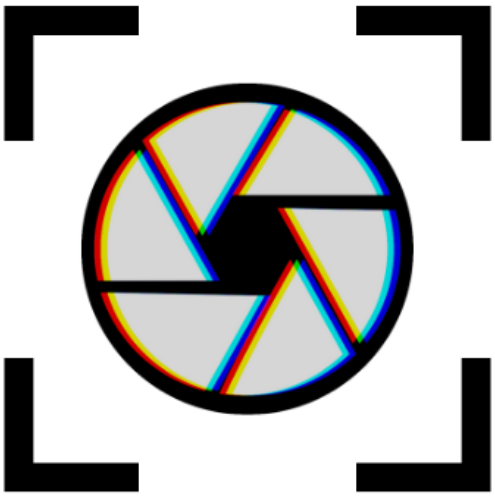


ProcessCapturer

Convert your creation process into images/video

User Manual

Media Computing Project – WiSe 21/22
RWTH Aachen

Group 3
Wing Yin Chan
Sai Limaye

Description

ProcessCapturer is a Fusion360 add-in which captures your created models and then converts them into images and video*. Steps details can be shown on the generated media files* which help illustrate the creation process. The add-in provides full functionalities on Windows and hence it is suggested to use it on Windows. Limited features are available on MacOS. Version discrepancy details are given in the *Usage* section.

* Features of adding step details and generating video are only available on the **Windows** version.

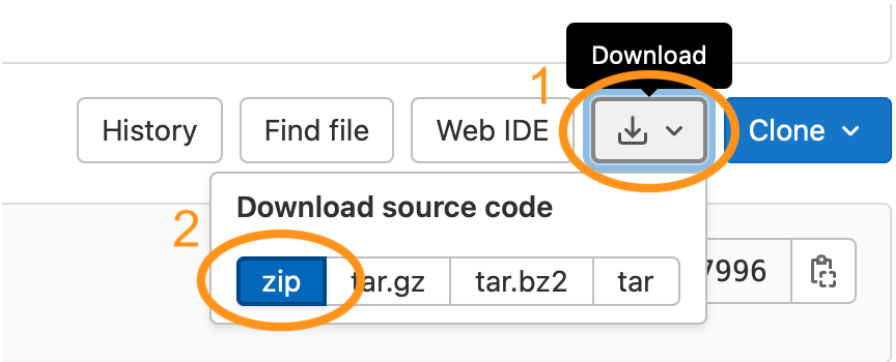
Installation

ProcessCapturer runs on both Windows and MacOS devices. The installation procedures on both platforms are the same. Please download the ProcessCapturer source folder from our GitLab repository before proceeding.

Download the source folder:

- Go to ProcessCapturer GitLab repository at https://git.rwth-aachen.de/wingyin97606/mcp-group3.

- Click “Download” → “zip” to download the source folder.



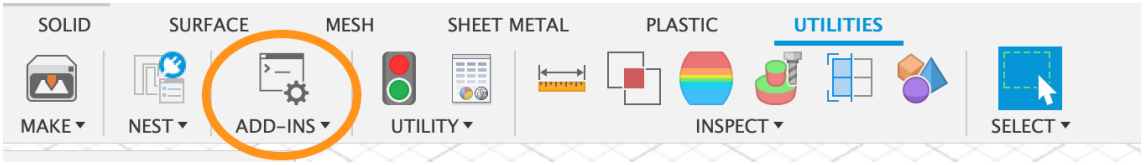
After downloading the source folder to your computer locally, please follow either method below to install the add-in in Fusion 360.

- Method 1

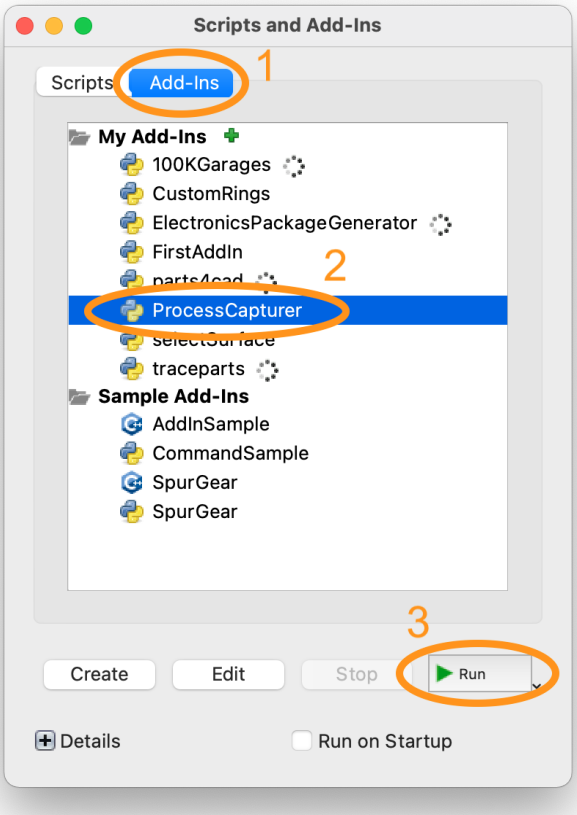
Step 1: Unzip the downloaded file and place the ProcessCapturer folder in the below path according to your operating platforms:

Windows: *%appdata%\Autodesk\Autodesk Fusion 360\API\AddIns*
MacOS: $HOME/Library/Application Support/Autodesk/Autodesk Fusion 360/API/AddIns

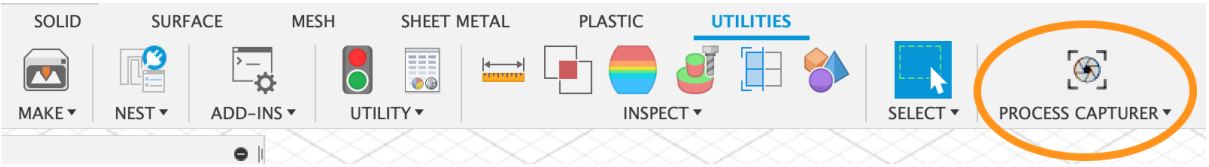
Step 2: Open Fusion360 and click "ADD-INS" under the UTILITIES tab to open the add-in dialog.



Step 3: In the add-in dialog, click "Add-Ins". You should be able to see that ProcessCapturer has been added to your list of add-ins. Select it and click "Run" at the bottom.



Step 4: If a new panel named ProcessCapturer has been added under the UTILITIES tab, the installation and activation of the add-in are successful.

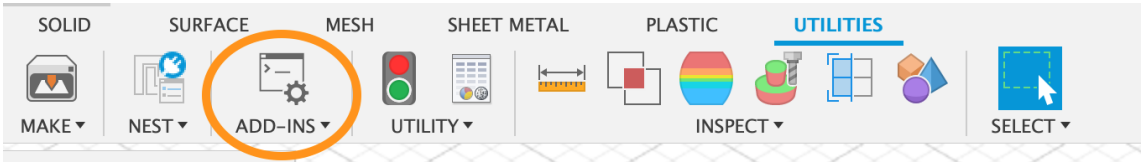


- Method 2

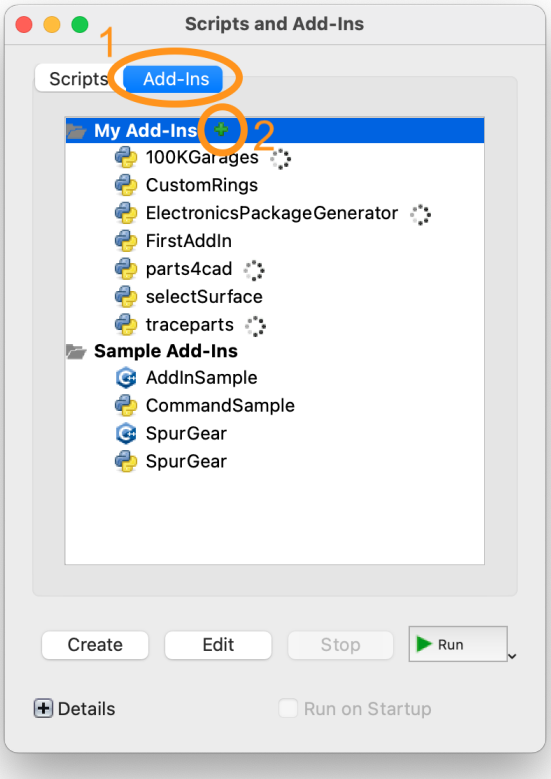
If you did not place the unzipped folder in the directory stated in Method 1, you may still install the add-in to Fusion360 by the following:

Step 1: Unzip the downloaded file and place the ProcessCapturer folder in your desired directory.

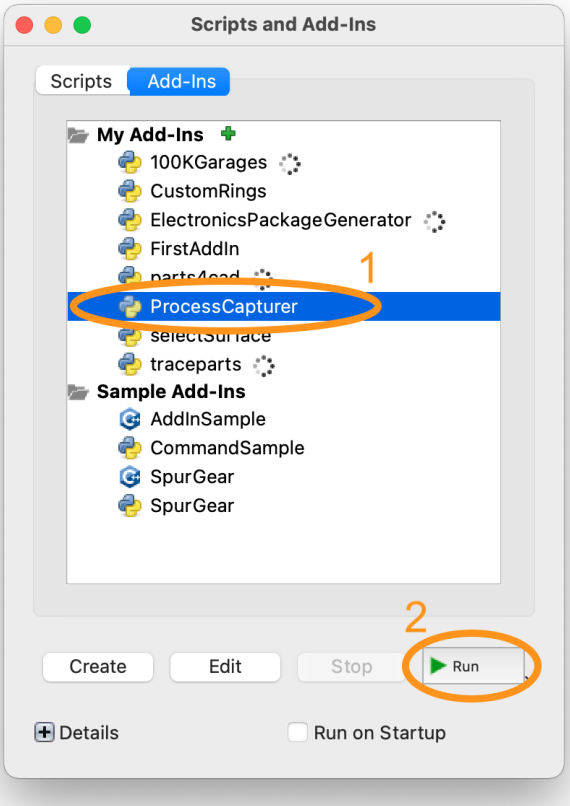
Step 2: Open Fusion360 and click “ADD-INS” under the UTILITIES tab to open the add-in dialog.



