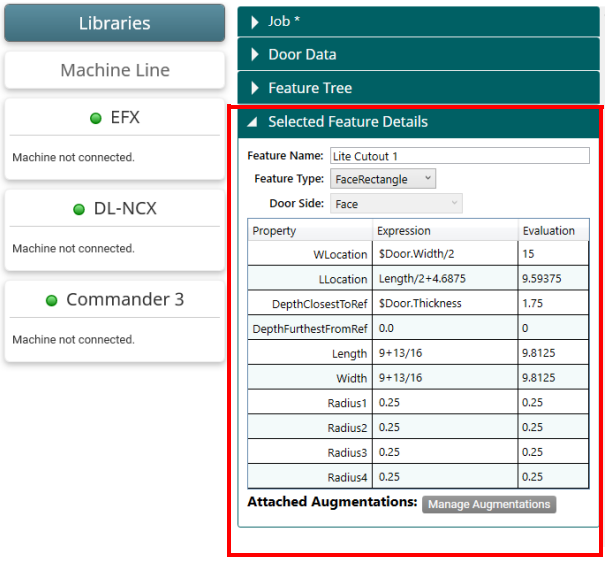


FIGURE 3- 10. Feature Details Example

Feature Group

A **Feature Group** represents a set of cuts or processes to be performed on a door and/or a jamb. Each **Feature Group** has a collection of **Features** that describe the operations to be done. **Feature Groups** can be created, edited, and saved in the **Feature Group Library**. **Feature Groups** and associated **Features** may be added to a **Door Job**. Figure 3- 8 below shows a collection of Feature Groups in a Door Job.

More information about **Feature Groups**, see “Summary of a Feature Group and Features” on page 1-24.

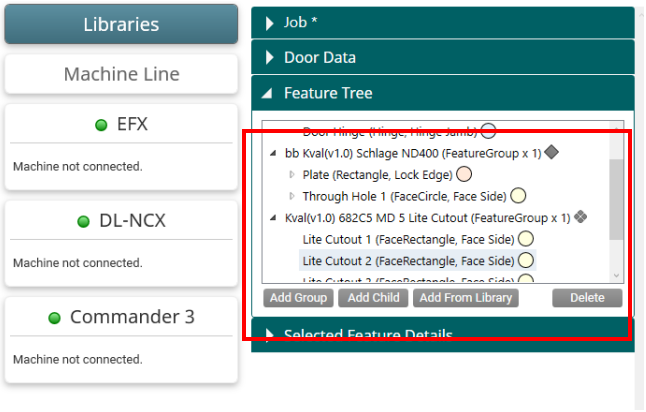


FIGURE 3- 11. Feature Group Panel

Feature Group Library

Below is a list of highlights about this screen.

- Selecting a file from the table leads into the **Door Feature Creation** screen
- The **Door Feature Library** contains shape information.
- There is one shape information per file.
- Files can be saved and be attached to the many **Door Job** files
- Files support revisions.
- Tracks variants.

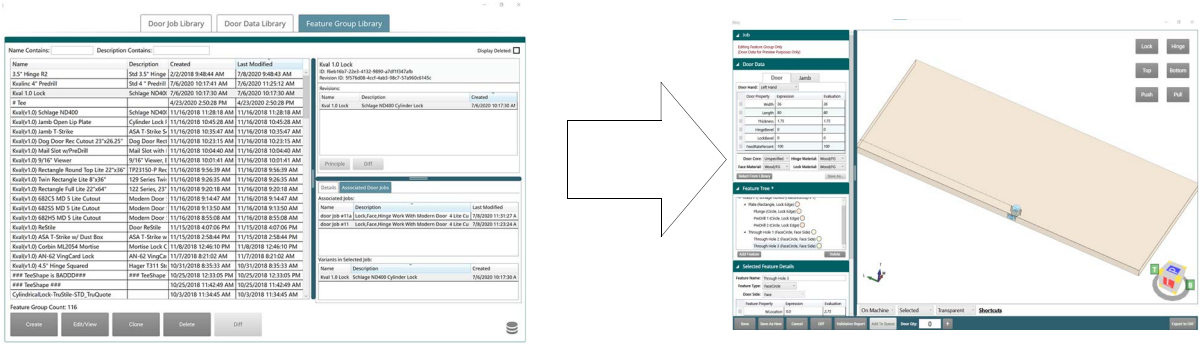


FIGURE 3- 12. Feature Group Library

H

Handing

Door handing can be a confusing concept. There are a few different methods to determine the hand of a door. Each method depends upon the reference in relation to door and the door opener.

