

Preparation for Using the Add-on

To ensure the smooth functionality of the add-on, some preparations need to be made. The code was written using Blender version 4.1, and further processing of objects and data generated in the workflow is done with the BlenderBIM add-on version 0.0.240602. Therefore, these versions are recommended for use. To position the issues in the model, an IFC file of the respective building is required as a basis. Before using the program, a BCF file with data on the camera and a photo of the issue must be created. The data should be in the format described in the BCF-XML documentation (buildingSMART International Ltd., 2024). The GAMMA AR app can be used for this purpose. If using GAMMA AR is not possible due to system requirements, fSpy can be used as an alternative. The adjustments made to the BlenderBIM code in the preparation (<https://github.com/SirreJ/UV-mapping-IFC-BlenderBIM>) are also required to enable the textured saving of issues in the IFC model.

Workflow Issue Visualization

It is assumed that the preparations for using the add-on have been made and a BCF file with images of the issue is available. The workflow begins with loading an IFC project into Blender. This is done through the BlenderBIM menu (Figure 16).

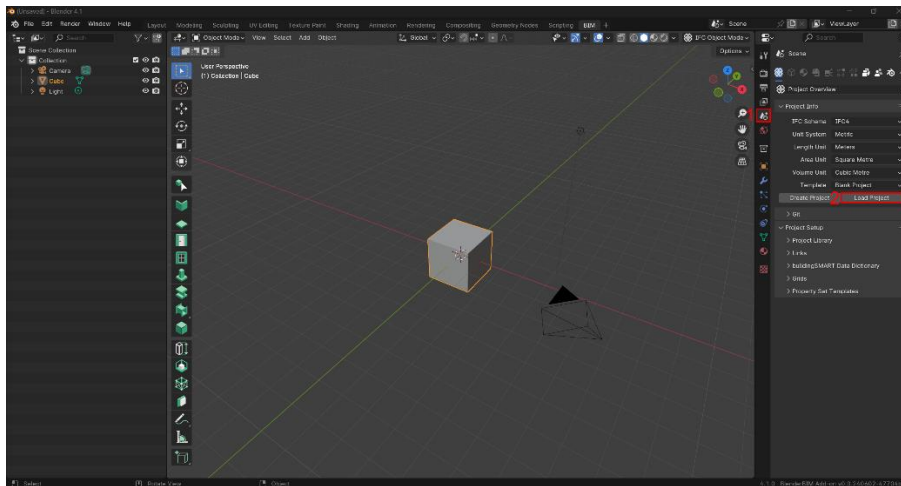


Figure 16: Loading the IFC Project

After loading the IFC model (Figure 17), part of the geometry is simplified (Figure 18) to enable seamless projection of the issue. To add the issue projection to the IFC model in a later step, it is important to activate the "Force Triangulation" box, as described in the basics of UV and texture mapping. Further processing is done using the programmed add-on for Blender BCF Issue View. With the installation of BlenderBIM, the add-on can be found in the Scene menu under Blender Properties.

