CentroidCalculator User Manual

Overview

CentroidCalculator is a Fusion 360 add-in designed to calculate the centroids of pockets or closed chains in 2D Adaptive operations within the Manufacture workspace. It processes planar faces and edge loops (circular or non-circular) in selected setups, providing centroid coordinates in both centimeters and inches. The results are displayed in a dialog, logged to a file, and saved to a text file for reference. This add-in is particularly useful for machinists and CAM programmers who need precise centroid data for toolpath planning or fixture setup.

Key Features

- Calculates centroids for planar faces and closed edge chains in 2D Adaptive operations.
- Supports both circular (e.g., holes) and non-circular (e.g., complex pockets) edge loops.
- Outputs coordinates in centimeters and inches for flexibility.
- Logs detailed operation data and saves results to a text file.
- Provides robust error handling with user feedback through Fusion 360's UI.

System Requirements

- **Fusion 360**: Latest version with CAM capabilities (cloud updates recommended).
- **Operating System**: Windows 10/11 or macOS (compatible with Fusion 360).
- **Permissions**: Write access to the add-in's directory for logging and text file output.
- **Internet Connection**: Not required for operation, but recommended for initial add-in download and Fusion 360 updates.

Installation

1. **Download CentroidCalculator**:
    - Obtain the CentroidCalculatorAddIn.py file and associated Resources folder from the Autodesk App Store or the developer's distribution channel.

- Ensure the Resources folder contains the add-in's icon for proper display in Fusion 360.

2. **Install the Add-In**:
   - Open Fusion 360.
   - Go to the **Tools** tab > **Scripts and Add-Ins** (under the **Add-Ins** section).
   - In the **Add-Ins** tab, click **Add-Ins** > **Create Add-In**.
   - Navigate to the folder containing CentroidCalculatorAddIn.py and select it.
   - Ensure the **Run on Startup** checkbox is selected for automatic loading.
   - Click **Run** to load the add-in.
3. **Verify Installation**:
   - Switch to the **Manufacture workspace** in Fusion 360.
   - Under the **Tools** tab, locate the **Adaptive Centroid Calculator** panel.
   - Confirm the **Adaptive Centroid Calculator** button is visible (see *Figure 1*).

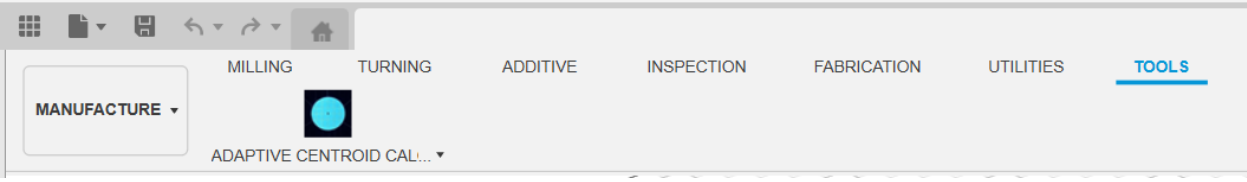

Figure 1: CentroidCalculator button in tools tab

Using CentroidCalculator

CentroidCalculator operates within the Manufacture workspace and requires an active design with CAM setups containing 2D Adaptive operations. Follow these steps to use the add-in:

Step-by-Step Instructions

1. **Prepare a Design with CAM Setup**:
   - Open or create a Fusion 360 design with a part suitable for machining.

- In the **Manufacture workspace**, create at least one setup with one or more 2D Adaptive operations.
- Ensure the 2D Adaptive operations include pocket selections (planar faces or edge chains).

2. **Switch to Manufacture workspace**:
   - In Fusion 360, select the **Manufacture workspace** from the workspace dropdown.
3. **Select a Setup (Optional)**:
   - In the CAM browser, select a specific setup to analyze. If no setup is selected, the add-in defaults to the first setup in the document.
   - To select a setup, click it in the browser or use the **Select** tool to pick it in the canvas.
4. **Launch CentroidCalculator**:
   - Go to the **Tools** tab in the Manufacture workspace.
   - In the **Adaptive Centroid Calculator** panel, click the **Adaptive Centroid Calculator** button.
   - The add-in processes all 2D Adaptive operations in the selected (or default) setup.
5. **Review Results**:
   - A dialog displays the centroid results for each pocket or closed chain in the 2D Adaptive operations (see *Figure 2*).
   - Results include:
     - Setup and operation names.
     - Centroid coordinates (X, Y, Z) in centimeters and inches for planar faces or edge chains.
     - Warnings or errors for invalid geometry (e.g., non-planar faces or unclosed chains).
   - If no valid centroids are found, the dialog indicates this.

