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Fly Elise-ng
MSFS Multi-View
Step by Step Guide v2.0

1 Introduction

MSFS2020 has been released back in 2020. In November 2024 Microsoft and Asobo released MSFS2024.
MSFS2024 has a bumpy landing. The new "stream all" implementation ensures that almost all content is streamed from the MS servers. All the airplanes, scenery, liveries and other SimObjects are streamed online during and after the game startup.
Back in 2020 Microsoft introduced an experimental multi-monitor feature in MSFS2020 SU10. The feature was experimental, undocumented and virtually unusable.
The following 3 key functionalities are missing from the current MSFS multi-monitor feature:

- Consistent and accurate specification and configuration of the view/camera position and orientation (pitch, bank, heading) for each view independently.
- Accurate specification of the Horizontal and/or Vertical Field of View (FOV) for each view/camera independently, including asymmetric FOV and frustums.
- System level specification for the multi-view parameters independent from the selected plane or flight scenario.

Although there have been so many attempts to contact and convince Asobo and Microsoft to implement and release a proper and functional multi-view interface similar to ViewGroups in P3D and multi-view in X-Plane, Asobo/Microsoft have failed to provide a clear roadmap for this essential multi-view feature.

Fast forward to the release date of MSFS2024, Microsoft removed the "experimental" flag from MSFS2024 multi-monitor feature but did not implement the required controls for properly configured the views.

We at Fly Elise-ng decided to take the current multi-monitor feature and work-around all its limitations and inconsistencies in order to provide a usable and workable multi-view geometrical correction and edge blending for perfect 100% geometrically accurate view.

We updated our Immersive Calibration PRO, Immersive Display PRO and Immersive LCD PRO software packages to support multi-PC (one channel/view per PC) and Single-PC (multiple channels/views per PC) using the current multi-view implementation in MSFS2020 and MSFS2024.

This document does not describe the steps needed to design and auto-align your multi-projection (Immersive Calibration PRO) or multi-LCD visual system (Immersive LCD PRO).
For all details about designing and auto-aligning workflow, please check our website for the latest documentation and step by step guides:

Calibration PRO User Guide
Calibration PRO Step by Step (No Cam)
Calibration PRO Step by Step (Multi Cam)
Immersive LCD PRO Step by Step Guide

The rest of this step by step guide describes the steps needed to:

- Export the multi-view data from Immersive Calibration PRO and/or Immersive LCD PRO for MSFS2020 and MSFS2024.
- Configure MSFS with the exported MSFS multi-view data
- Configure and use Immersive LCD PRO and Immersive Display PRO with the exported MSFS multi-view data

The latest Immersive LCD Pro and Immersive Display PRO include single-click tools to configure the installed MSFS2020 and MSFS2024 with the exported multi-view data each time the system in re-calibrated.
The users so not need to manually change one or more MSFS2020 MS2024 files.
However, the manual editing of the MSFS files is still possible and available.

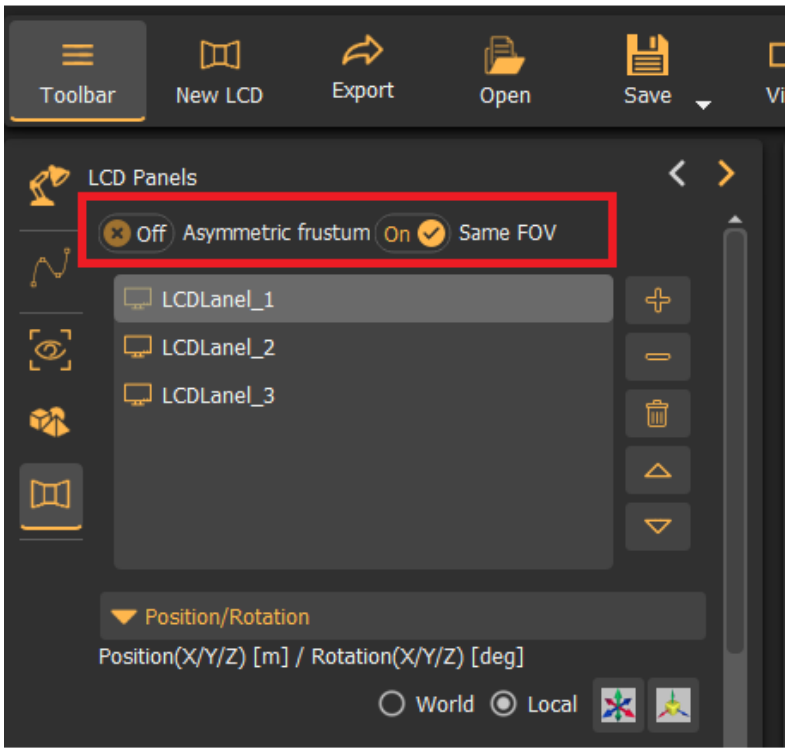
FPS PERFORMANCE DISCALIMER: All Fly Elise-ns warping and edge-blending processing is performed on the GPU. Our warping algorithms use the most advanced GPU techniques and minimal GPU resources to limit the impact of the warping on the frame rate. The processing algorithms are optimized to

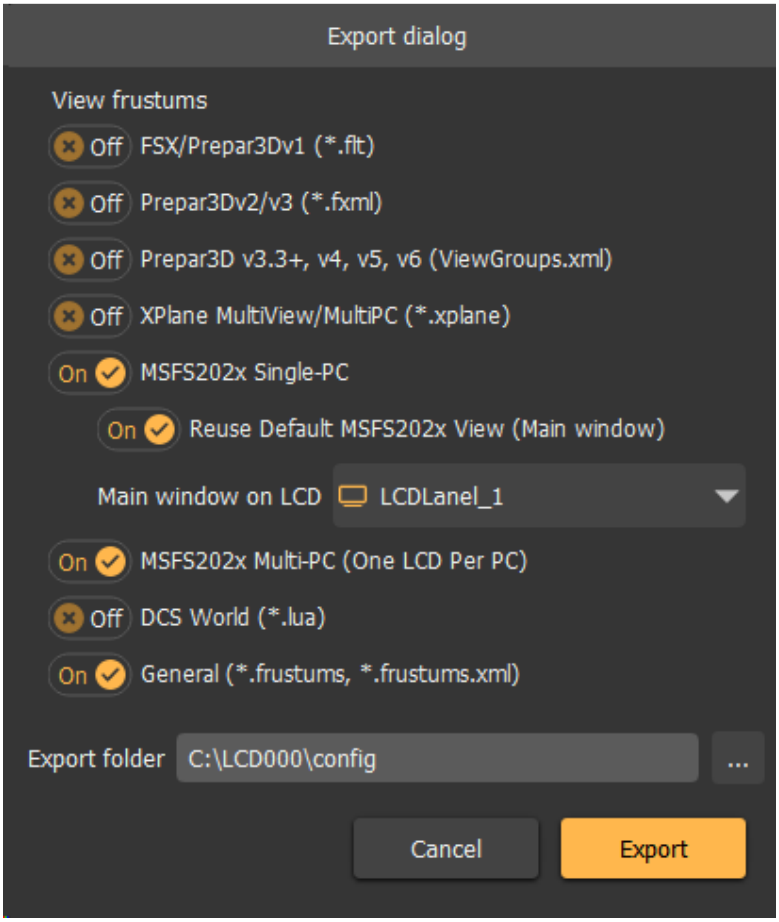
sub-millisecond timing, which means at most 1 frame drop on 1000 frames (0.1% FPS drop).
Any additional FPS performance drop can only be accounted to the MSFS rendering and processing performance required to render one or multiple views with the desired Field of View.
Please do not address FPS performance questions to Fly Elise-ng.