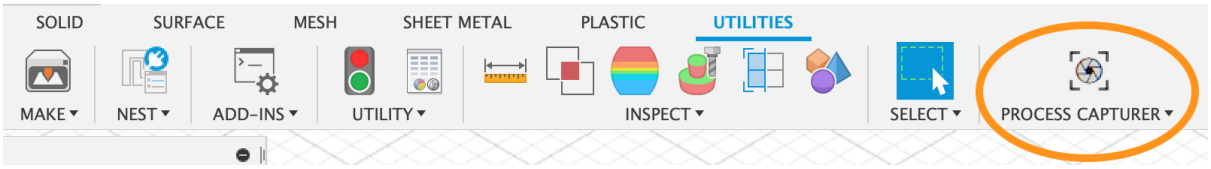
Step 3: In the add-in dialog, click “Add-Ins”. Then click on the green “+” button to select the directory that you placed the ProcessCapturer folder in.



Step 4: After selecting the correct folder, a new item ProcessCapturer should be displayed in the list of add-ins. Select it and click “Run” at the bottom.



Step 5: If a new panel named ProcessCapturer has been added under the UTILITIES tab, the installation and activation of the add-in are successful.



If you encounter any problems during the installation process, please refer to the official instructions provided by Fusion360 at https://help.autodesk.com/view/fusion360/ENU/?guid=GUID-9701BBA7-EC0E-4016-A9C8-964AA4838954.

Usage

Due to the use of the external OpenCV library in ProcessCapturer, which is not functioning with Fusion 360 on MacOS unless explicitly installed locally, our add-in behaves adaptively with different functionalities on both platforms:

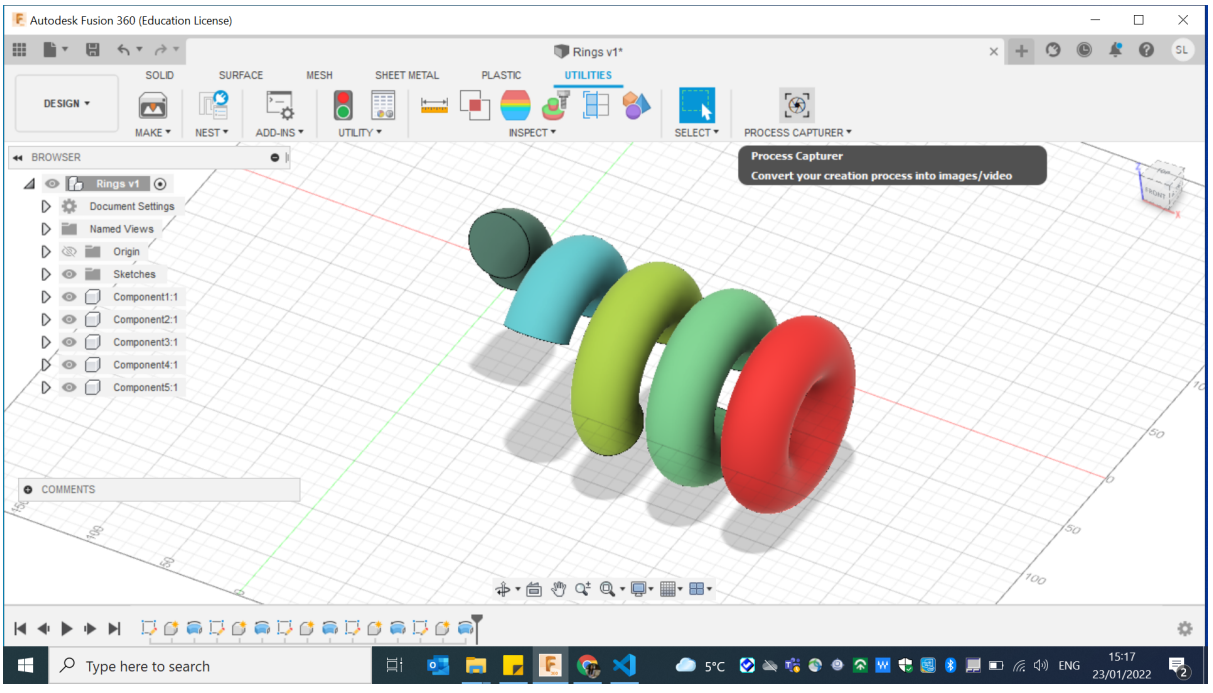
- Running on **Windows**: It is able to take snapshots from the users' design and then create a video out of these images, with step description texts displayed on each frame if desired.
- Running on **MacOS**: Only taking snapshots with no special text added are available.

Detailed steps of using ProcessCapturer on both platforms are illustrated as follow:

Running on Windows

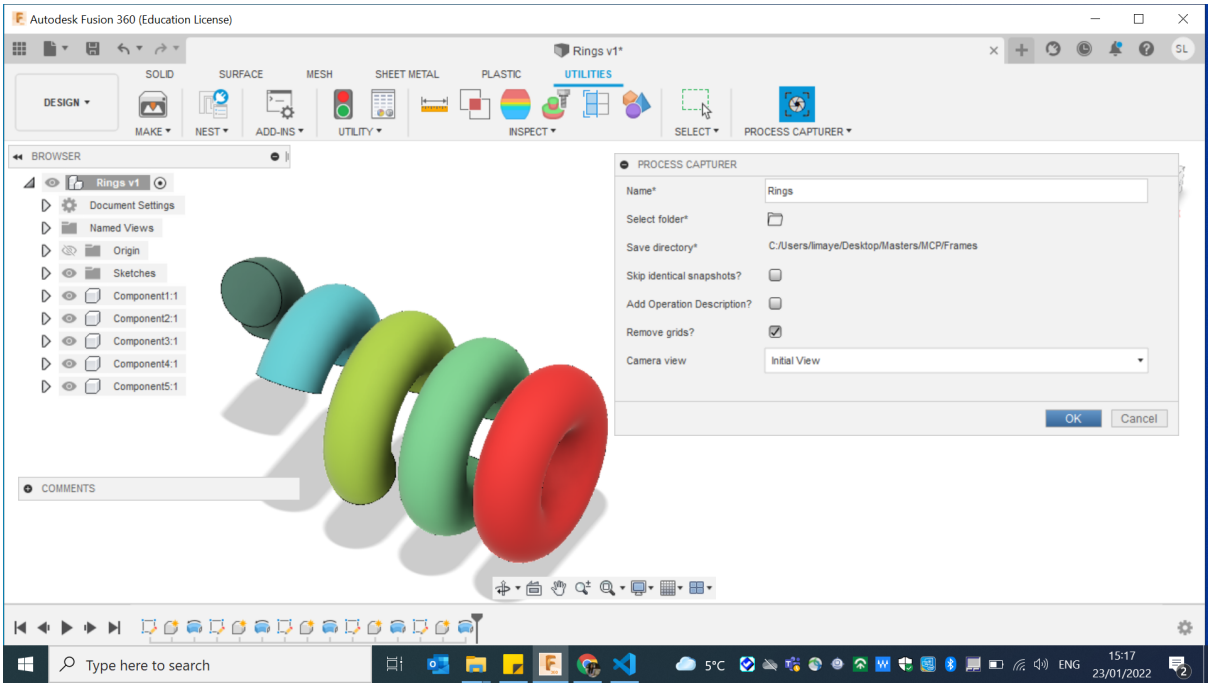
Step 1: Open a model. Either import an existing model or create a new design.

Step 2: Run the add-in. Click on the button Process Capturer under the UTILITIES tab to start the plugin.

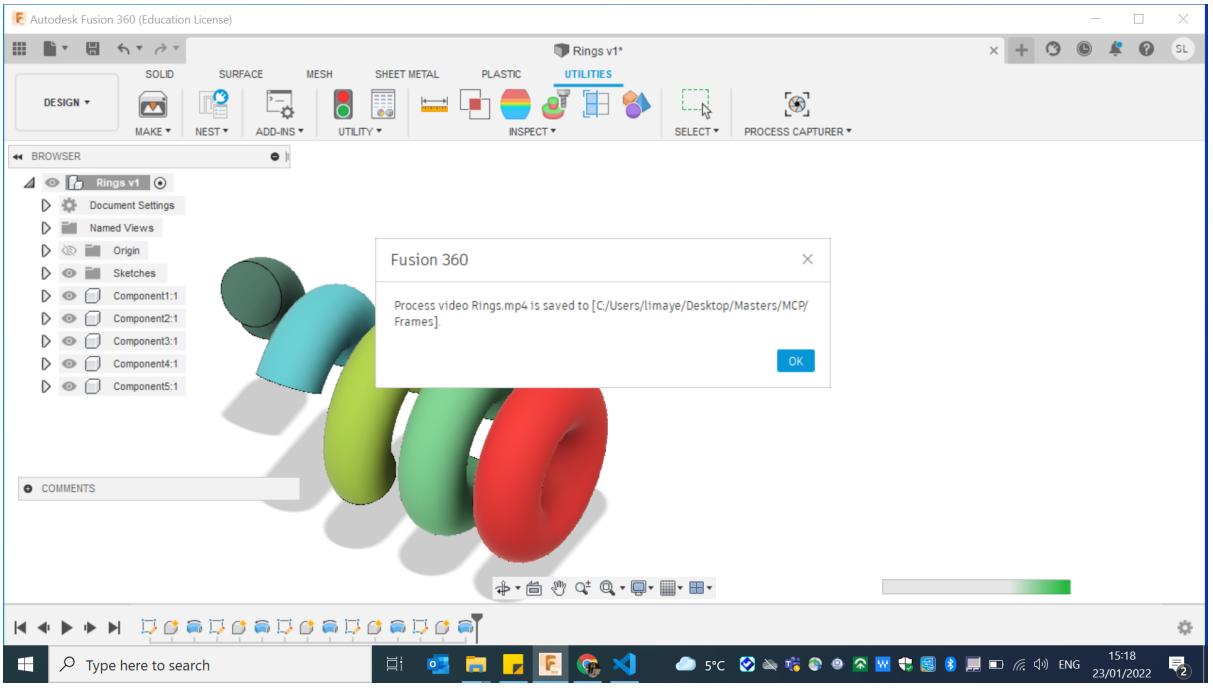


Step 3: Input required parameters. Once the plugin starts, it will ask the user for different inputs like the Name of the video and the folder that they wish to save the video in. The Name and Target folder inputs are mandatory to be filled. They are indicated with *. Without them, the user won't be able to move forward. The plugin also provides more input options like the following -

