Content

Getting Started

Requirements

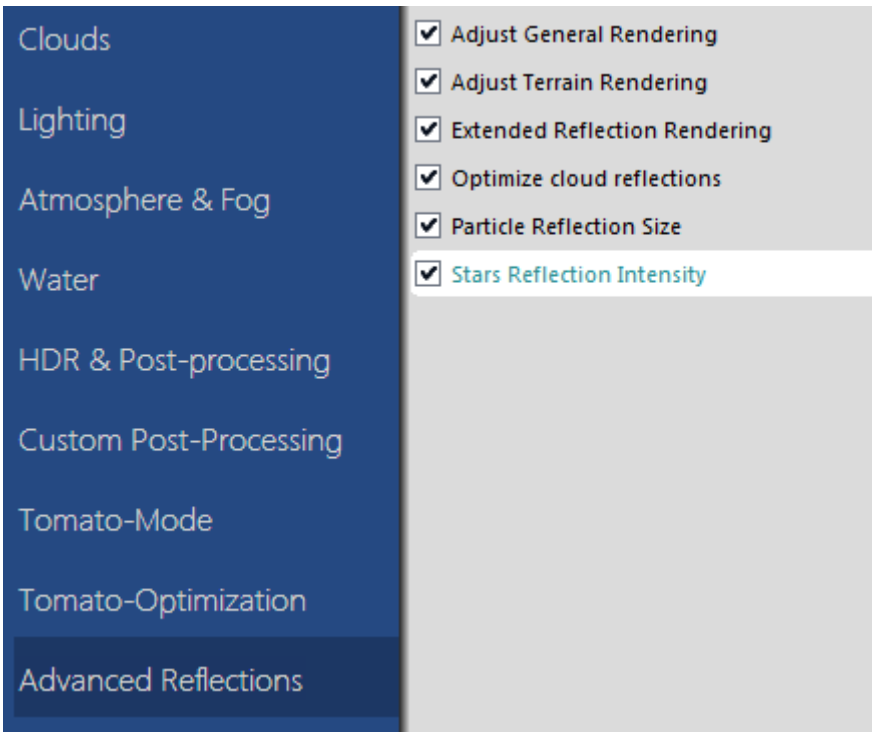
There are some requirements to get this feature working properly.

- You must have dynamic reflections in P3D at least at Low.
- You will have to modify the aircraft models to make them usable with dynamic reflections. The included tool will help you with that. However, there are already some aircraft available, which already support dynamic reflections. You don’t need to modify theses
- You should have a good GPU, otherwise the performance will be horrible!

Compatible Presets

You can use the reflections with any preset you want. The implementation is not bound to the included presets.

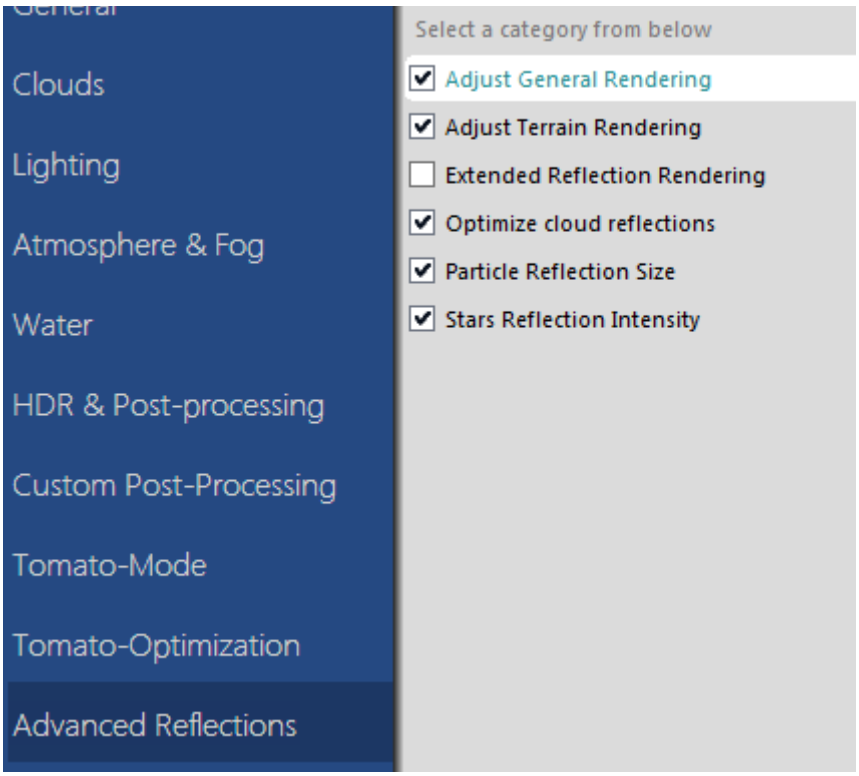
If you want to use the extended reflection rendering with your personal preset, make sure these options are all enabled:



Some of these options will require you to have other options enabled as well. The application will tell you if you have to enable other tweaks as well.

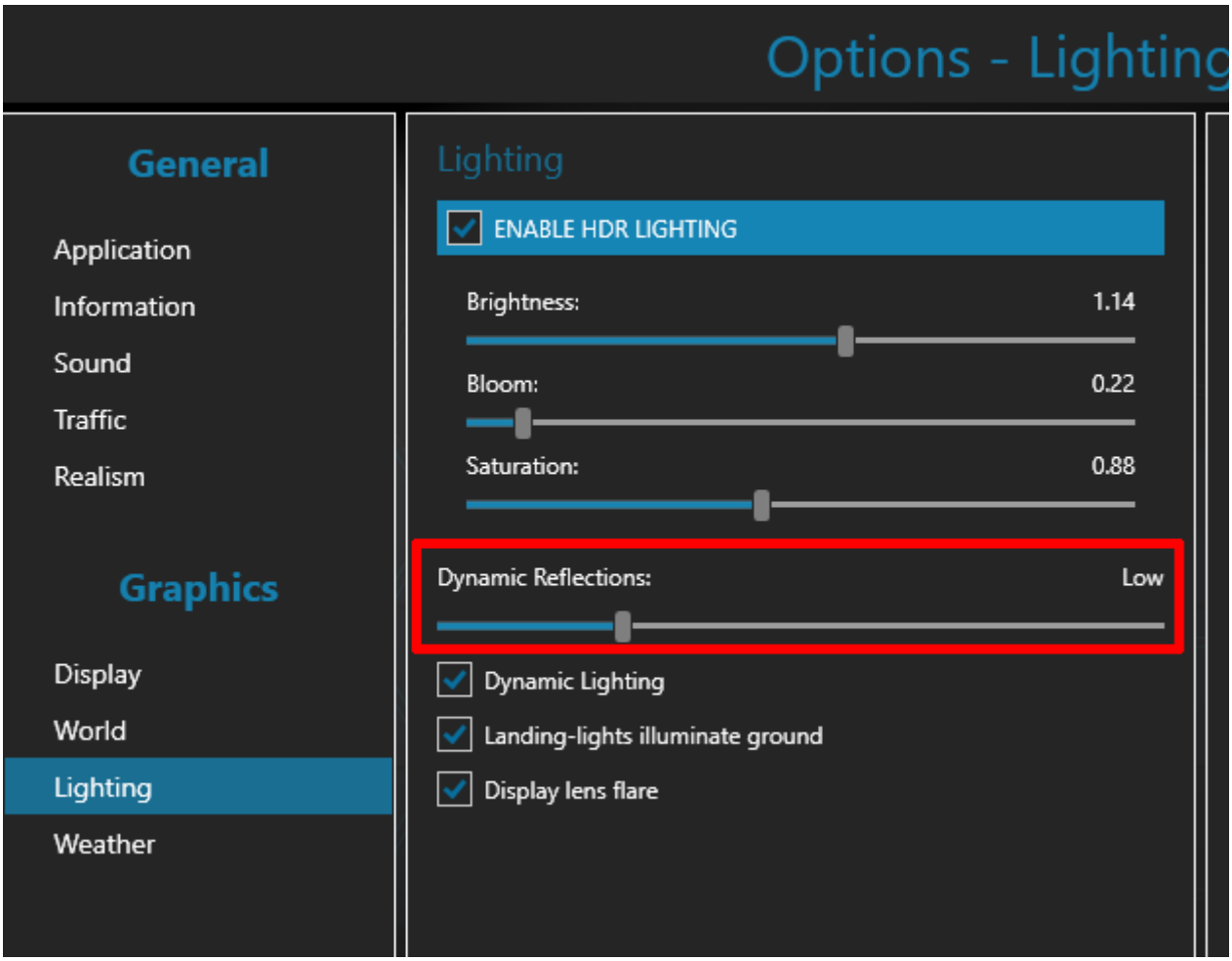
Disabling the Reflections

If you don't want to use the reflections anymore, but still want to use the application, just disable the option "Extended Reflection Rendering" and apply your preset again:



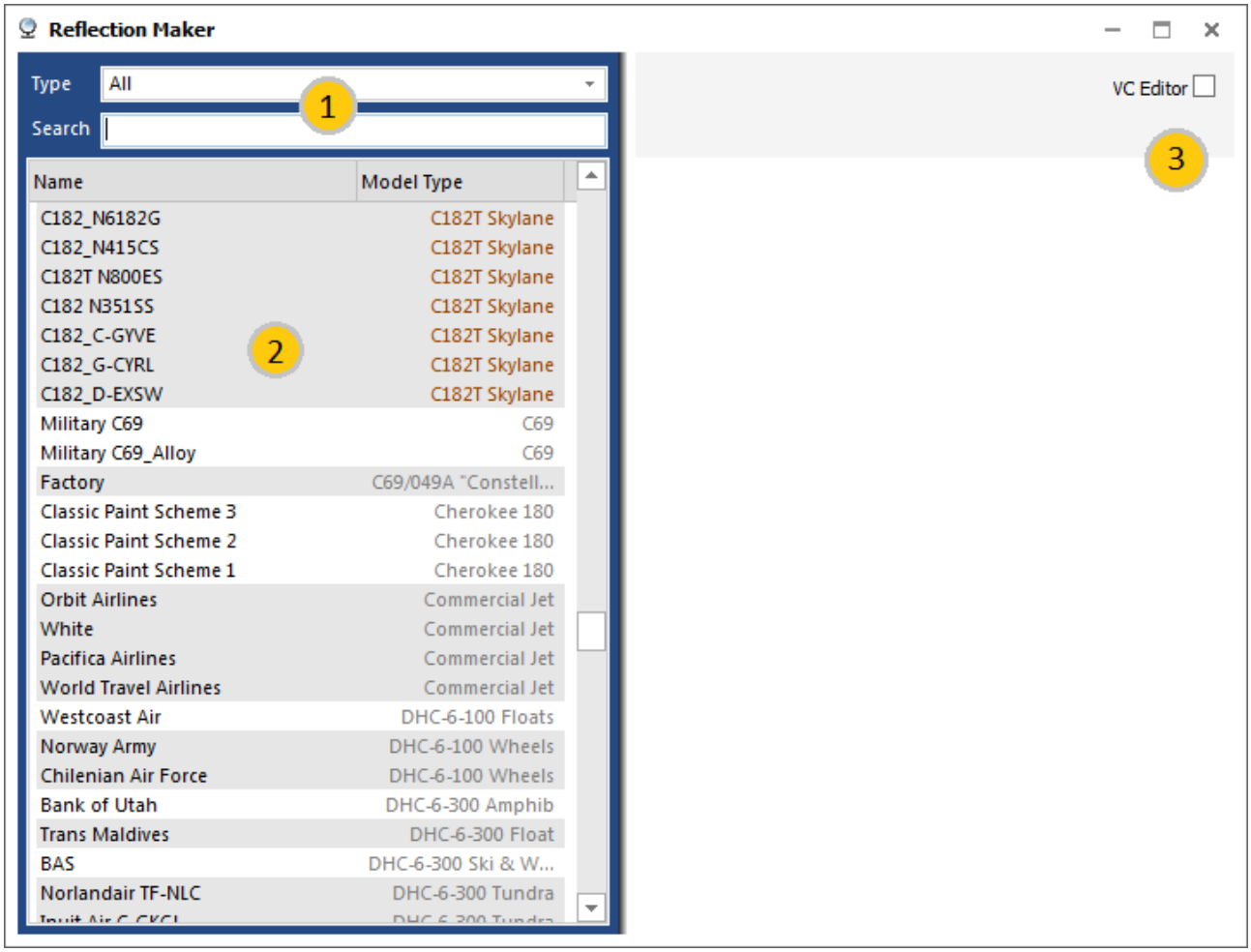
Enabling Dynamic Reflections

In P3D, you MUST have dynamic reflections enabled. Any value between “Low” and “Ultra” will work. The performance impact will depend on the value you choose here. So play around with the value and see what works best for you.