Handing is **Right Hand**, or **Left Hand** referenced. However, terms vary in the industry. See the list of terms in Figure 3- 13 and Figure 3- 14.

In **KvalCAM**, door hand is selected at the **Door Job Data** section.

The terms used are:

- Right Hand
- Left Hand
- Left Hand Reverse
- Right Hand Reverse

About Door Hand Designation

Left Hand and Right Hand or **inswing** doors are the most popular choice on the residential market. With these doors, the hinges are installed on the inside opposite the key side of the door. This can be an excellent security benefit, as intruders can't tamper with the hinges. They can, however, knock the door back by force as it swings inward. These doors will offer you more space on the outside, however, that means that there will be more limited space inside.

Reverse Right and Left Hand or **outswing** doors are often used commercially. These doors have hinges that face the outside or key side. Security hinges are often used in reverse hand doors to stop the removing of the hinges. Because they open outwards, they are more difficult to kick in but they also limit space on the outside when open.

How to Determine Door Handing

This section describes one method to determine a doors handing. For an illustrated view of determining door hand, see Figure 3- 13 and Figure 3- 14.

1. Stand on the outside (key side) of the door.
2. Facing the door, see what side the hinges are located.
3. The location of the outside or inside hinges determines the hand reference.
   - If the hinges are to the left, it is a left hand door.
   - If the hinges are to the right, it is a right hand door.

Left Hand Door

In the figure below, note that the hinge is located on the left side of the door opener. A **Left Hand** door opens or swings in to the interior. A **Left Hand Reverse** door opens out or reverse of the **Left Hand** door.

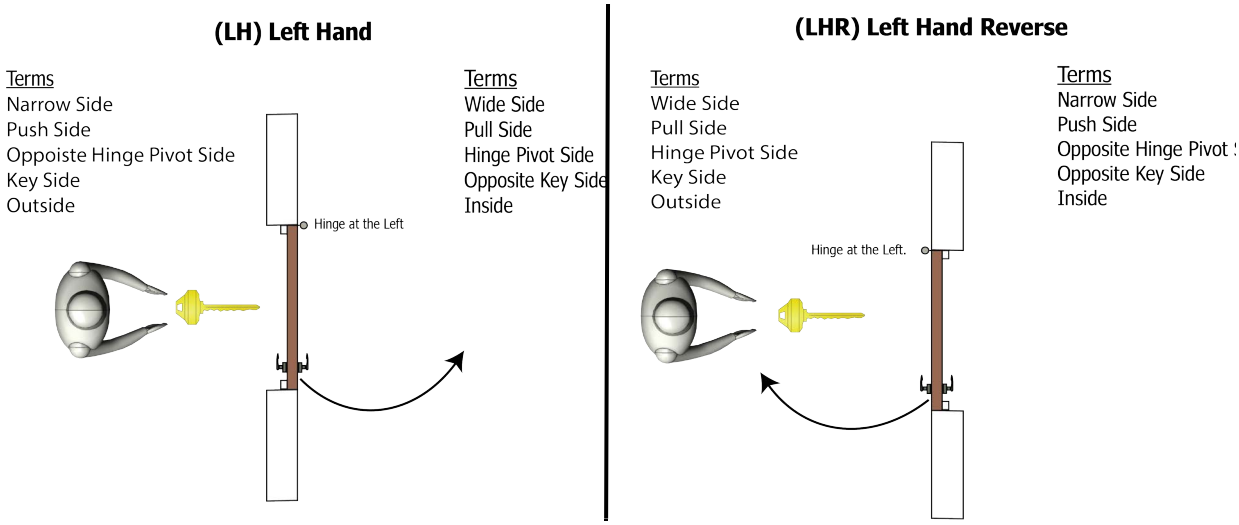


FIGURE 3- 13. Left Hand Doors

Right Hand Door

In the figure below, note that the hinge is located on the right side of the door opener. A **Right Hand** door opens or swings in to the interior. A **Right Hand Reverse** door opens out or reverse of the **Right Hand** door.