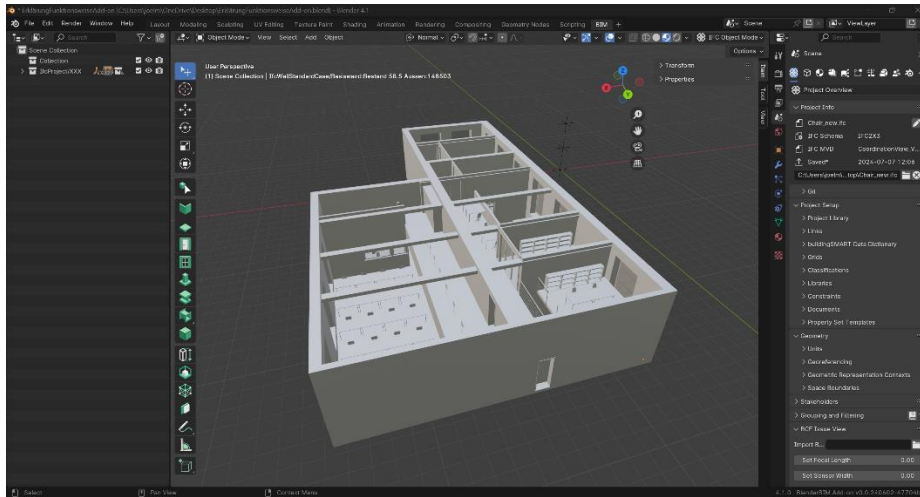


Figure 17: Complex Geometries of IFC Project

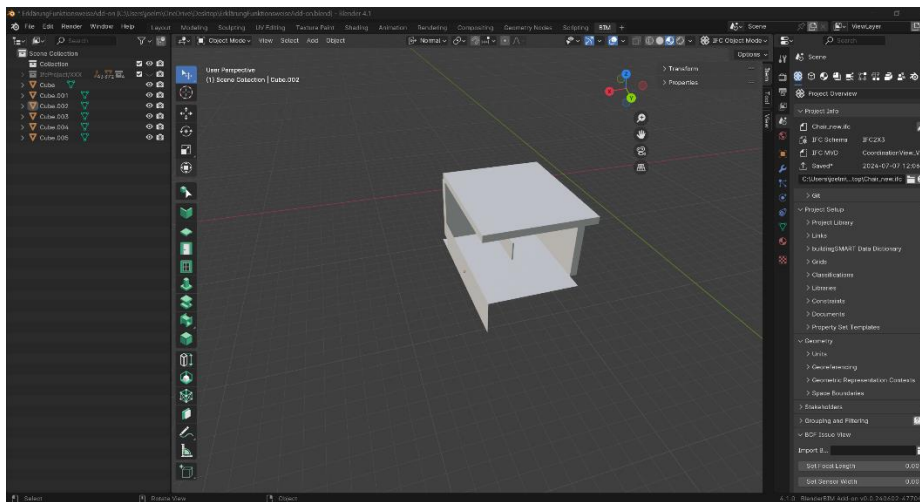


Figure 18: Simplified Geometries of IFC Project

Next, the path to the issue photo is selected or entered in the import field. If the sensor width and focal length of the camera used to take the photos are known, these values can be specified for an accurate reproduction of the image framing (Figure 19). If these values are unknown, only the Field of View from the BCF can be used by leaving the values for sensor width and focal length at 0.00. In this case, an iPad Pro 12.9-inch of the fourth generation was used. The camera used has a focal length of 4.25mm and a sensor width of 4.8mm with an aspect ratio of 4:3.

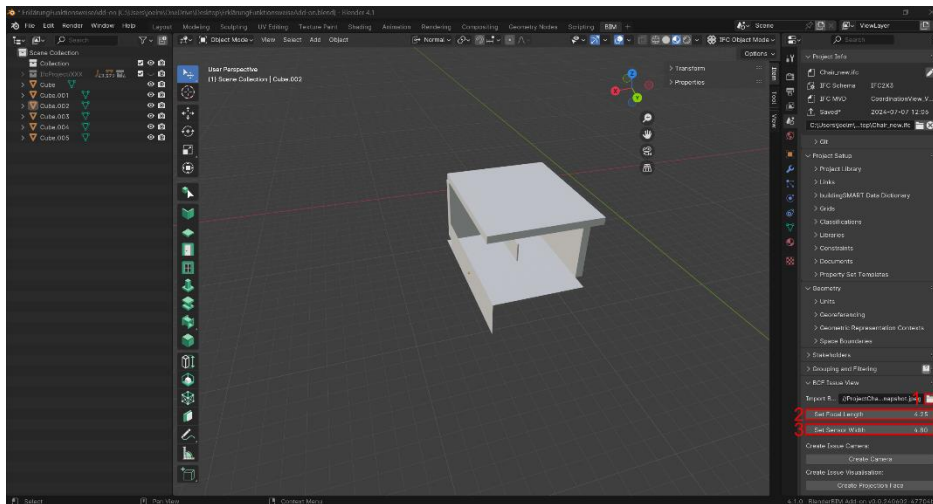


Figure 19: Selecting the Issue Photo and Entering Focal Length and Sensor Width

By clicking the "Create Camera" button, the camera is created in Blender. This switches the view to the camera, allowing for seamless execution of the script by clicking on "Create Projection Face." Without this camera perspective, incorrect results may occur. "Create Projection Face" creates a trimmed projection surface of the issue on the area visible in the center of the camera frame. Additionally, an "AnnotationLayer" is created, which can be used to add comments or other graphical annotations. The black area is transparent as a texture and can be used for labeling the issues by switching the viewports. A possible view after using the two buttons can be seen in Figure 20. The texture of the issue plane and the texture of the Annotation Layer are saved in a folder on the desktop upon creation.