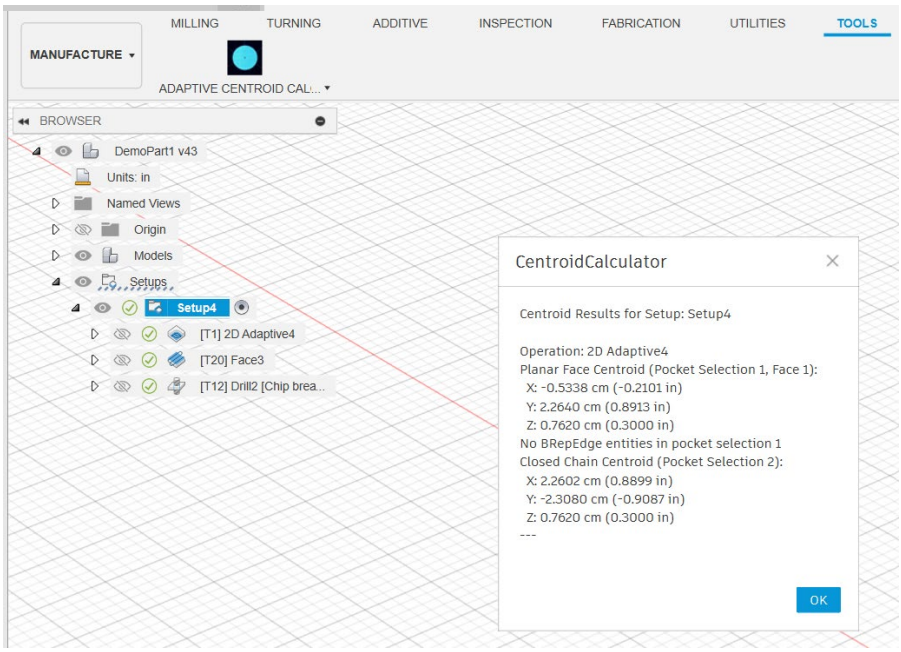

Figure 2: CentroidCalculator results dialog.

6. **Access Output Files**:
    - **Log File**: Check attempt_centroid.log in the add-in's directory for detailed operation logs.
    - **Results File**: Open centroid_results.txt in the add-in's directory to review the centroid results in text format.

Example Use Case

- **Scenario**: Calculate centroids for pockets in a 2D Adaptive operation for a machined plate.
- **Steps**:
    1. Open a design with a plate containing multiple pockets (e.g., circular holes and rectangular slots).
    2. In the Manufacture workspace, create a setup with a 2D Adaptive operation targeting the pockets.
    3. Select the setup in the browser (optional).
    4. Launch CentroidCalculator from the **Tools** tab.

5. Review the dialog showing centroids for each pocket (e.g., circular holes use the circle center, slots use weighted edge centroids).
6. Open centroid_results.txt to copy coordinates for fixture planning.