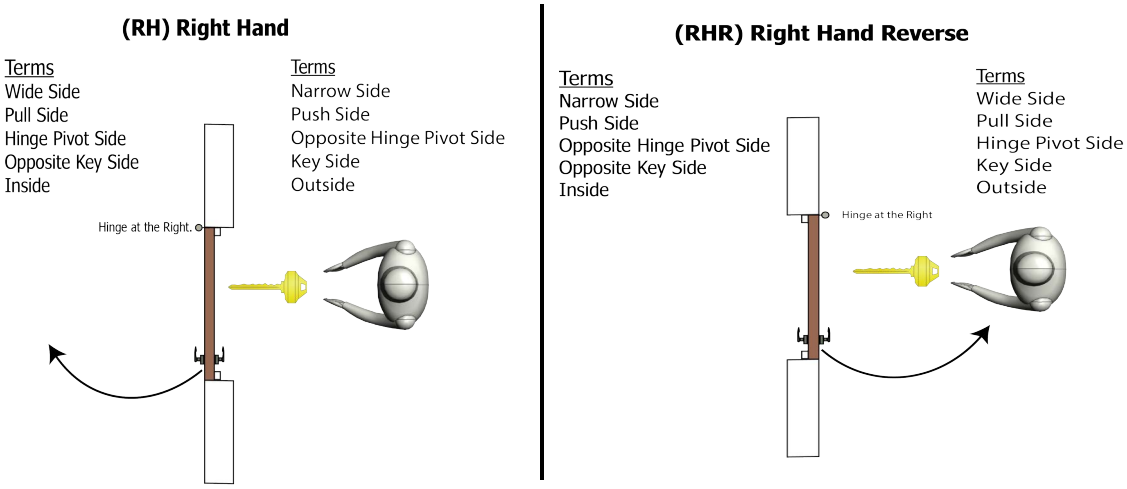
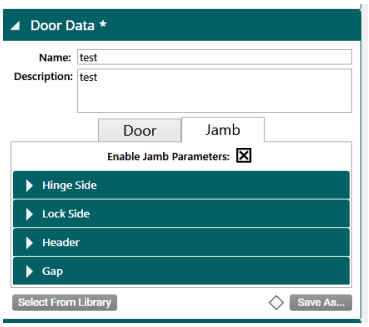


FIGURE 3- 14. Right Hand Doors

Jamb Data Table

Select the **Jamb** tab to view, edit, or save the jamb data properties. The figure below describes the available **Jamb Data** properties.



Jamb Properties include all the parameters to create a door frame. The data is normally created remotely and saved into the database. The properties are shown in the figure below. For an example of using the **Jamb Data** section, see "Jamb Data Process Steps" on page 2-3.

Note: To activate jamb data, the **Enable Jamb Properties** check box must be selected.