2 MSFS Multi-view export

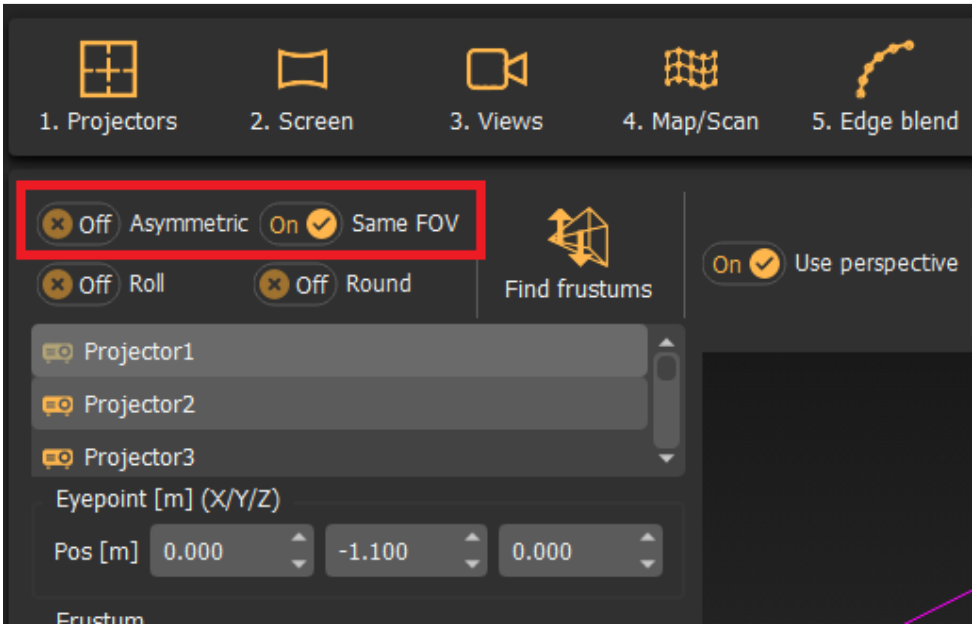
Both Immersive Calibration RPO and Immersive LCD PRO software support export for Multi PC (one channel/view per PC) or Single PC (multiple channels/views per PC) MSFS multi-view data. The multi-view data contains the needed parameters to configure the view orientation and the horizontal/vertical Field of View (FOV) for each view.

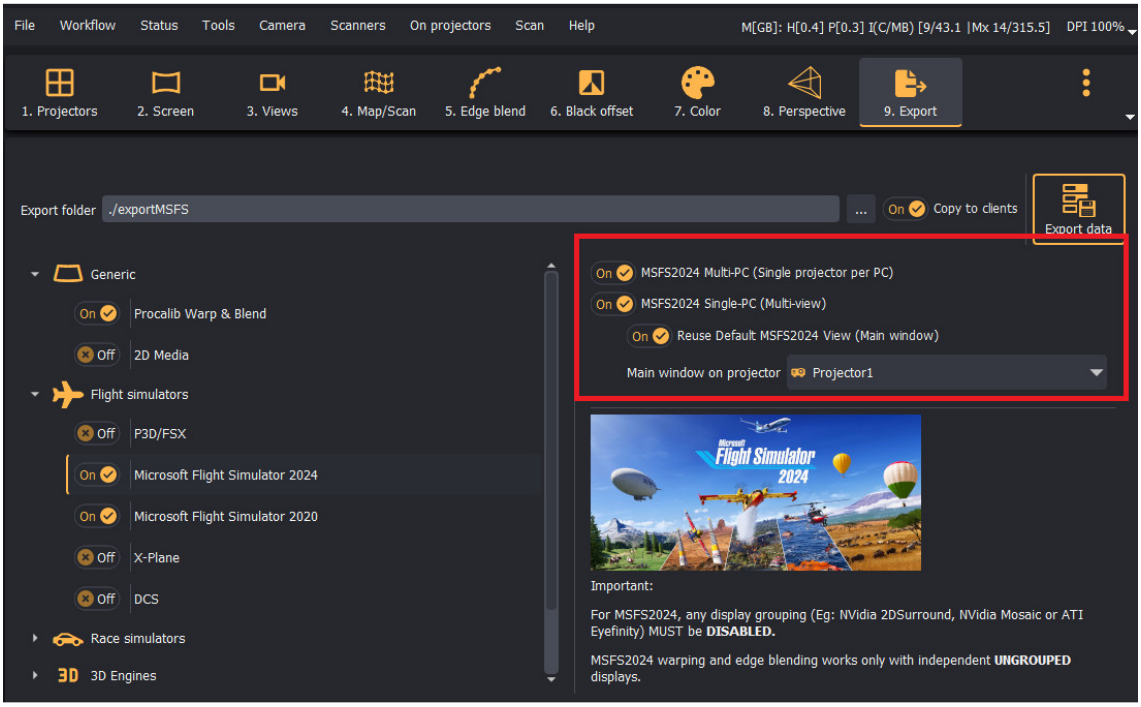
Immersive LCD PRO





Immersive Calibration PRO





Current MSFS implementation supports only one FOV value for all views per PC. In case of Multi-PC setups this is not an issue at all, because each PC has only one view.
However, on a Single-PC setup with more than one view, all views have to have the same FOV.

IMPORTANT: When exporting multiple views for Single-PC, ALWAYS make sure that Same FOV is selected and checked to ensure all views have the same FOV.

IMPORTANT: MSFS does NOT support asymmetric frustums. ALWAYS make sure Asymmetric frustum is turned OFF before you calculate and export the perspective view data.

IMPORTANT: The current multi-view MSFS export has a limitation of Vertical FOV between **26 degrees and 104 degrees**. Any design which produces Vertical FOV out of this range will not be able to be exported and needs to be re-designed.