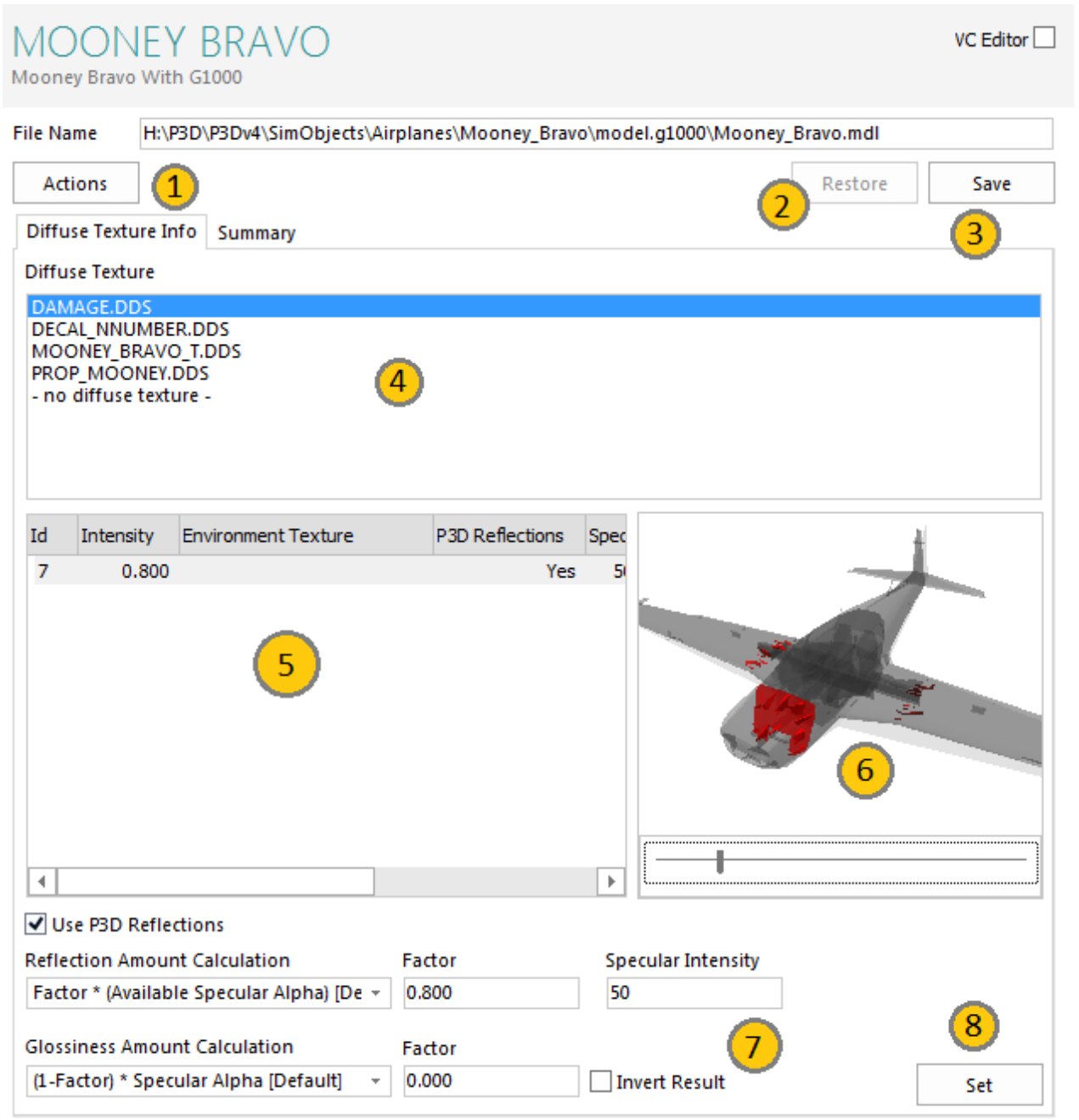
Modifying Aircraft

To adjust the aircraft models, you can use the included secondary tool to accomplish that. Note that you modify the model, not the livery. So every livery using the model will work as soon as you have changed the model itself. When you open the tool, you will see this:



1. Here you can filter the aircraft list
2. This list contains all aircraft you have installed in the sim. The model type is colored orange if the model has been modified by the tool, otherwise its gray
3. The “VC Editor” checkbox will allow you to toggle between external and internal vehicle editing. Normally, VCs doesn’t need to get adjusted

Now select an aircraft you want to modify in the left list. After that, you will see the aircraft in the main pane.