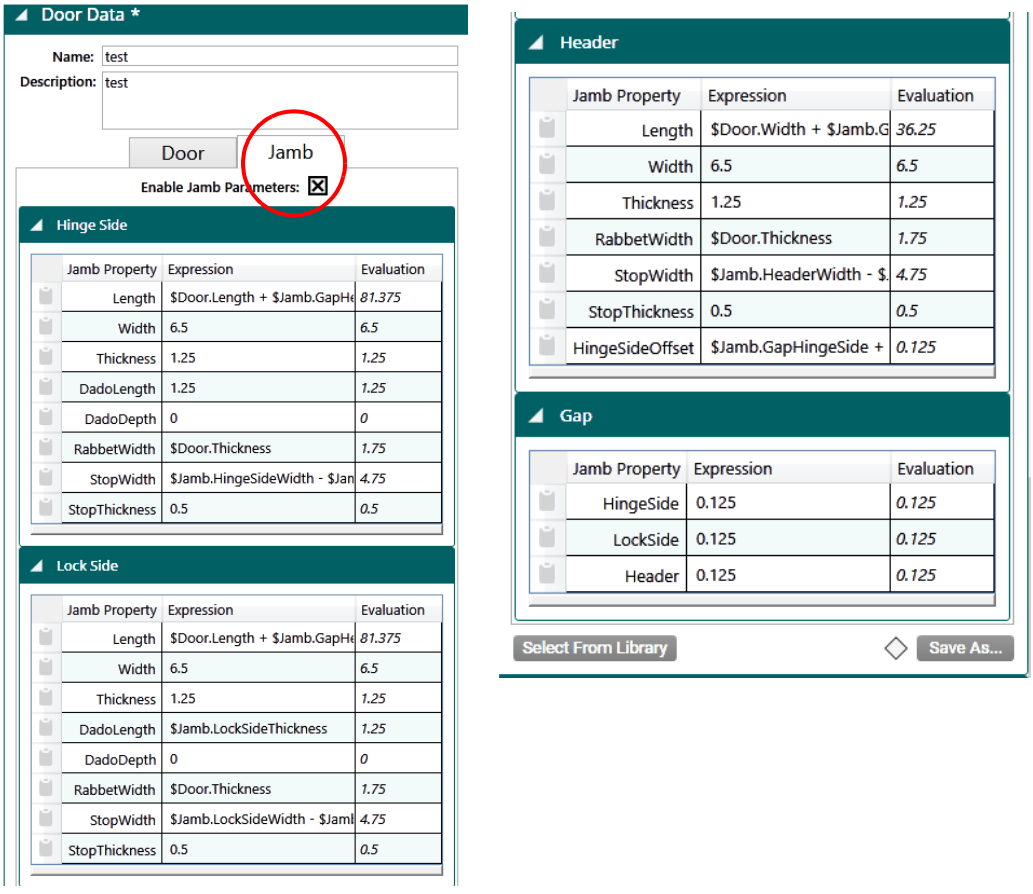


FIGURE 3- 15. Jamb Data Tables

Jamb Data Table Content

The properties available in the Jamb Data table are listed below.

Hinge /Jamb Sides	Header	Gap
Length	Length	
Width	Width	
Thickness	Thickness	HingeSideOffset
DadoLength	RabbetWidth	LockSide
DadoDepth	Stop Width	Header
RabbetWidth	Stop Thickness	
Stop Width	HingeSideOffset	

L

Left Hand Door and Left Hand Reverse Doors

See “Left Hand Door” on page 3-13

Library Principle

A **Library Principle** is a **Door Data** file and/or a **Feature Group** is a file added from the library[1] to a **Door Job** with no changes made to it.

Library Principles can be associated with a **KvalCAM** revision. The figure below shows a **Feature Group** that is identified as a **Library Principle.**

In this example, a **Hinge Feature Group** was added to the **Door Job** from the **Feature Group Library**. The dark gray diamond icon indicates that the **Feature Group** or **Door Data** is a **Library Principle**.

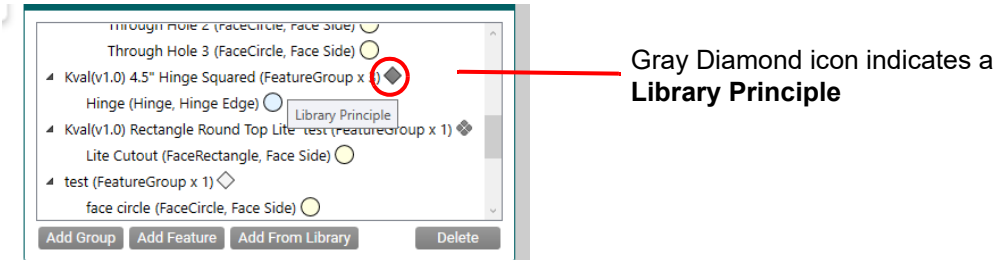


FIGURE 3- 16. Library Principle Icon

Library Principle Variant

A **Library Principle Variant** is a **Door Data** file and/or a **Feature Group** is a file added from the library[2] to a **Door Job** that has changes to it at the **Door Job** level. **Library Principle Variants** can be associated with a **KvalCAM** revision. The figure below shows a **Feature Group and Door Job** that is identified as a **Library Principle Variant.**

In this example, after **Door Job** file was added to the **Door Job,** the **Hinge Bevel** was changed from 3 to 0 causing the variant.

In this example, after **Feature Group** file was added to the **Door Job,** the radii of the hinge corners were changed from 0" to 0.25" causing the variant.

The spotted dark gray diamond icon indicates that the **Feature Group** or **Door Data** is a **Library Principle**.