Additional "Reuse Default MSFS View" option is only available for Single-PC setups. When selected, the exported view data will include the view parameters for the main MSFS window for the first view and each additional view will be

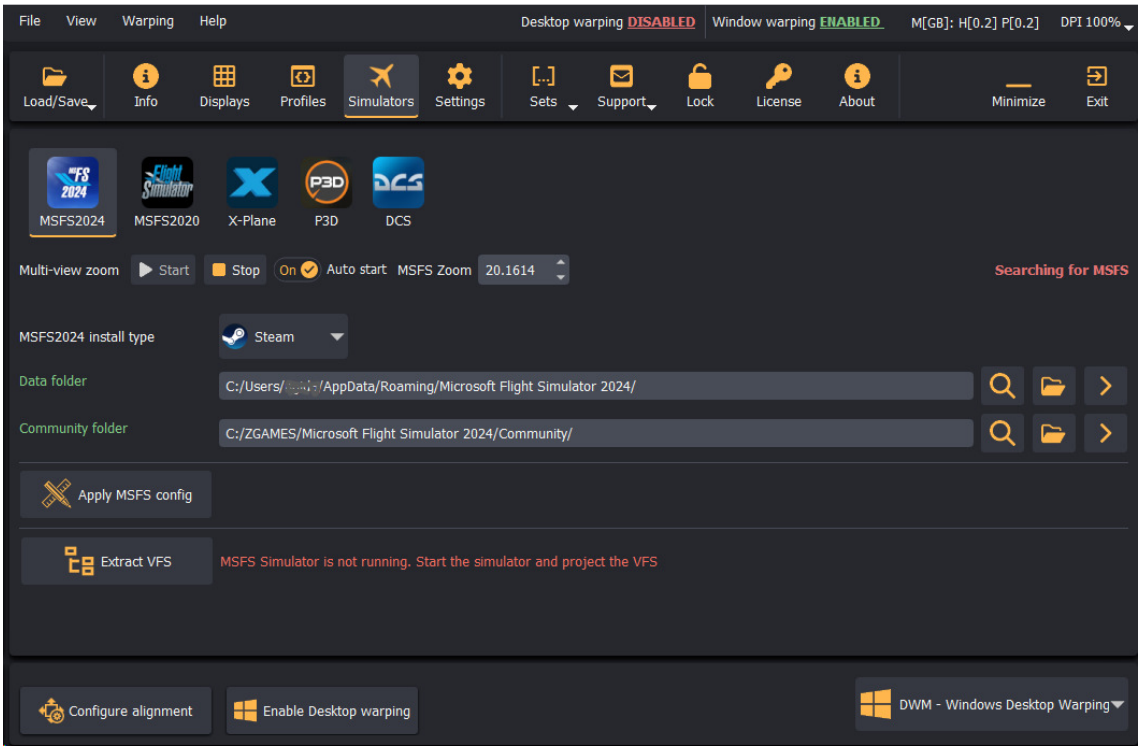
configured using the MSFS experimental multi-view window. This makes optimal use of the MSFS windows.
However, if the main window is to be used for some other rendering (example maps, instruments, etc...), then the option “Reuse Default MSFS View” can be disabled. In that case, each view will be opened on a separate multi-view window and the main window can be used for the menus and other rendering.

IMPORTANT: It is very important to specify on which projector the windows primary display is shown. This is the display that MSFS is using to show the main window. If this is not set correctly, the other views (windows) will not be properly aligned.

The MSFS export will export 2 text files: “msfs_multiPC.txt” and “msfs_singlePC.txt” respectively which contain textual information about the views and how to setup the views in MSFS.
In addition, the software will export a set of *.msfs files that can be used in Immersive Display PRO and Immersive LCD PRO for automatic MSFS2020 and MSFS2024 configuration.

3 Setting up the MSFS2020 and MSFS2024 for multi-view

Because MSFS2020 and MSFS2024 do not offer a proper interface for configuring multi-perspective view, the exported data from Immersive Calibration PRO has to be entered in 3 files: 2 files per aircraft (cameras.cfg and model.cfg) and one system configuration file (UserCfg.opt). In additional to that, the correct zoom has to be applied for each view.



The Simulator tab in Immersive Display PRO and Immersive LCD PRO provides functionality for automatically detecting the MSFS installation folders and automatically applying the needed configuration files changes per aircraft.
Depending on the installation type (Steam or MSStore) the software can detect the installation folder and the default community folder. Users can use the Detect button to auto-detect or “Select directory button” to select the MSFS installation folder.

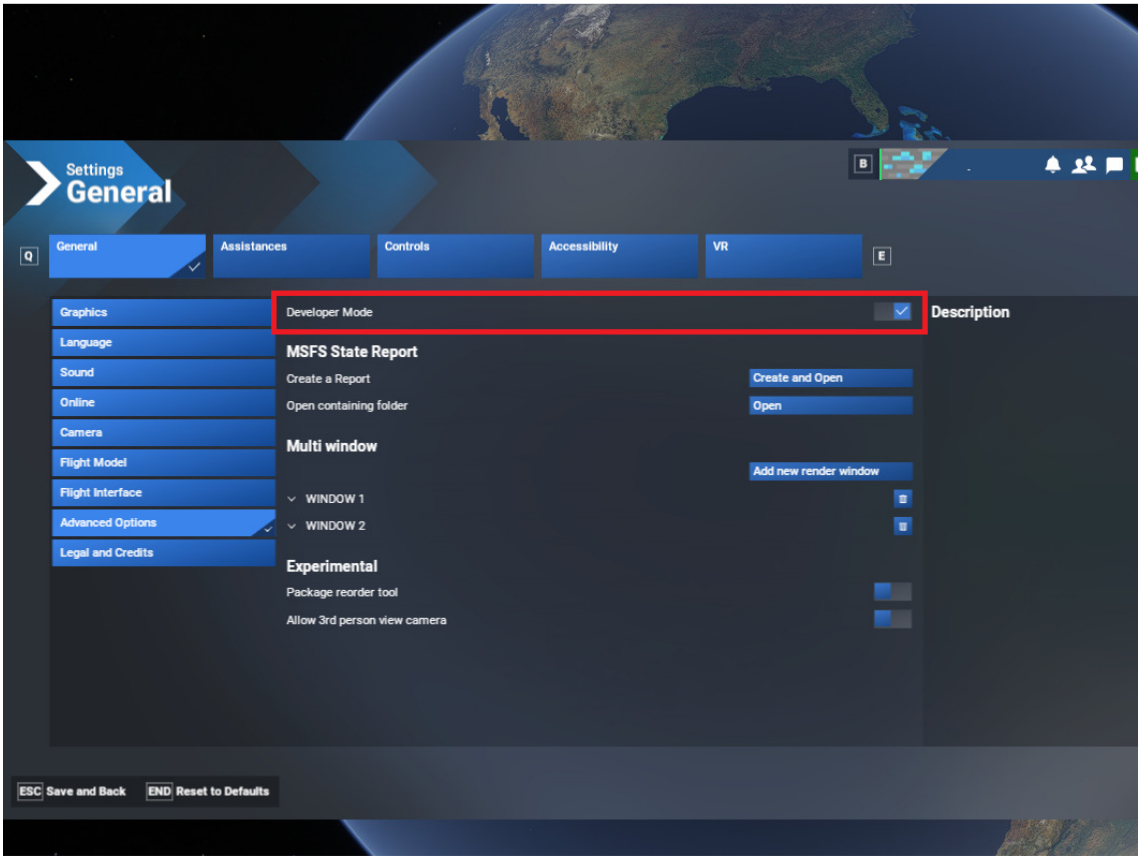
3.1 MSFS2024 VFS Projector and package creation

For MSFS2024, the software provides a tool to “extract” the needed files from the streamed MSFS2024 packages and to create an overlay VFS package with the modified files.