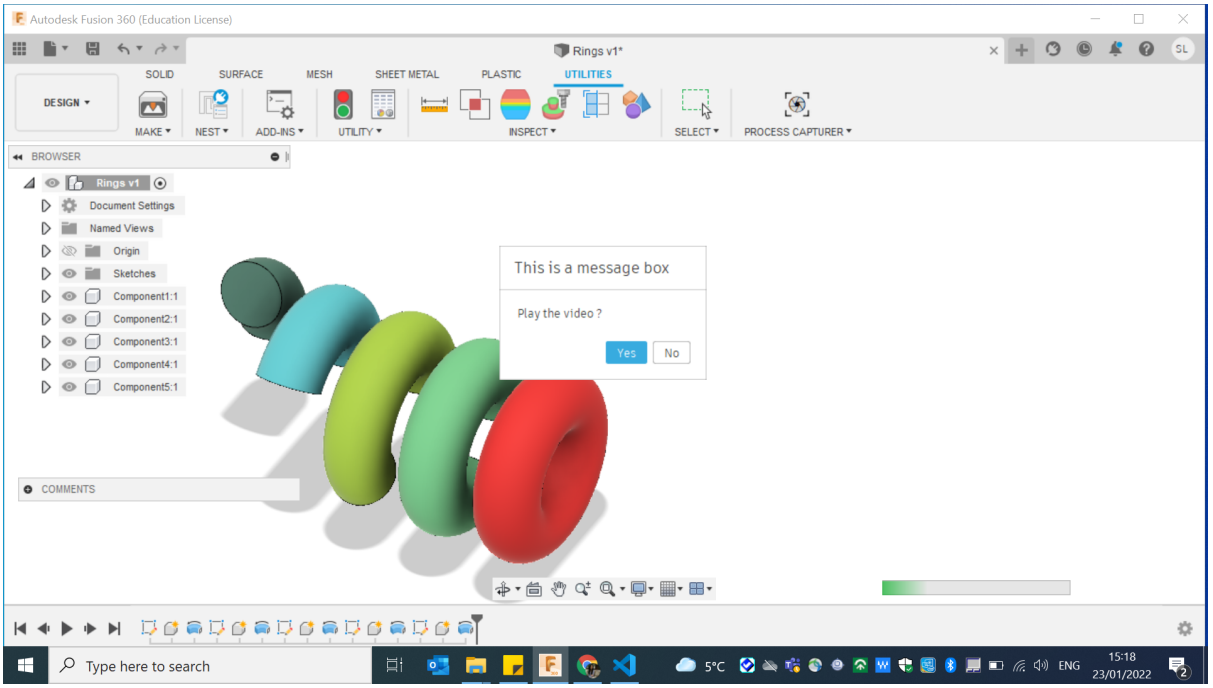
- Skip identical snapshots - There are some operations like Sketch, ConstructionPlane, ConstructionPoint, ConstructionAxis, ThreadFeature , Combine, Occurrence which do not make a visible change in the model. This feature will skip these steps from the video.
- Add operation description - This feature will add the name and details of the operation performed in that step of the creation process.
- Remove grids - Using this feature, the user can remove the background grids from the video.
- Camera view - This feature allows the user to change the camera view and view the model from different perspectives like Front view, Top view, Back view, Left view, Right view.



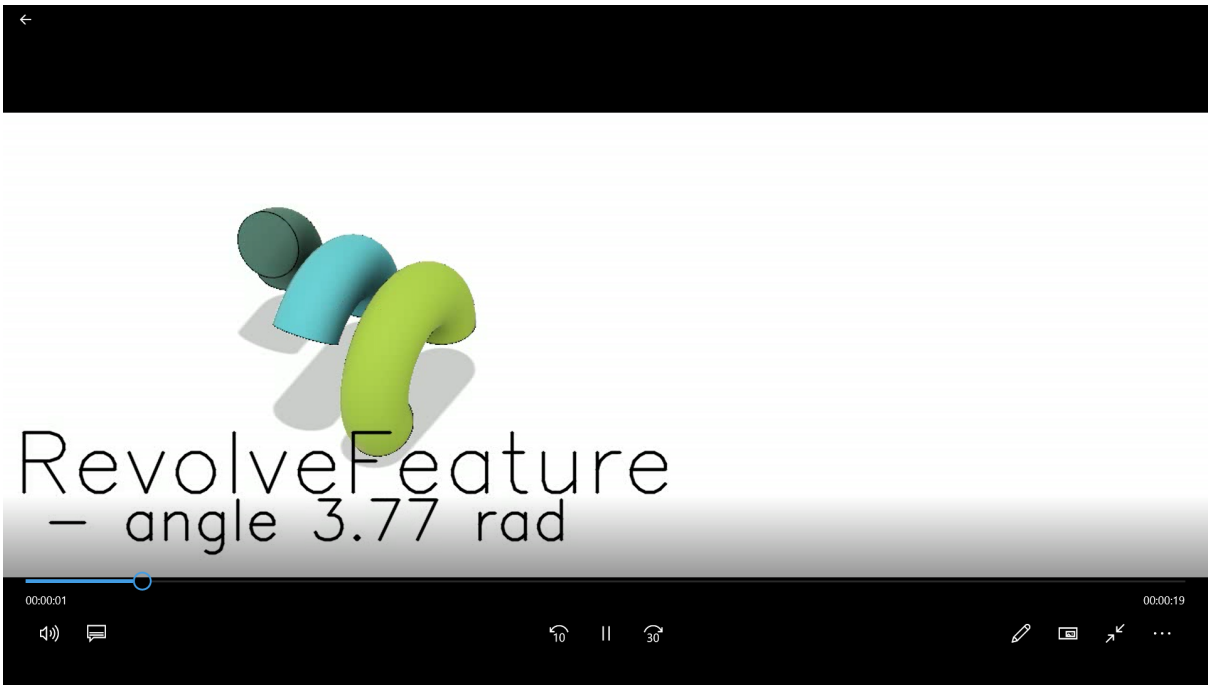
Step 4: Finish processing. Once the inputs are entered, the plugin will start and once the process is finished, it will display a message saying that the Process video is saved in the given target folder.