1. Door Job Library and/or Feature Group Library
2. Door Job Library and/or Feature Group Library

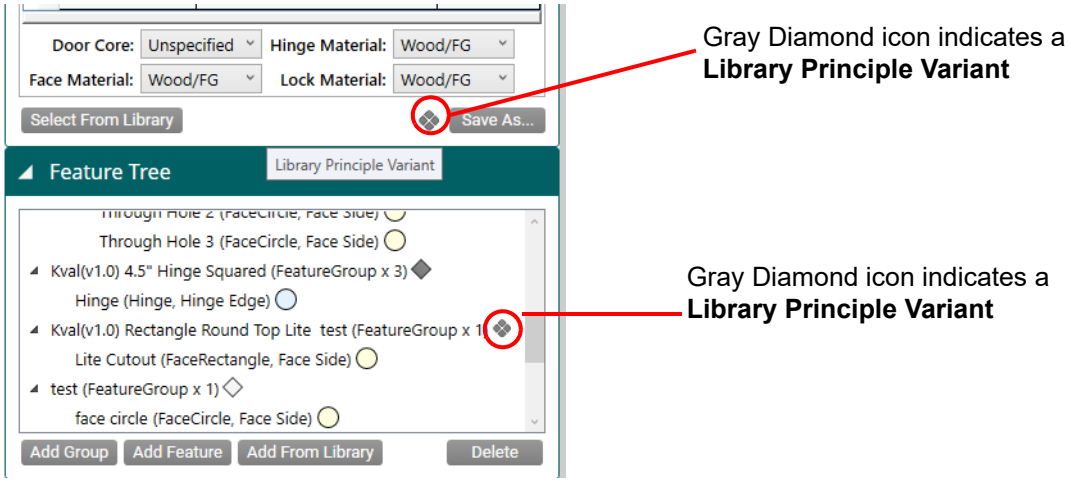
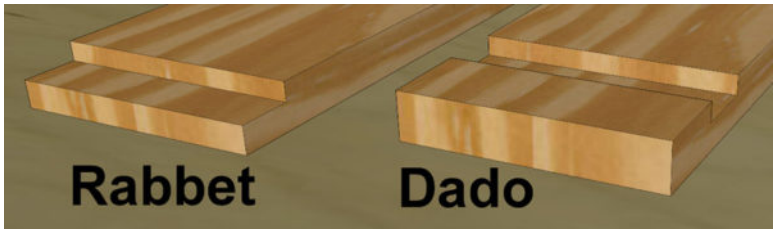


FIGURE 3- 17. Library Principle Variant Icon

R

Rabbet

A rabbet is deep notch formed in or near the edge of a jamb.



In **KvalCAM**, the rabbet width is used in the processing of a jamb. The rabbet width is a **Jamb Property** both the **Hinge Side** and **Lock Side** data tables.

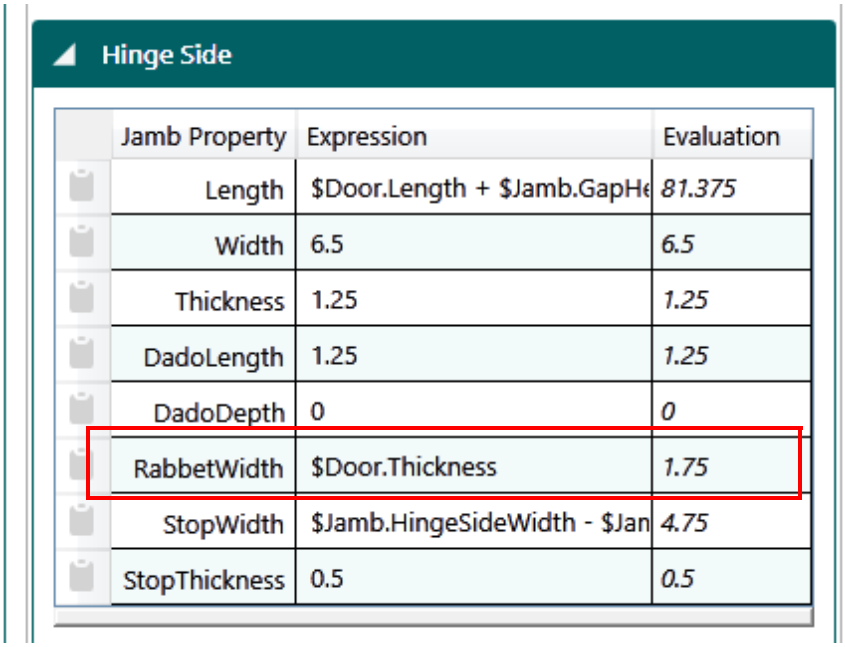


FIGURE 3- 18. Rabbet Width Data

Revision

After editing an existing **Door Job**, **Door Data,** or **Feature Group** in the **KvalCAM** library, a revision is created. Revisions represent a save point in the history of editing, the **Principle** revision is the current *save* point in the case of **Door Data** or **Feature Group**. In the case of a **Door Job**, the **Principle** is the *loaded* version into the editor.