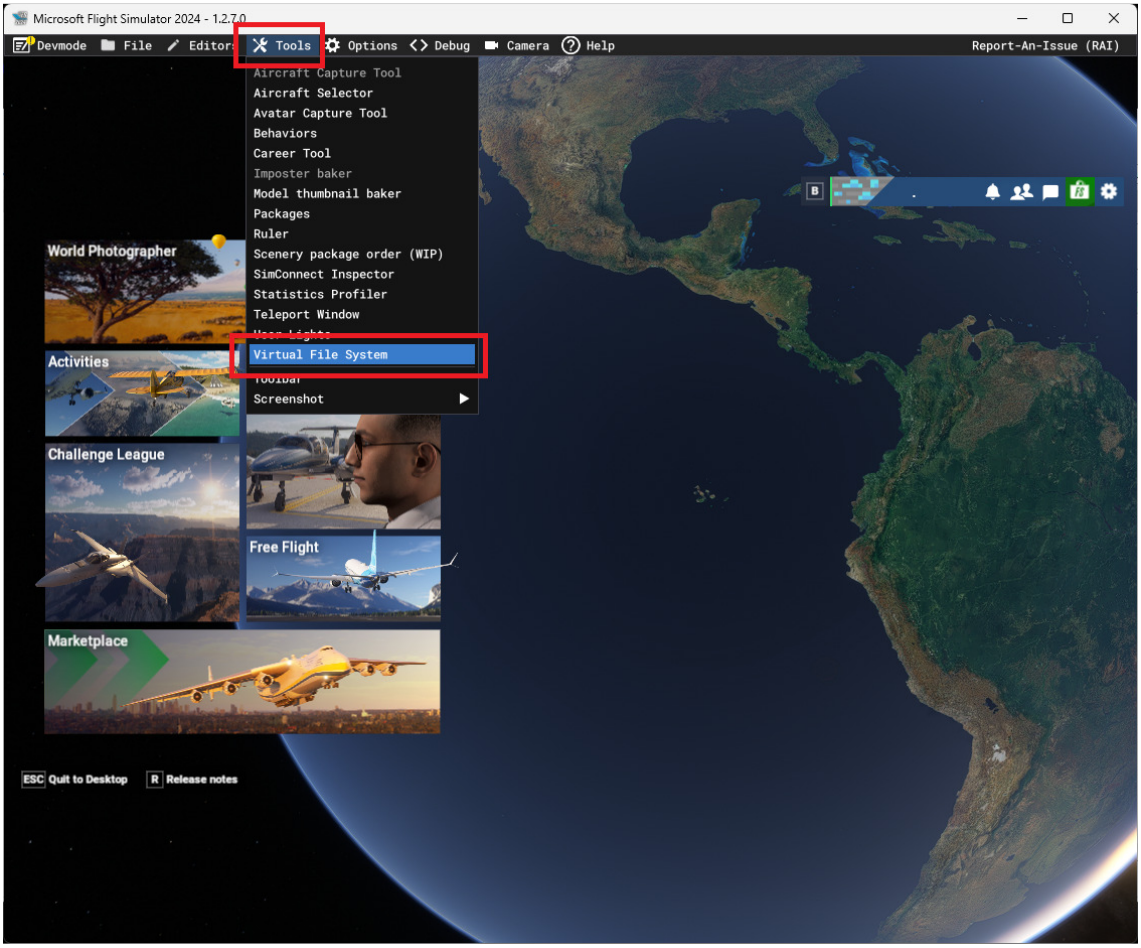
Microsoft Flight Simulator used a VFS (Virtual File System) to access its resources (Airplanes, SimObjects, Liveries, etc.). VFS is a layered file system which is composed of files created by different Microsoft, Asobo or 3rd party packages.
In MSFS2020 all the MSFS packages have been installed on the local file system and have been available locally for modification. However, in MSFS2024 all the built in packages that compose the VFS are streamed online when the simulator starts. In additional the content of the package is compressed and is not available on the local file system for modification.
In order to allow modification of the streamed aircraft files, we offer a VFS Extractor tool to extract the relevant airplane files from the MSFS2024 VFS and create a set of packages with the modified aircraft files. The packages content can be put in the community folder and overlaid on top of the streamed packages. This ensures that the modification needed for 100% accurate geometry and edge-blending is applied even to the streamed content.

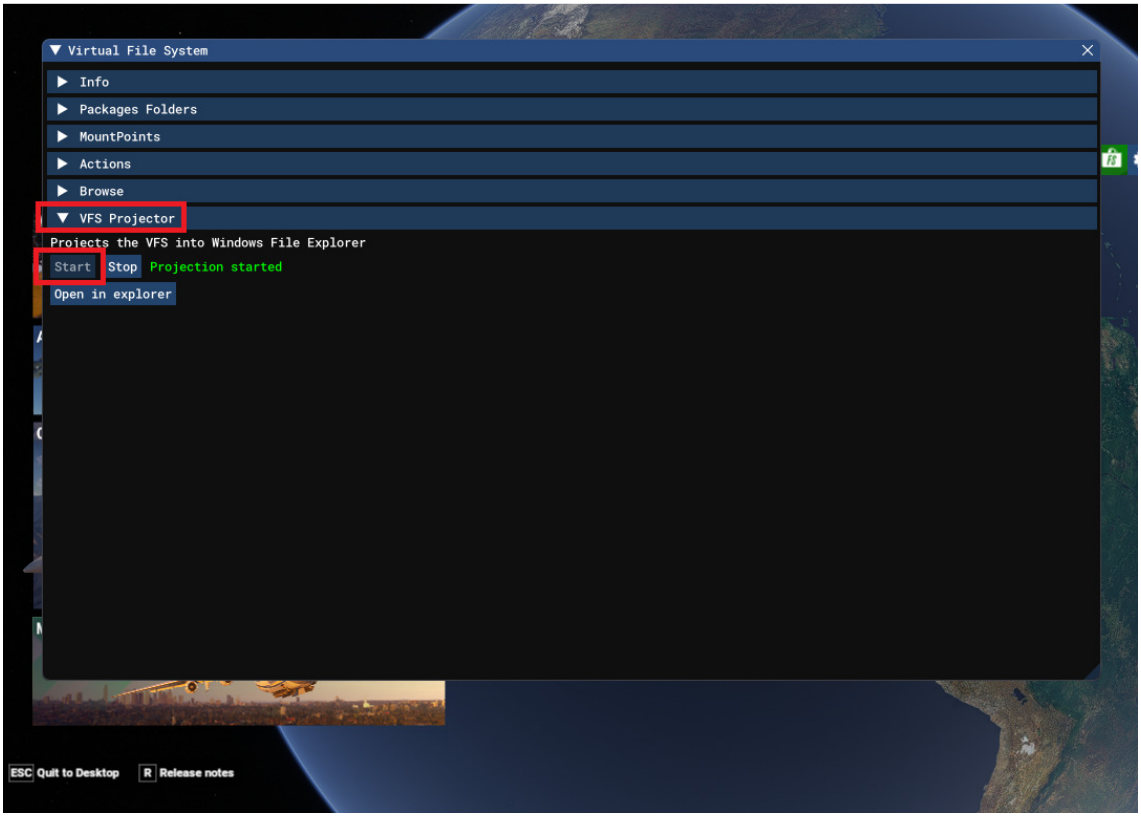
In order to be able to extract the streamed content follow the following steps:

1. Enable the developer mode



2. From the Tools / Virtual file system menu, select the VFS Projector and start the VFS projection. This will mount the MSFS VFS in the install folder VFSProjection directory

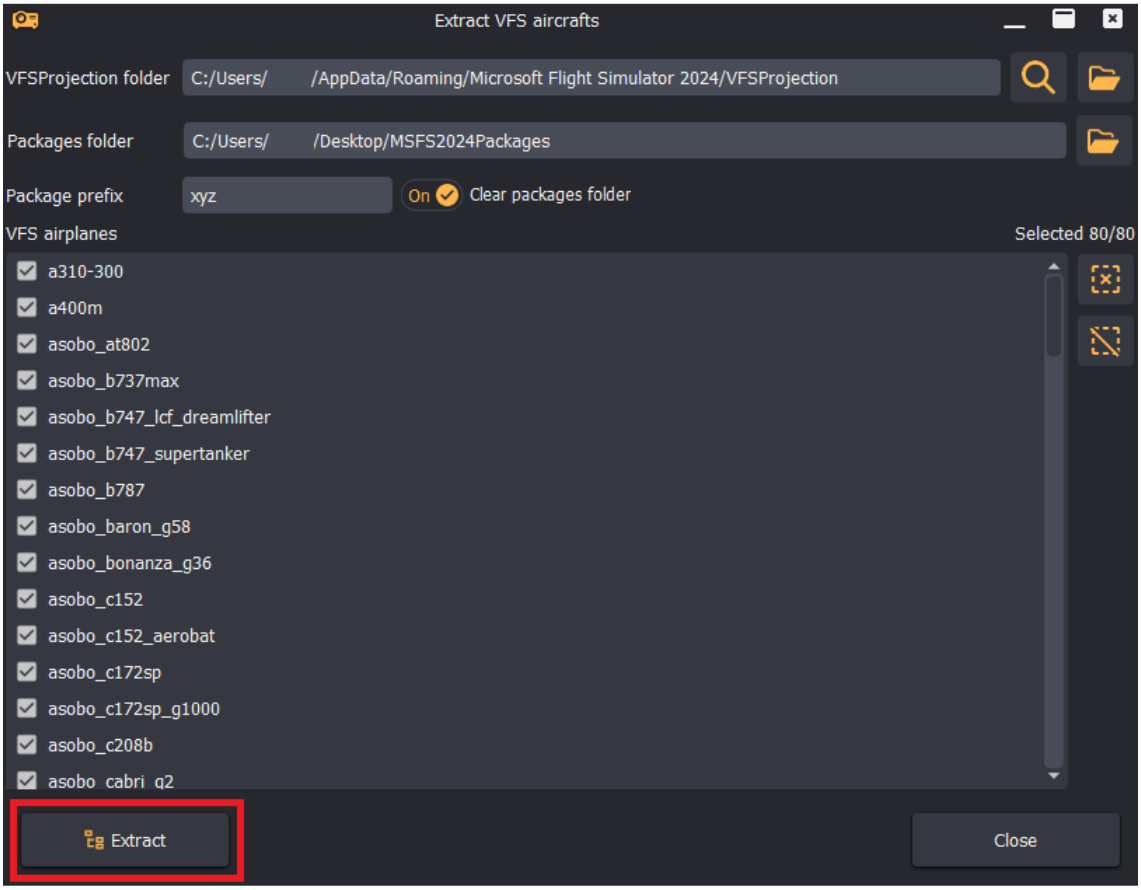

Microsoft Flight Simulator 2024 - 1.2.7.0
Devmode
File
Editor
Tools
Options
Debug
Camera
Help
Report-An-Issue (RAI)
Aircraft Capture Tool
Aircraft Selector
Avatar Capture Tool
Behaviors
Career Tool
Imposter baker
Model thumbnail baker
Packages
Ruler
Scenery package order (WIP)
SimConnect Inspector
Statistics Profiler
Teleport Window
Virtual File System
Screenshot
World Photographer
Activities
Challenge League
Free Flight
Marketplace
ESC Quit to Desktop
R Release notes



3. Press the “Extract VFS” button to open the VFS extract tool. The VFS Extract tool will detect all streamed aircrafts. User can select one or more aircraft and create separate community package for each aircraft. The community package only contains the cameras.cfg and the model.cfg files that need to be updated from the exported calibration data.

   IMPORTANT: This tool will only detect unencrypted airplanes. Any encrypted and DRM protected airplane will not be listed.

