

Collect Calibration Images

To digitize a point of interest (POI) on a calibration object, select the POI by clicking on its name in the table in the ****Calibration Object**** widget. The table row will be highlighted in blue, and when you move the cursor into one of the X-ray windows, the cursor will change to a circle inside a square, with the POI name to the right. The circle represents the expected size of the POI on the X-ray image, which is dependent on the pixel size of the image and the radius of the POI, which is specified in the subject file. The square represents the region of the image that will be searched for the center of the POI (some of the outer pixels of the POI can be outside the square). The size of the square is controlled by the *Click Search Factor* parameter. A larger number makes it quicker and easier to digitize POIs, but you don't want the square to contain more than one POI. When you click the left mouse button, CalibratedDSX will search the X-ray pixels within the square to determine which one is the best candidate for the center of the POI. This is done by using the *Centroid Threshold* parameter to separate the POI pixels from the background, and the *Edge Threshold* parameter to determine if these pixels represent a circular POI. The POI is assumed to be a bright circle on a dark background, with the center of the POI being the brightest. The 2D coordinates of the POI center in each view are calculated as the weighted center of the pixels above the *Centroid Threshold*.

If you make a mistake identifying the proper POI in the first view, you can press the *Esc* key to cancel the process. If you make a mistake after identifying the POI in the second view, you can remove the POI pose by unchecking the *pose* box in the POI table. Once you have digitized a POI, CalibratedDSX automatically advances the current POI to the next one in the table that does not already have a pose (unless the *Auto-advance* box is not checked).

Many calibration objects contain too many beads to manually identify in the X-ray images. These objects usually contain a small number of “tokens” (uniquely shaped radiopaque objects) that can be easily identified. Instead of manually digitizing the beads, you can digitize these tokens instead and then use the **Predict POI Locations** command to automatically identify the beads. The [calibration tutorial](#) describes this process in more detail. If you have difficulty predicting POI locations, there are two likely causes. First, make sure you are digitizing each token in the correct location, which is usually its geometric center but this depends on its XYZ coordinates in the subject file. Use the **Ctrl** key as described below to digitize an exact point. Second, try manually identifying a few of the beads to make sure the POI parameters are correct. Don't worry about identifying them correctly; this is just to make sure the parameter values are right. After confirming that you can digitize them, deselect them and try predicting again using just the tokens.

Once you have identified the POIs for one or more reporting times, you can have CalibratedDSX attempt to automatically identify them for other reporting times using the *Propagate POIs* command in the *Tools* menu. See the wiki entry for this command for more details.

Note: If you hold down the **Alt** key while the POI cursor is displayed over an X-ray image, the cyan point inside the circle will display the location that the centroid-finding algorithm would calculate if you left-clicked with the cursor in its current position. This point will update in real-time as you move the cursor. If the point is not visible inside the yellow square, it means either there is no suitable location of a POI centroid, or that region of the image has been masked by a previously digitized POI.

Note: To override the centroid-finding algorithm and digitize a POI at exactly the XY coordinates you click on, hold down the **Ctrl** key when clicking. While **Ctrl** is pressed, the yellow square will not be displayed, indicating that the centroid-finding algorithm has been deactivated. This feature can be

helpful when digitizing non-circular or overlapping POIs.

Note: When digitizing a POI, all previously digitized POIs on the image are masked out, so that no two POIs can be located at the same point. This is done by using the estimated size of each POI on the image to ignore the circular region of pixels around the POI location. This can be especially helpful when digitizing two adjacent POIs in a sequence of frames. If you digitize one of the POIs in all frames first, then propagating the second POI through the sequence is easier because it can't erroneously "lock onto" the first POI's location.

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