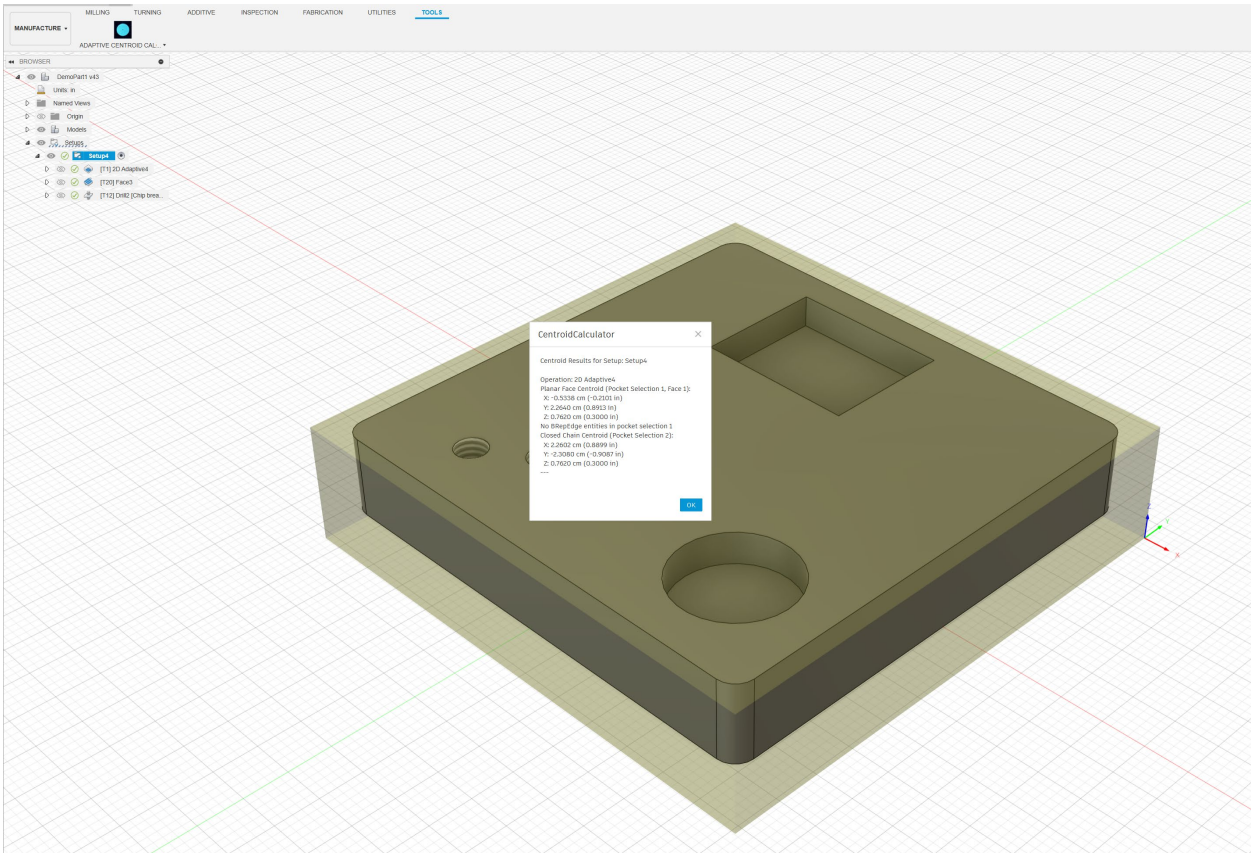

Figure 3: Centroid results for part pockets within Adaptive clearing process.

Logging and Output

CentroidCalculator generates a log file and a text file for tracking operations and results.

Log File

- **Location**: attempt_centroid.log in the add-in's directory (e.g., where CentroidCalculatorAddIn.py is stored).
- **Fallback Location**: If the add-in directory is not writable, logs are saved to the system's temporary directory (e.g., %TEMP%\attempt_centroid.log on Windows).

- **Content**: Includes timestamps, debug messages, errors, and detailed centroid calculations (e.g., edge endpoints, chain construction, and centroid coordinates).
- **Accessing Logs**:
    - Navigate to the add-in directory or temporary directory.
    - Open attempt_centroid.log in a text editor to review operations.

Text Output

- **Location**: centroid_results.txt in the add-in's directory.
- **Content**: Mirrors the dialog output, including:
    - Setup and operation names.
    - Centroid coordinates (X, Y, Z) in centimeters and inches.
    - Warnings or errors for each pocket or chain.
- **Accessing Text File**:
    - Open centroid_results.txt in a text editor or spreadsheet application.
    - Use the data for documentation, toolpath adjustments, or fixture design.