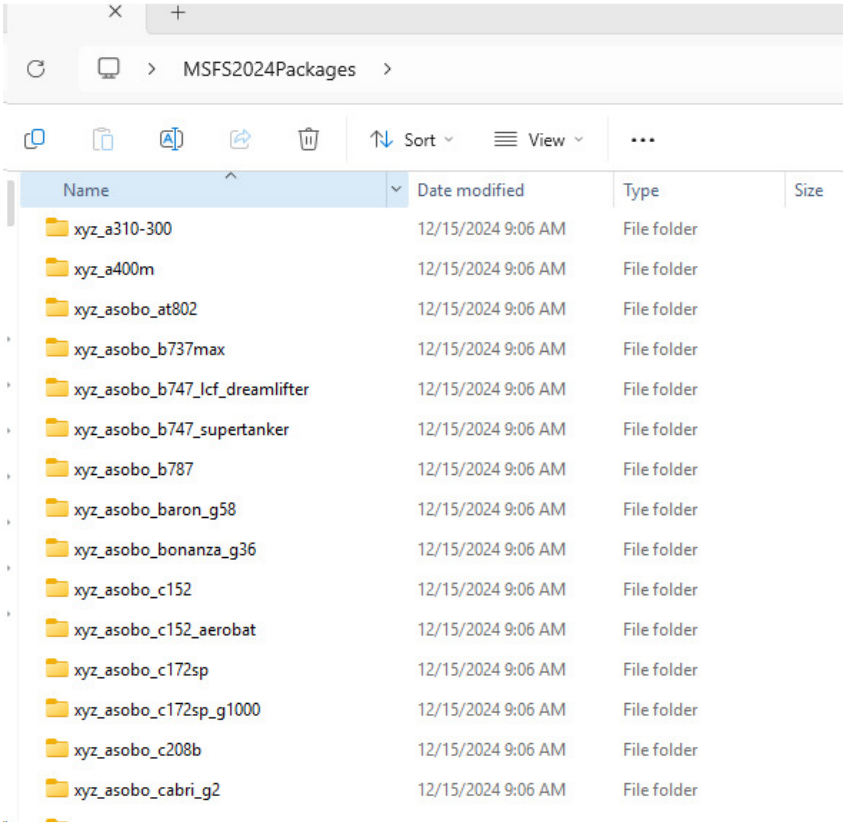
   IMPORTANT: Any previously extracted and mounted packages will NOT be extracted again. If any of the extracted packages is already added to the community folder, make sure it is removed from the community folder before running this step.



4. Select the packages output folder and select a prefix to be applied to each package name. When enabled, the previous content of the packages folder will be cleared.

The “Clear packages folder” will make sure that any existing content in the Packages folder will be removed and deleted.

After pressing the Extract button, the output packages folder contains a packages for each selected aircraft.
Each package folder contains the camera.cfg file, models.cfg file and other msfs package files. The camera.cfg file needs to be selected when the exported “*.msfs” configuration will be applied.



IMPORTANT: We advise you to use a separate extracted packages folder then the MSFS2024 community folder. After the streamed airplanes are extracted, the exported "*.msfs" configuration files can be loaded and applied per aircraft. After that, the packages can be copied or linked in the MSFS2024 community folder.

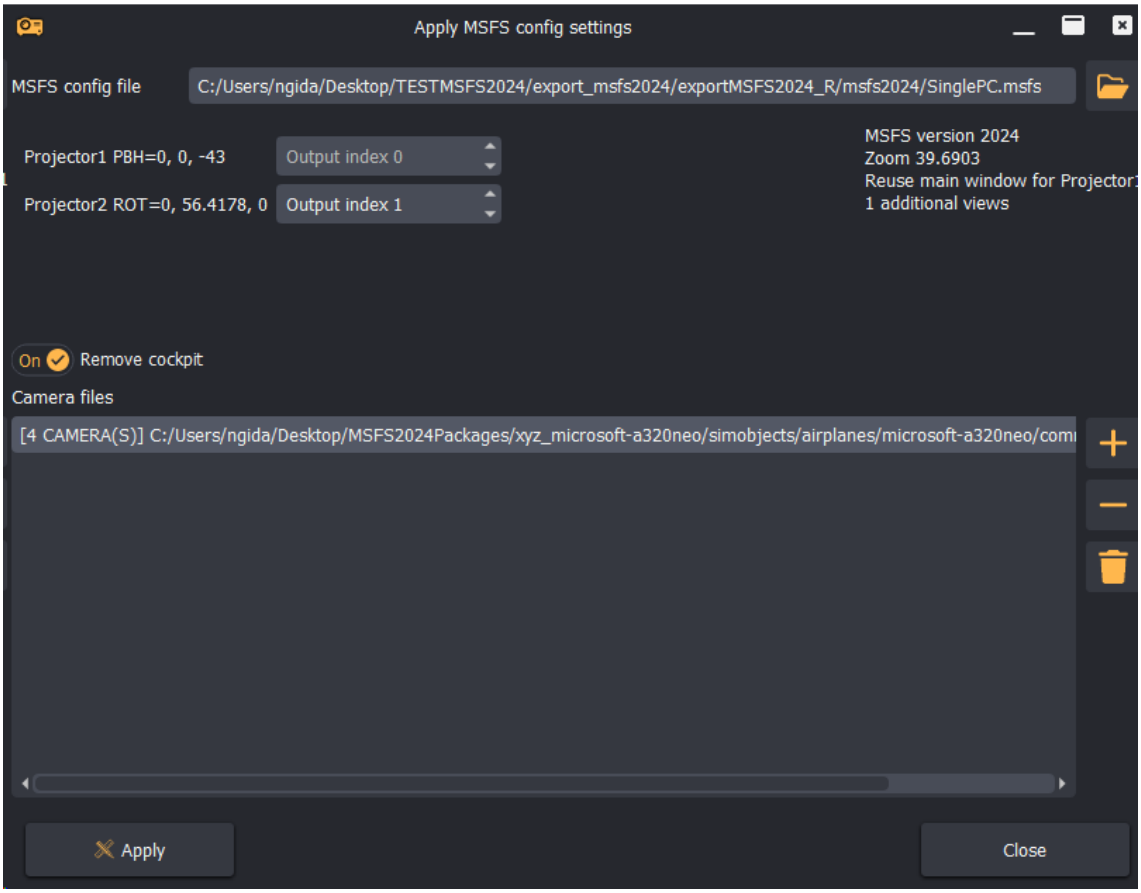
IMPORTANT: We advise you to use a 3rd party tool MSFS Add-ons Linker 2024 (https://flightsim.to/file/1572/msfs-addons-linker) to have a separate add-ons folder and use linking to link one or more community add-ons in the MSFS2024 community folder

4 Applying the *.msfs configuration files

Both Immersive Calibration PRO and Immersive CDL PRO will export one or more *.msfs configuration files. For a Multi-PC configuration, a separate *.msfs configuration file is exported per PC. For a Single-PC configuration a single .msfs file is exported.

This step is the same for both MSFS2020 and MSFS2024.
IMPORTANT: The automatic removal of the virtual cockpit is only available for MSFS2024. For MSFS2020, the cockpit must be removed by manually editing the model.cfg file. Check the section 7. Removing the virtual cockpit.

Use the “Apply MSFS Config” button to open a separate window.



As a first step, select the exported *.msfs file. This will open the file and show the context of the file. For each additional view(window) to be created, the user can select the OutputID on which the window should be placed.
MSFS2020 and MSFS2024 enumerate the outputs starting from 0. 0 is always the primary desktop display.
E.g.: For a 3x1 ungrouped projector setup, if the left window is the primary desktop display, then the output IDs will be 0, 1, 2.
It is very important to set the values correctly to patch the output index order of your PC.

The window can be put on another output once MSFS starts. Just sue Alt+Enter to enter a windowed mode, drag the window to the desired output and press Alt+Enter to enter to return to full screen mode.

The required changes must be made per airplane. Use the + and the – button on the right side to locate and add the airplane cameras.cfg file. This file will be updated with the exported data from the *.msfs configuration file.