Step 5: Play the created video. The plugin will then ask if the user wishes to play the video



If the user clicks on Yes, then a video player from their machine will be opened to play the video.

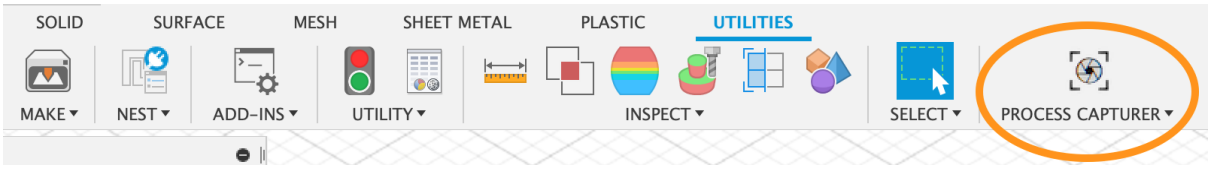


Running on MacOS

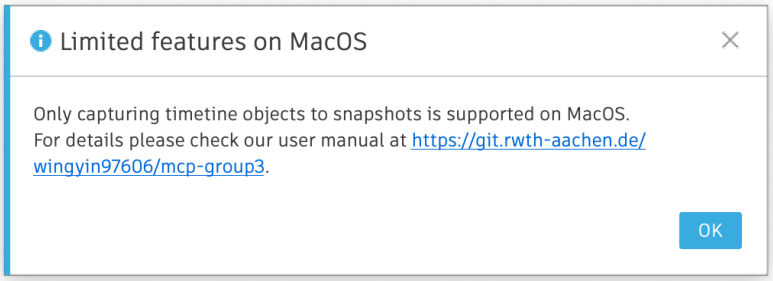
The using procedures on MacOS are similar to that on Windows.

Step 1: Open a model. Either import an existing model or create a new design.

Step 2: Run the add-in. Click on the button under the UTILITIES tab to start the add-in.

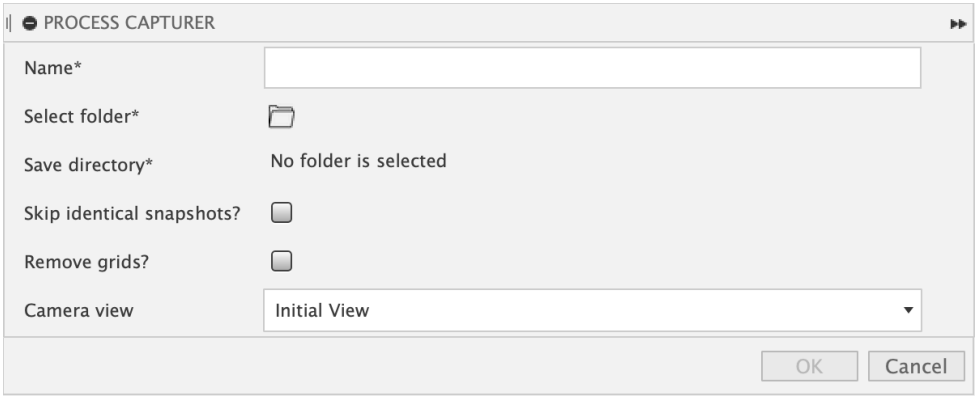


When the add-in is first started, an information dialog box will be shown to notify users about the limited features availability on MacOS. For details please refer to the *Usage* section.



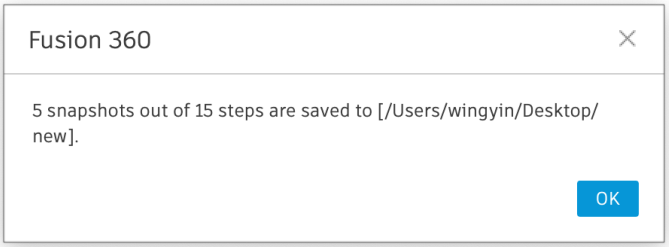
Step 3: Input required parameters. A command input dialog will be shown when the plugin is started. It will ask the user for different inputs like the Name of the snapshots and the folder that they wish to save the images. The Name and Target folder fields are mandatory to be filled. They are indicated with *. Without them, the user won't be able to move forward. The plugin also provides more input options as described as below:

- Skip identical snapshots - There are some operations like Sketch, ConstructionPlane, ConstructionPoint, ConstructionAxis, ThreadFeature , Combine, Occurrence which do not make a visible change in the model. This option will skip these steps from the captures.
- Remove grids - Using this feature, the user can remove the background grids from the images.
- Camera view - This feature allows the user to change the camera view and view the model from different perspectives like Front view, Top view, Back view, Left view, Right view.