Right Hand Doors and Right Hand Reverse Doors

See “Right Hand Door” on page 3-13

V

Validation

All feature groups are analyzed by a validation routine before the software permits the operator to download the programmed cut to the machines for processing.

The validation routine queries the capabilities of each machine and current tools loaded to determine if the programmed cuts can be performed by the line. If at least one machine in the line is capable of performing each cut/feature in the group, the group will be considered valid and the Add to Queue button will be enabled.

If any feature or cut fails validation, however, an Orange or Red box will be highlighted over the faulty cut/feature for review and the **Add to Queue** button will be disabled. Figure 3- 19 shows a feature that fails validation.

Note: Red only appears if the expression cannot be interpreted to a real number for validation, while orange appears if the line cannot perform the cut.

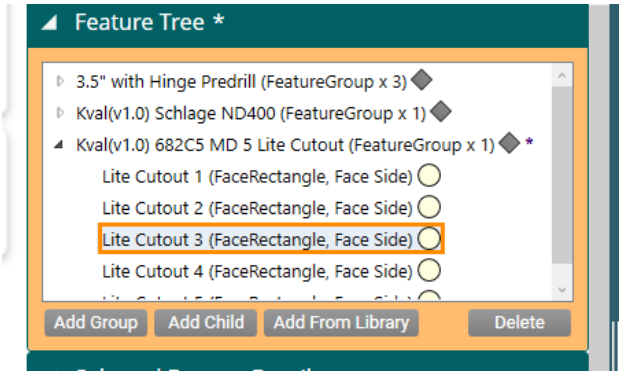


FIGURE 3- 19. Example of a Validation Error Indication

Validation Report

Validation Report identifies particular faults that would cause a feature to fail a process step. Each feature has its own validation tests and will fail if the tests for a valid feature are not satisfied. Clicking on a specific test will provide an explanation of the test being performed so that the user can correct the mistake. Figure 3- 20 shows an example of a Validation Report.

Note: Validation will only work if the information that is fed to the machine line is accurate. Inaccurate information that is downloaded from Tool Configurations, Calibrations, or Libraries (e.g. material types) will produce unexpected or potentially harmful results to the machine and/or operator.

Note: Some process cuts in fringe cases may pass validation that results in non-conforming cuts (cut does not match visual representation). If this incident occurs,

it is recommended to contact the Kval Service Group. See the **Contacting Kval** information that is located on the back of the front cover of this manual.