The cameras.cfg file can be found the airplane package folder. For the built-in MSFS2024 streamed aircrafts use the extracted packages from the previous chapter.

One or more airplanes can be added to the list and updated at once.

After pressing the Apply button, the listed airplane cameras.cfg files will be updated and if needed the global UserCfg.opt file will be updated as well to ensure that the additional windows are created.

For **MSFS2024**, if the option “Remove cockpit” is selected, then the 3D cockpit model will be removed and the package will be updated accordingly. This option is only available for MSFS2024.

For **Multi-PC (Single channel/view per PC)** a separate software is needed to synchronize the position and state of each MSFS instances on each PC. One can consider WideView or similar software to couple and synchronize multiple MSGFS instances.

5 Setting up the MSFS zoom

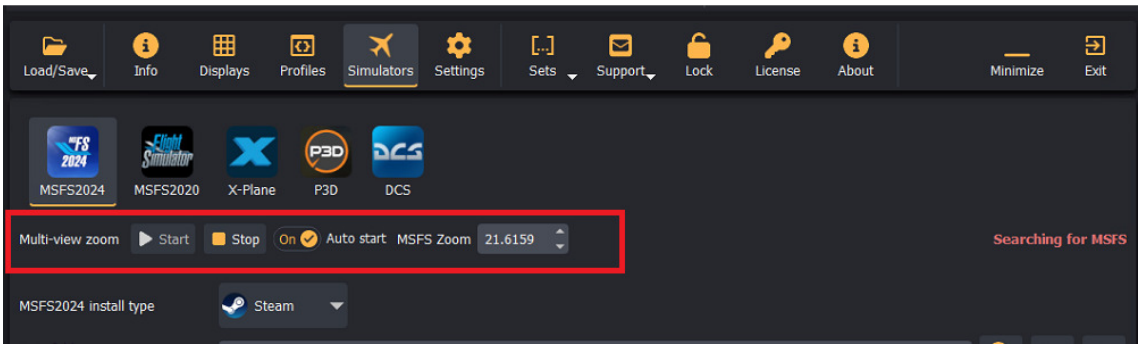
MSFS has a very limited and volatile way to set the view Field of View. Only a single ZoomPercentage value (slider) can be used to zoom in and out and setup the field of view. There is no direct logical relation between the zoom factor and the actual horizontal or vertical field of view.
Additionally, when changing views in MSFS, the ZoomPercenatge values are often reset to the default 50%.

The exported *.msfs configuration files contain the correct zoom that needs to be applied to all view in MSFS.

IMPORTANT: Without applying the correct zoom, the views will not be aligned and edge blended.

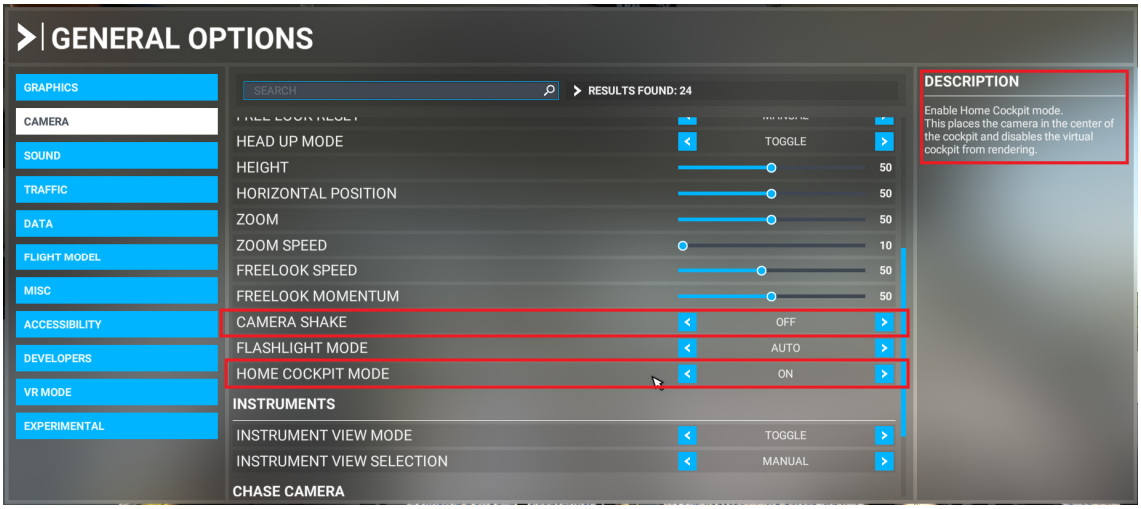
After pressing the Apply button, the zoom percentage will be automatically configured.

In order to ensure a stable and accurate ZoomPerentage, both Immersive LCD PRO and Immersive Display PRO include a SimConnect client which connects to the MSFS instance on the same PC and makes sure that exported ZoomFactor is always applied to MSFS Virtual Cockpit view. Even when changing views or ZoomPerentage in the GUI, the desired ZoomPerentage will be set and enforced correctly by both Immersive LCD PRO and Immersive Display PRO software. This is required for both a Single-PC multi-view and Multi-PC multi-view setups.
In the Simulator tab, press on Start (or enable auto-start) to start SimConnect client which will connect to MSFS and make sure the entered Zoom value is always applied in MSFS.



6 Setting up the MSFS cockpit mode

By default, MSFS has some camera options enabled that will change the view orientation and will mess up with the geometrical correction and edge-blending. To prevent any view changes, make sure that the CAMERA SHAKE option is turned OFF and the HOME COCKPIT MODE is turned ON.



7 Removing the virtual cockpit

Although the HOME COCKPIT MODE documentation suggests that when this option is enabled the Virtual Cockpit will not be drawn, the current and the latest version of MSFS contains a bug and the interior and exterior are still drawn even when HOME COCKPIT MODE is enabled. This is undesirable with simulator setups with its own cockpit and when the visual system only needs to project the outside views (and not the virtual cockpits and other exteriors).

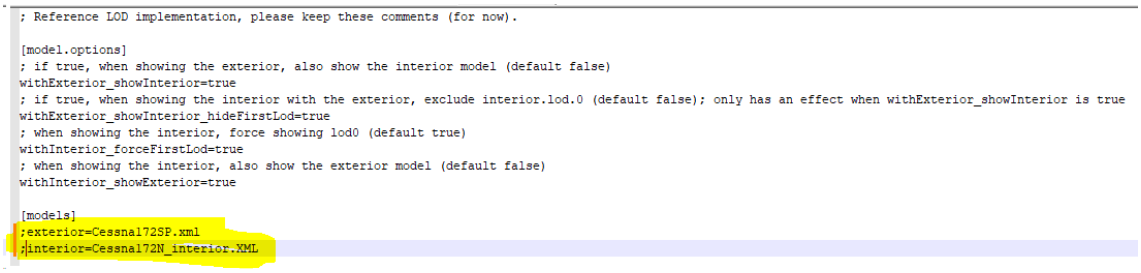
Fortunately, there is another way to remove the rendering of the interior and/or exterior of the aircraft.