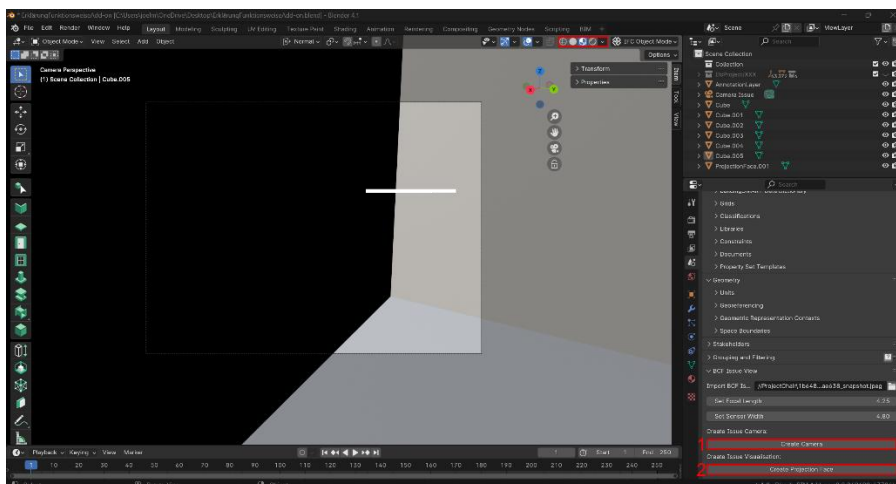


Figure 20: Creating the Camera and Issue Projection

The "AnnotationLayer" can be edited in the "Texture Paint" workspace of Blender. For example, areas can be marked, and comments can be added. After labeling, the changes to the texture must be saved (Figure 21).

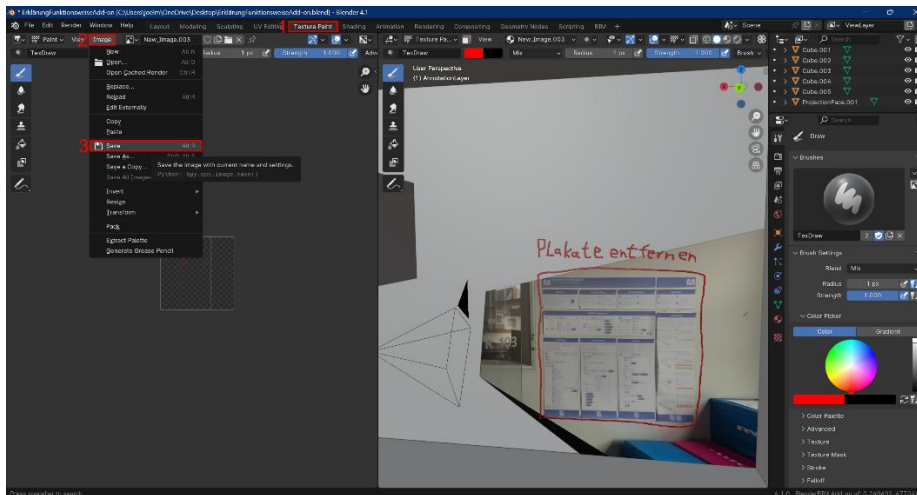


Figure 21: Labeling and Saving the Annotation Layer

After the issue has been projected and annotations added to the Annotation Layer, they can be saved in the IFC file (Figure 22).