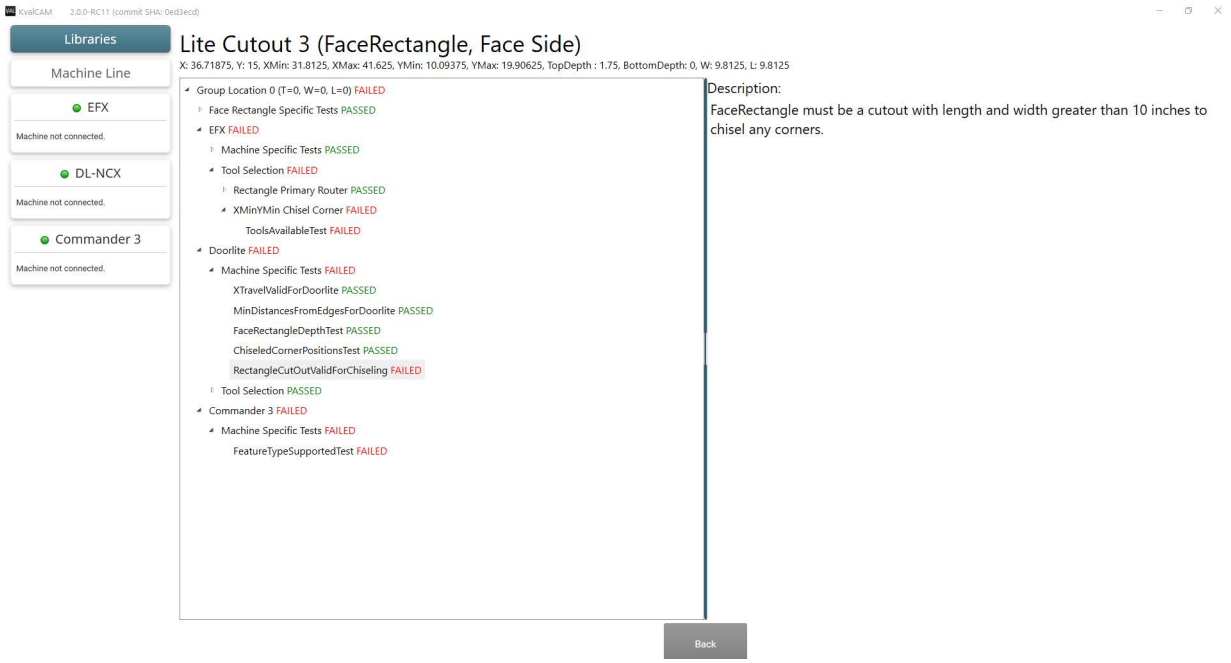


FIGURE 3- 20. Example of a Validation Report

Variant

A variant refers to a **Revision** that has been modified **after** adding it to a **Door Job**. Modified **Variants** are only created by editing a **Revision** inside of a **Door Job**, and can never be directly added to a **Door Job.**

Variants track the use of a **Revision** while still allowing a change to the **Revision** to suit the purposes of the **Door Job.**

For example, there may be a **Feature Group** that represents cuts for a particular lock, but the location of the lock varies between **Door Jobs.** By adding the lock **Feature Group** to the **Door Job**, then changing its location, and saving the **Door Job** a modified **Variant** will be created.

When looking at the associated **Door Jobs** of that lock **Revision** all of the **Door Jobs** will be listed, even if the location varies between the jobs.

Figure 3- 21 Shows an example of a Door Lite Cutout **Feature Group** with a variant that is associated with a **Test Door Job.**

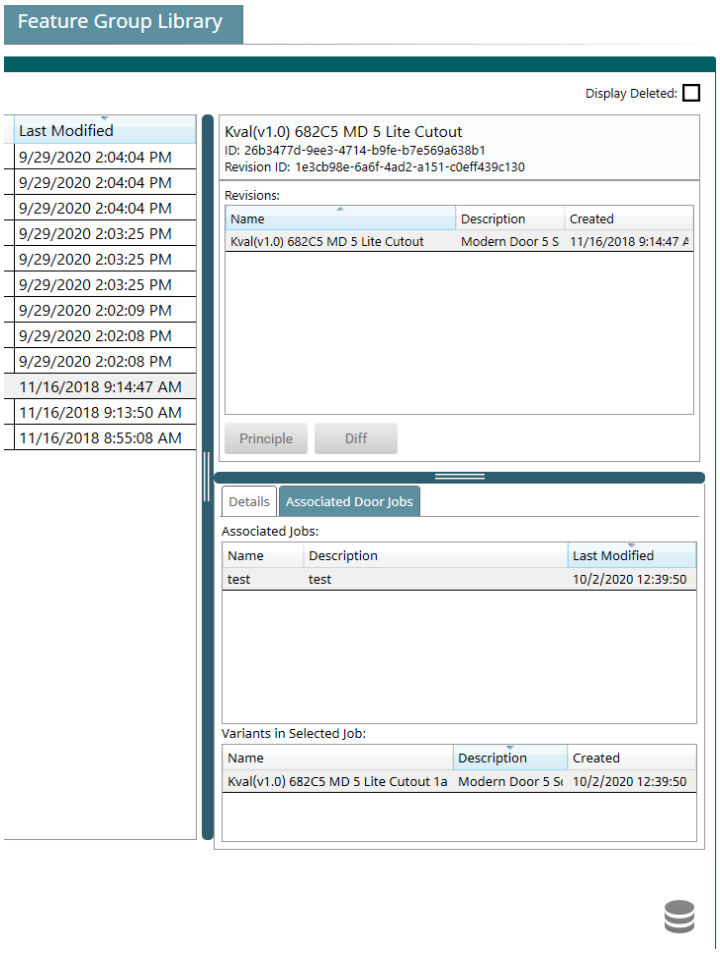


FIGURE 3- 21. Example of a Variant

Table of Symbols and Keywords

The table below describes keywords and symbols. that are available in **KvalCAM**.

Note: The "?" symbol is restricted and can not be used in an expression.