IMPORTANT: The following steps only work with MFSF2020. Do not use this for MSFS2024. For MSFS2024 use the option "Remove cockpit" option when applying MSFS config settings.

Locate and make a copy of the SimObjects model.cfg file for the particular aircraft.

Example: The Asobo default C172sp airplane (for Steam installs) can be found here:
`<MSFS_INSTALL>\packages\Official\Steam\asobo-aircraft-c172sp-classic\SimObjects\Airplanes\Asobo_C172sp_classic\model\model.cfg`

Edit the file and put the ";" (semicolon) before exterior and interior lines to comment out the lines. This will remove them from the rendered views.



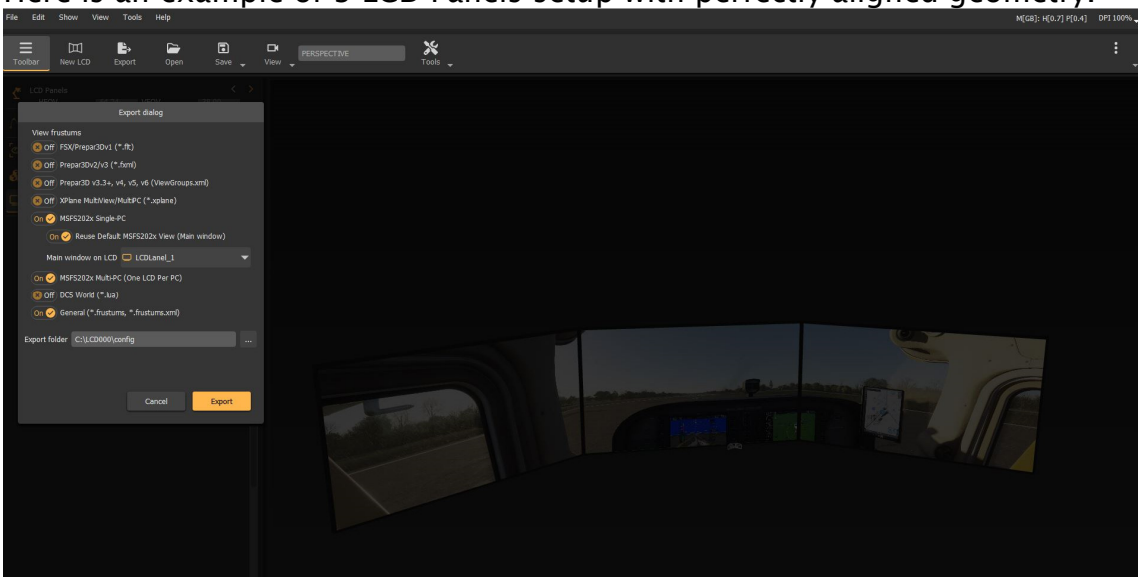
```
; Reference LOD implementation, please keep these comments (for now).

[model.options]
; if true, when showing the exterior, also show the interior model (default false)
withExterior_showInterior=true
; if true, when showing the interior with the exterior, exclude interior.lod.0 (default false); only has an effect when withExterior_showInterior is true
withExterior_showInterior_hideFirstLod=true
; when showing the interior, force showing lod0 (default true)
withInterior_forceFirstLod=true
; when showing the interior, also show the exterior model (default false)
withInterior_showExterior=true

[models]
;exterior=Cessna172SP.xml
;interior=Cessna172N_interior.XML
```

8 Final setup

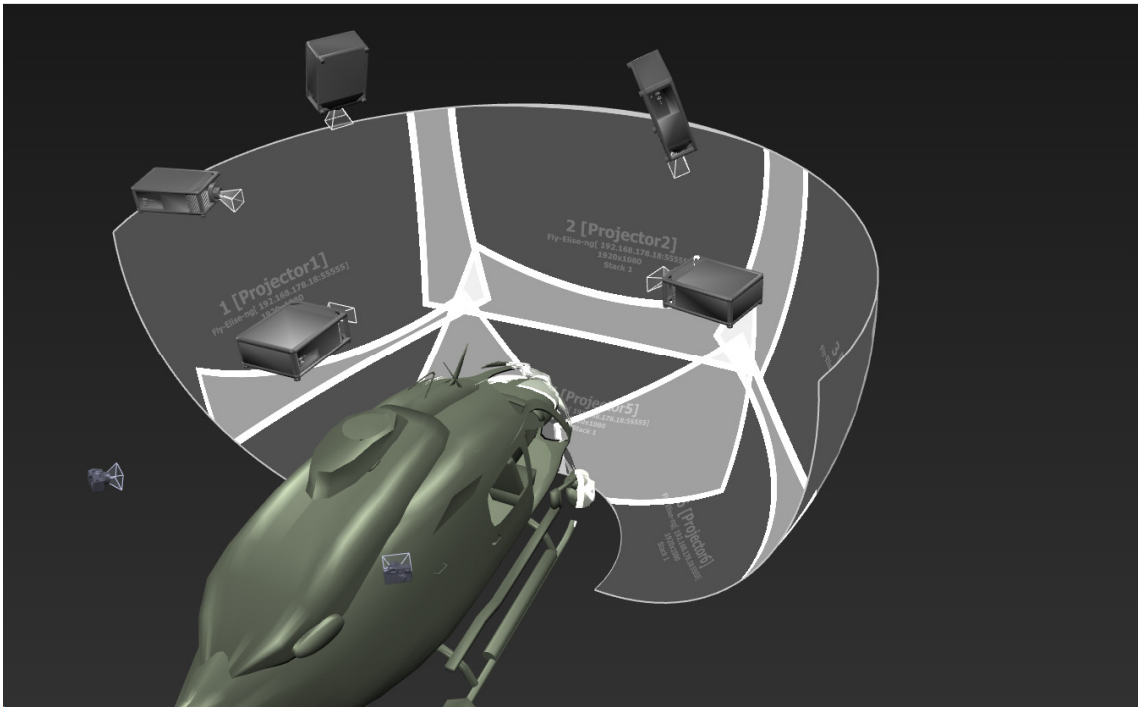
There is one more step. Just load the exported multi.procalib files in Immersive Display PRO or the exported .lcdcalib files in Immersive LCD PRO respectively.
Start MSFS in full screen mode and make sure that the main view and the additional views are positioned on the correct video output display.

After that the views will be perfectly aligned and edge blended.
Happy flying.

Here is an example of 3 LCD Panels setup with perfectly aligned geometry.



Here is an example of one of our customers 6 channels helicopter setup with MSFS.




WINDOW 5
WINDOW 4
WINDOW 3
WINDOW 2
WINDOW 1
Microsoft Flight Simulator - 1.30.7.0