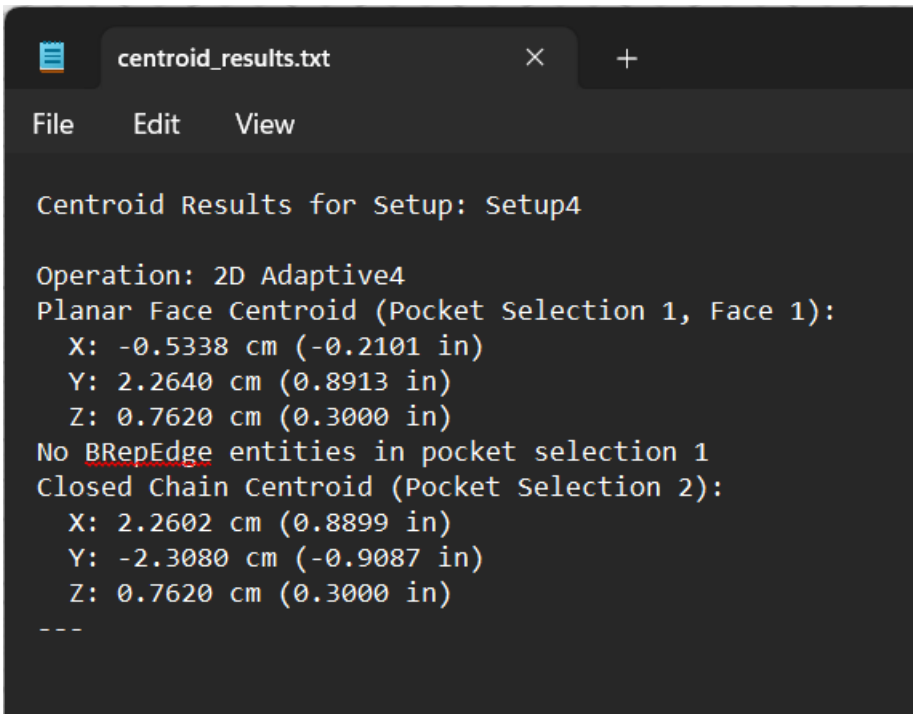

Figure 4: Sample centroid_results.txt

Troubleshooting

Below are common issues and solutions:

Issue: "No CAM data exists in the active document"

- **Cause**: The document has no CAM setups or operations.
- **Solution**:
    - Switch to the Manufacture workspace and create a setup with at least one 2D Adaptive operation.
    - Ensure the design includes machinable geometry (e.g., pockets or contours).

Issue: "No 2D Adaptive operations found in setup"

- **Cause**: The selected setup contains no 2D Adaptive operations.
- **Solution**:
    - Verify the setup includes 2D Adaptive operations (check the operation names in the CAM browser).
    - Create or edit operations to include 2D Adaptive strategies targeting pockets.

Issue: “No curve selections found in pockets”

- **Cause**: The 2D Adaptive operation’s pocket parameter is empty or invalid.
- **Solution**:
    - Edit the operation in the Manufacture workspace.
    - Ensure the **Pockets** parameter includes valid selections (planar faces or edge chains).
    - Reselect the pocket geometry if necessary.

Issue: “Failed to build edge chain”

- **Cause**: The edge loop is not closed or contains invalid geometry.
- **Solution**:
    - Check the log file for details on the failing edges (e.g., endpoints not connecting).
    - Verify the pocket geometry in the design is continuous and closed.
    - Simplify complex edge loops or repair the model in the Design workspace.

Issue: “Permission denied writing to centroid_results.txt”

- **Cause**: The add-in lacks write permissions for the add-in directory.
- **Solution**:
    - Run Fusion 360 as an administrator.
    - Move the add-in to a writable directory (e.g., Documents\Fusion 360\AddIns).
    - Check the log file for the fallback log location (temporary directory).

Issue: Add-In Does Not Appear in Manufacture workspace

- **Cause**: The add-in failed to load or was not installed correctly.
- **Solution**:
    - Go to **Tools** > **Scripts and Add-Ins** and check for errors in the add-in list.
    - Verify the Resources folder is in the same directory as CentroidCalculatorAddIn.py.
    - Review the log file for initialization errors.

Advanced Tips

- **Selecting Specific Setups**: Always select the desired setup in the CAM browser before running CentroidCalculator to avoid processing the default setup.
- **Complex Pockets**: For non-circular pockets, ensure edge loops are clean and continuous to avoid chain-building errors.
- **Log Analysis**: Use attempt_centroid.log to debug complex geometries, as it includes detailed edge and centroid data.
- **Batch Processing**: To process multiple setups, run CentroidCalculator for each setup individually or extend the add-in via the API for automation.
- **Coordinate Usage**: Copy centroid coordinates from centroid_results.txt for use in CNC programming or fixture design software.