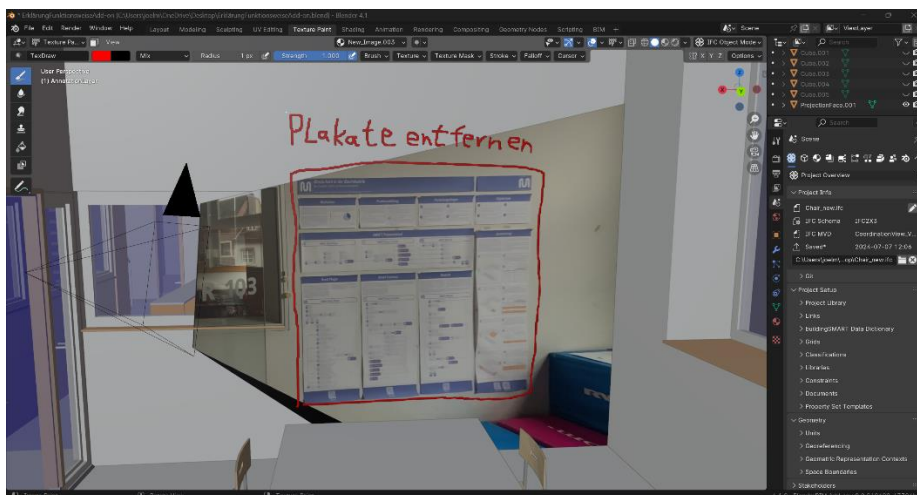


Figure 22: Issue and Annotations in the IFC Model in Blender

Each layer is assigned an IFC class. BlenderBIM automatically assigns an already existing material to the newly assigned objects, so only the images saved in the folder on the desktop need to be saved as a style (Figure 23).

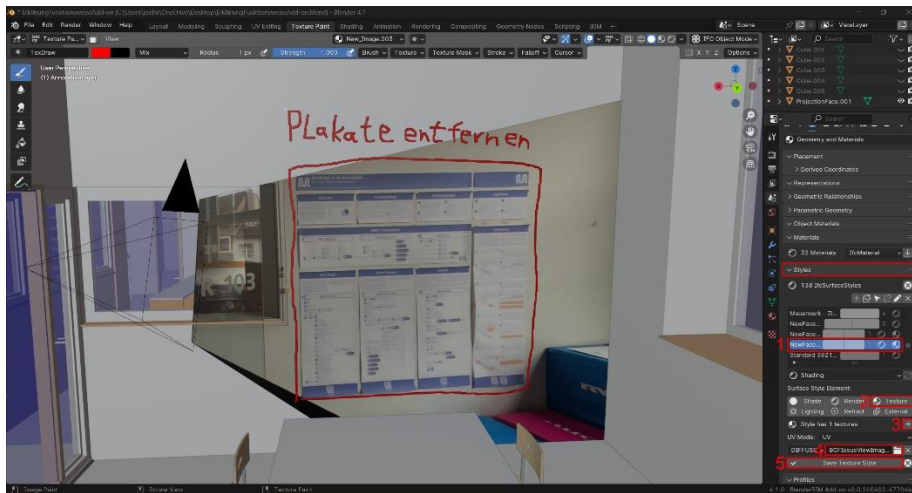


Figure 23: Assigning the Texture as IFC Style

If it is necessary to create a custom material for the issue layers, the UV map will be lost when assigning the material. The result can then be viewed in the KITModelViewer (Figure 24).

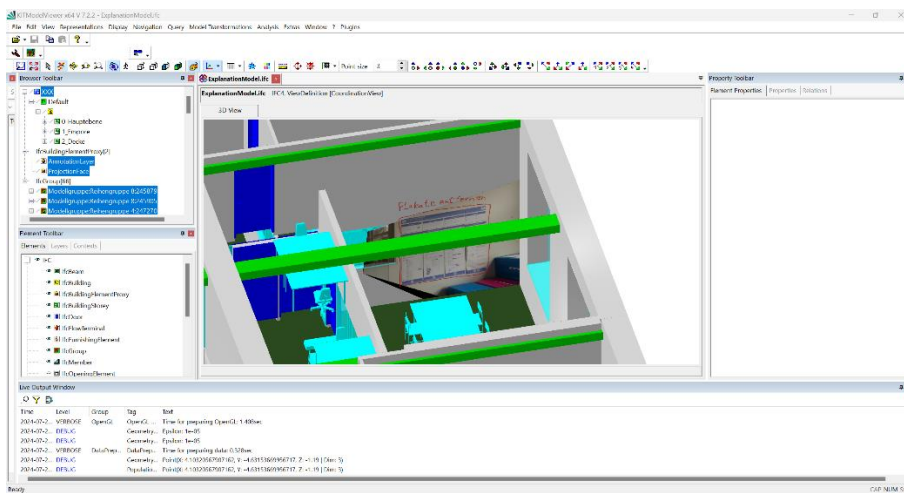


Figure 24: Issue and Annotations in the IFC Model in KITModelViewer