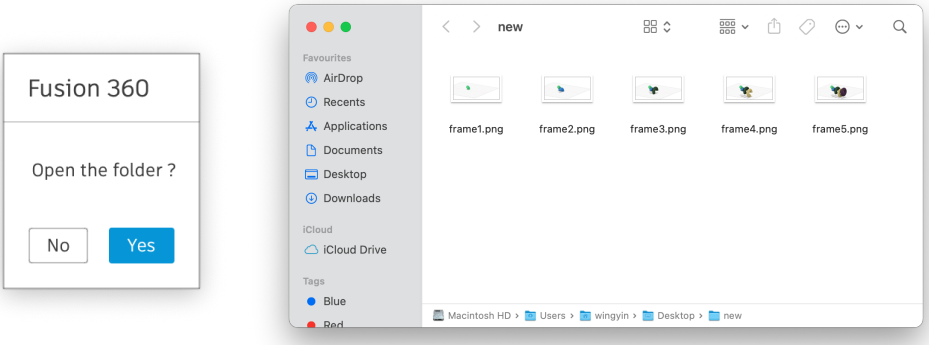


Please click OK after all necessary inputs are entered.

Step 4: Finish capturing. Once the inputs are entered and OK is clicked, the plugin will start working. A message saying that the snapshots have been saved in the given target folder will be displayed after the process is done.



Step 5: Open the target folder. The plugin will then ask if the user wishes to open the folder where those images are saved. If the user clicks on Yes, the folder will be opened in the default application (i.e. Finder).



Working Procedures

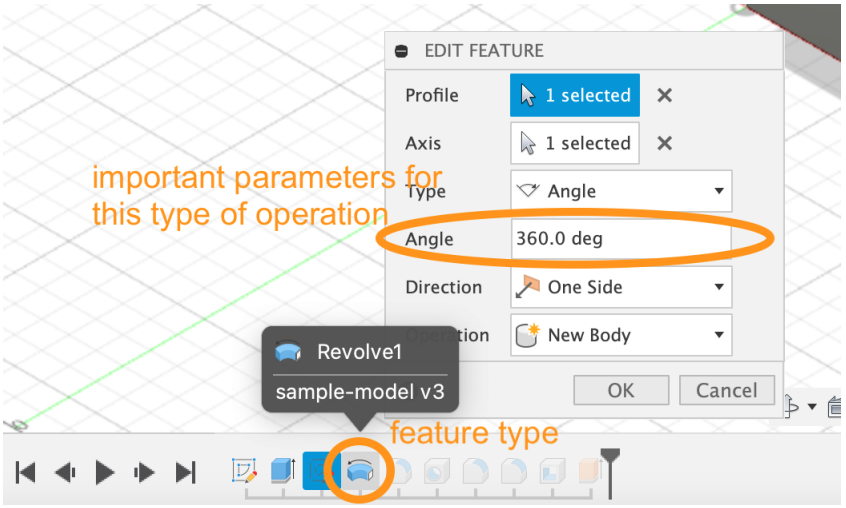
ProcessCapturer captures your design model step by step and then generates snapshots or video to assist you showcase your design process to others. The working mechanisms behind it are described in the following.

Step 1: Get user inputs
ProcessCapturer firstly reads the user inputs from the add-in dialog. It gets the saving directory, filename and other preferences that are entered by users in this stage.

Step 2: Retrieve the required steps of the model from timeline
ProcessCapturer accesses all the steps from your design timeline.

After obtaining the whole operation list from the timeline, it will then identify the type of feature of each step. If "skip identical snapshot" is checked in Step 1, any operation of feature types Sketch, ConstructionPlane, ConstructionPoint, ConstructionAxis, ThreadFeature or Combine will be excluded in the later procedures. These feature types are omitted since they make no visual changes to the intermediate model.

Then it retrieves the operation details of those selected steps. It will process the retrieved data and convert into easy readable sentences that could be printed on the frame afterwards.



Step 3: Take snapshots for each step and save them in the target folder

Once we have the customised timeline model with the user-defined inputs, the plugin will iterate through each step and take snapshots of the corresponding phase of the model and save it in the user selected folder.

Step 4: Add text on each captures and create video (running on Windows only)

OpenCV provides a real-time optimised Computer Vision library which can be used for image and video processing. Once the snapshots for each step are saved in the target folder, using Opencv, Process Capturer will read each image and add their text descriptions if it is selected by the user. If not, this step is skipped. These images will be then combined sequentially to create a video and it will be saved in the user selected folder.

Step 5: Play the video or open the saving directory
On Windows, the plugin uses os.startfile() which starts the selected file in its associated program. So, if the user selects to play the video, the plugin will play the created video in a video player that is available on the user's machine. On MacOS, the plugin will open the folder that where the snapshots are saved instead using the default application (i.e. Finder).