Support

For issues not covered in this manual:

- **Log Files**: Share attempt_centroid.log and centroid_results.txt with support for detailed diagnostics.
- **Developer Contact**: Check the Autodesk App Store page for support details or contact support@automatedviking.com .

License

CentroidCalculator is distributed under the terms specified by its developer. If purchased or downloaded from the Autodesk App Store, refer to the store's licensing agreement. For custom distributions, contact the developer for licensing details.

Version History

- **Version 1.0** (June 2025): Initial release with centroid calculation for planar faces and edge chains, logging, and text output.

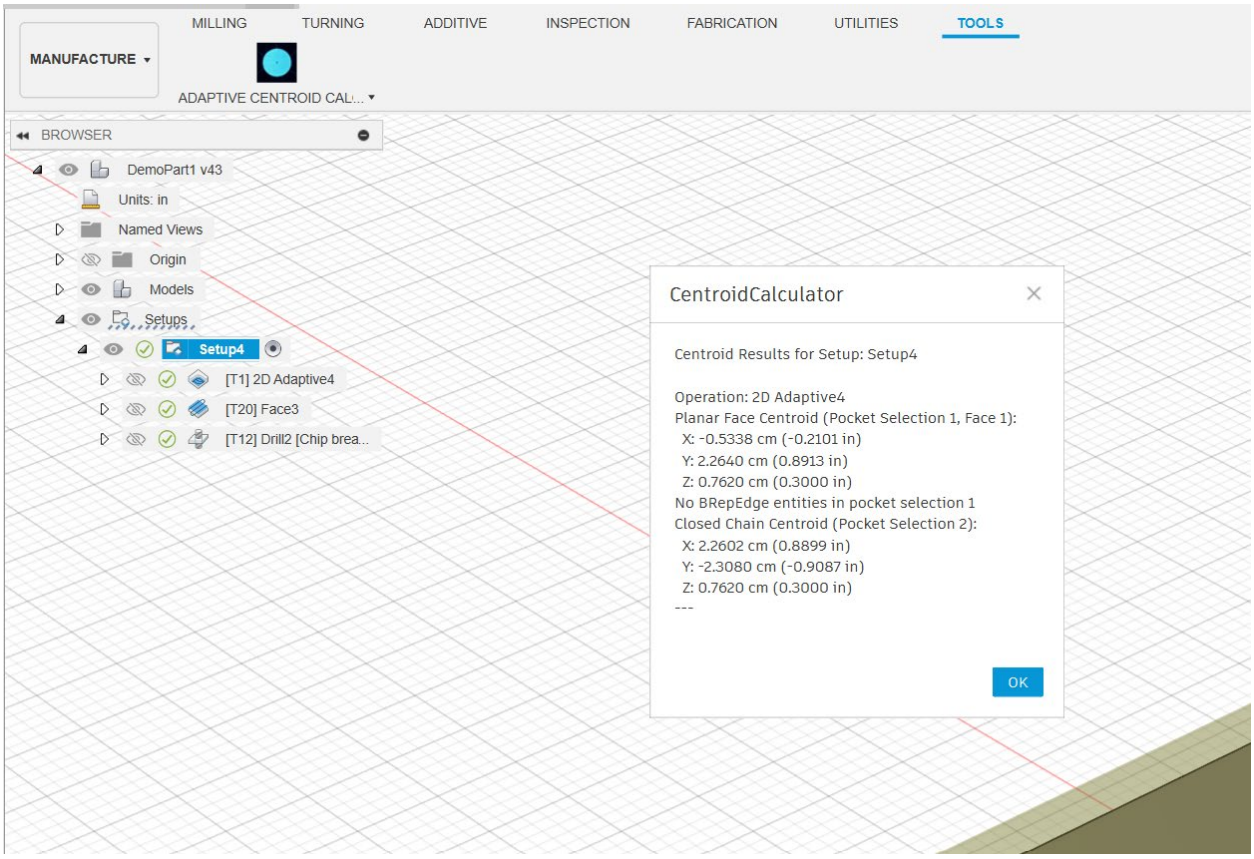

Figure 5: CentroidCalculator processing all pocket centroids within Adaptive clearing processes.

This manual is provided as-is. Ensure you have the latest version of CentroidCalculator and Fusion 360 for optimal performance.