Symbol or Keyword	Description	Example Expression
#	Reference a defined property on the parent feature group	*1+#MyProperty*
$Ancestor#	Reference ancestor (parent or higher) in the tree	*Ancestor1.Length*[1]
$Door	Reference door data	*$Door.Thickness/2*
$Group	Reference group locations for the feature	*$Group.WLocation*
$Math	Access a math function or constant	*$Math.Max(Length,$Math.PI)*
$Parent	Reference parent feature	*$Parent.Length+1*
(and)	Parenthesis order of operation	*(2+2)*2=8*
*	Multiplication	*5*3=15*
+	Addition	*5+1=6*
-	Subtraction	*1-8=-7*
/	Division	*1/8=0.125*

1. *(0basedindex,0=parent,1=grandparent,etc.)*

Common Door and Jamb Properties

The table below describes some of the door and jamb properties that are available in **KvalCAM**.

Door Properties

Property	Description	Example Expression
Feed Rate Percent	Feed rate percent defined for the door.	*$Door.FeedRatePercent*
HingeBevel	Bevel defined for the hinge edge of the door in degrees.	*$Door.HingeBevel*
Length	Length of the door.	*$Door.Length*
LockBevel	Bevel defined for the lock edge of the door in degrees.	*$Door.LockBevel*
Thickness	Thickness of the door.	*$Door.Thickness*
Width	Width of the door.	*$Door.Width*

Jamb Properties

Property	Description	Example Expression
Hinge Jamb Side	Hinge Jamb Dado Length	*$Jamb.HingeSideDadoLength*
	Hinge Jamb Side Thickness	*$Jamb.HingeSideThickness*
	Hinge Jamb Width	*$Jamb.HingeSideWidth*
	Hinge Jamb Rabbet Width	*$Jamb.HingeSideRabbetWidth*
Lock Jamb Side	Lock Jamb Dado Length	*$Jamb.LockSideDadoLength*
	Lock Jamb Side Thickness	*$Jamb.LockSideThickness*
	Lock Jamb Width	*$Jamb.LockSideWidth*
	Lock Jamb Rabbet Width	*$Jamb.LockSideRabbetWidth*
Gaps	Gap at the Header	*$Jamb.GapHeader*
	Gap at the Hinge	*$Jamb.GapHingeSide*
	Gap at the Lock	*$Jamb.GapLockSide*

Property	Description	Example Expression
Header	Header Width	*$Jamb.HeaderWidth*
	Header Rabbet Width	*$Jamb.HeaderRabbetWidth*
	Head Hinge Side Dado Depth	*$Jamb.HingeSideDadoDepth*

Supported Math Constants

The table below describes math constants that are available in **KvalCAM**.

Identi-fier	Description	Example Expression
abs	Absolute value function	*$Math.abs(3 - 5) = 2*
sin	Sine trigonometric function accepting angle in radians	*$Math.sin($Math.PI / 2) = 1*
sind	Sine trigonometric function accepting angle in degrees	*$Math.sind(90) = 1*
cos	Cosine trigonometric function accepting angle in radians	*$Math.cos(0) = 1*
cosd	Cosine trigonometric function accepting angle in degrees	*$Math.cosd(90) = 0*
tan	Tangent trigonometric function accepting angle in radians	*$Math.tan($Math.PI / 4) = 1*
tand	Tangent trigonometric function accepting angle in degrees	*$Math.tand(45) = 1*
asin	Inverse sine (arcsin) trigonometric function	*$Math.asin(1) = PI / 2*
acos	Inverse cosine (arccos) trigonometric function	*$Math.acos(-1) = PI*
atan	Inverse tangent (arctan) trigonometric function	*$Math.atan(1) = PI / 4*
atan2	[1]Quadrant based inverse tangent (arctan) function, first argument is y, second argument is x, uses the polarity of the arguments to determine quadrant	*$Math.atan2(-1, 0) = -PI / 2*
max	Max value between two arguments	*$Math.max(2, 5) = 5*

Identi-fier	Description	Example Expression
min	Min value between two arguments.	*$Math.min(2, 5) = 2*
E	Euler's number.	*$Math.e* = 2.71828...
PI	Math constant Pi (π)	*$Math.PI* = 3.14159...

1.see: https://msdn.microsoft.com/en- us/library/system.math.atan2(v=vs.110).aspx)

http://www.kvalinc.com

Contacting KVAL

Phone and Fax:

In the U.S and Canada, call (800) 553-5825 or fax (707) 762-0485

Outside the U.S. and Canada, call (707) 762-7367 or fax (707) 762-0485

Email: service@kvalinc.com

http://www.kvalinc.com

Customer Service

Mailing address:

Customer Support Department

Kval Incorporated

825 Petaluma Boulevard South

Petaluma, CA 94952