Design Choices

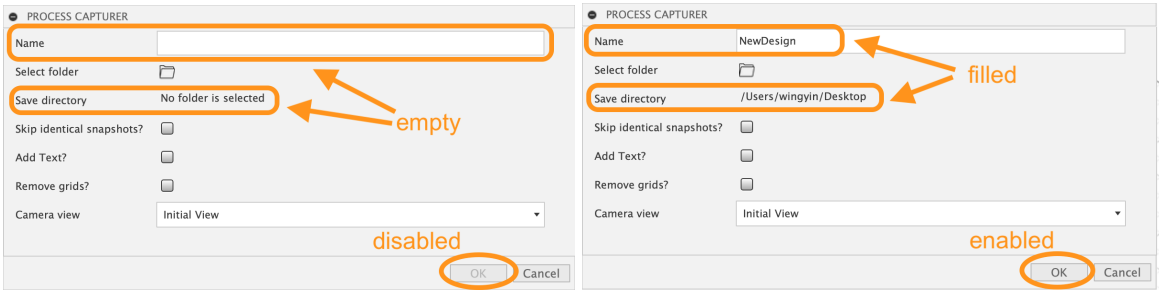
This part highlights the design choices that we adopted in ProcessCapturer in order to enhance the user experience.

Placement of the add-in

ProcessCapturer is placed in a newly created panel under the UTILITIES tab. The add-in serves as a tool that helps perform additional capturing without altering the model itself, hence it is suitable that it goes under the tab UTILITIES. Users can find the button easily without looking into submenus under different panels.

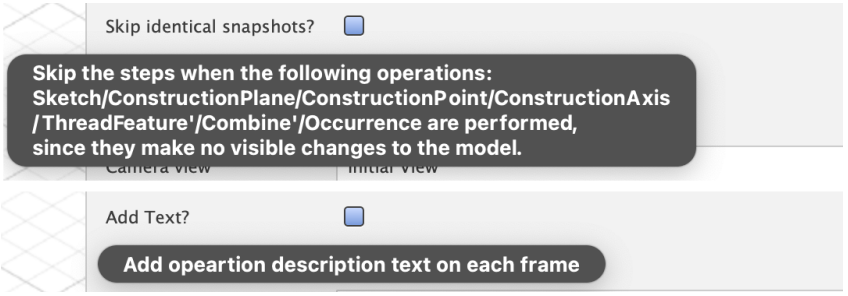
Disabling OK button for input validation

The fields "Name" and "Save directory" are mandatory. The OK button is enabled only when both these fields are filled. This checking avoids users from proceeding to further steps with insufficient inputs that lead to erroneous results.



Showing tooltips at input options

Tooltips are provided at “Skip identical snapshots” and “Add text” checkboxes to explain the purposes of these two options.

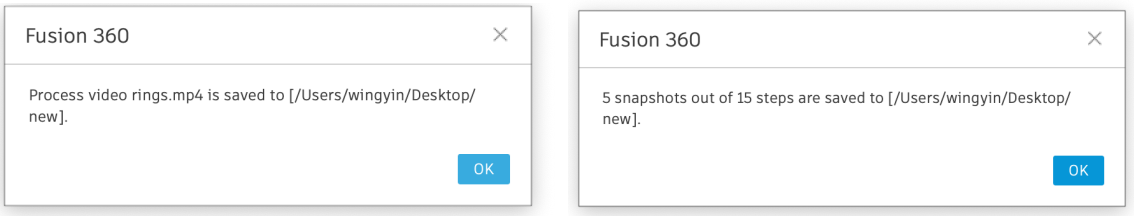


Showing input preview and visualising the capture process

When “Remove grids” or “Camera view” is selected in the input dialog, users are able to see those changes immediately in the design. This helps let the users understand what these options are used for. Also, the History Marker will move through the timeline during the capturing process to let users know what is doing with the add-in.

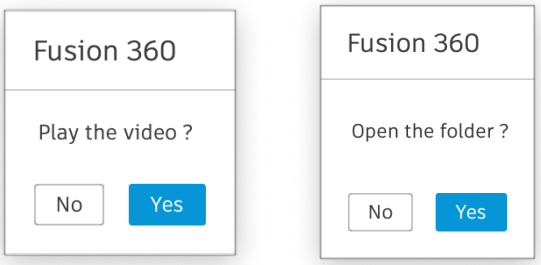
Displaying finish message

A message dialog will be shown after the capturing is done. It shows the total number of snapshots taken and their saving path. These help users understand what has been performed immediately.



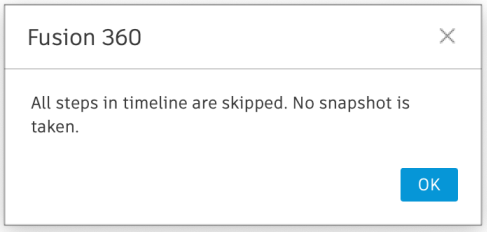
Opening the video or folder after the process is finished

A message dialog will be shown after the above finish message to allow users open the saved video/folder directly. This helps users check the resulting media files conveniently.



Limitations

ProcessCapturer is designed to capture models but not sketches. When running this add-in on projects with only sketches created, although it will not cause error, only empty planes will be captured in each frame. If “Skip identical snapshots ” is checked, it means that all steps from the timeline will be omitted and an alert message will be shown as below.



Hence, it is recommended to use it only on projects with solid objects created.