1. Under Actions, a menu will popup which will allow you to load a pre defined profile for the aircraft, save your changes as a profile, or execute quick actions
2. The restore button will re-activate the original, unmodified file
3. Save will save your changes to a new file. You will see, that the file name at the very top will actually change as soon as you press the button. The tool will create a copy of the existing model and modify the copy. After that, it just modifies the model.cfg so that the editor model gets loaded instead of the untouched one.
4. This list contains a list of all diffuse textures defined in the model. If you select one ore more texture in the list, all materials using the texture will be displayed in 5. The model preview 6 will highlight the selected texture in blue

5. This list displays all materials which use the selected diffuse texture in 4. Only the needed properties are displayed. Most important information at first is probably the column „P3D Reflections“. Every material having a “Yes” here will actually be displayed using the modified shaders. If a material has a filled “Environment Texture” AND has the “Use P3D Reflection” to no, the material will be displayed wrong in the sim. To edit one or more materials, just select them in the list. The model preview 6 will highlight all selected materials in red
6. The model preview is just a basic preview and the result will not be the same as in the sim. You will probably see a lot of parts being placed in wrong positions or with the wrong size. That is because the tool can not read animated objects correctly at the moment. But this will not destroy the output in any way. Drag with the left mouse button to rotate, drag with the right mouse button to move forward / side wards and drag with the middle mouse button to rotate around the center.
7. Here you can set the required PBR material settings – glossiness and reflectivity. The method to calculate the reflectivity can be different on each model. Currently the best working factors are “Factor * Specular Map Red” for the reflectivity and “Factor * Specular Map Alpha” for the glossiness. However, you can try out different values and see what it looks like. The reflectivity value should be between 0 and 1, but sometimes it is required to increase it to a value of 2 or 3. Don’t put in values greater than 9. The same rules apply for glossiness. Note that you must ensure, that the checkbox „Use P3D Reflections“ is checked for every material which should use the new shaders.
8. After you have changed the values, press the „Set“ button. This will save the new values in the material list. Note: this won‘t save the file. Also note: if you only change the glossiness value and have multiple materials selected, only the glossiness value will be saved to all selected materials. The other values won‘t get changed unless you have changed these, too.

Dynamic Reflection Map Quality

- If you set it to off, this won’t work. Your aircraft will look ugly. If you don’t have to power to use the dynamic reflections at least at low, you won’t be able to use this feature at all
- Low: this setting uses six 128x128 textures for the reflections. The dynamic reflection texture will only contain the terrain and the sky.
    - This setting works well for the Ambient Lighting on the aircraft.
    - There won’t see many specular reflections at all.
    - You won’t see lights reflecting on the surface during the night
    - The ambient lighting won’t change if clouds are visible

- Medium: this setting uses six 256x256 textures for the reflections. The dynamic reflection texture will contain surfaces marked as “runway”, too.
    - On some airports, you will see the taxi lines reflecting on the surface as well as some taxiway lights. Note that the developer of the airport must have setup the corresponding polygons correctly.
    - You will see the sun and the moon on the reflections
- High: this setting uses six 512x512 textures for the reflections. While this feature uses quite a lot of performance, it already gives you very nice details on the reflection map
    - You will see airport buildings on the reflections
    - You will see autogen buildings on the reflections
    - You will see clouds on the reflections.
    - You will see taxi lights on the reflections
    - The ambient lighting on the aircraft will change if you fly in/above the clouds

  Because of the included autogen, the performance lose is also dependent on your autogen quality and draw distance settings. So if you have set these values quite high, you will see a performance drop in areas with a lot of autogen. While the autogen render shaders have been been optimized, this could still reduce the performance significantly.

  Because of the included cloud reflections, the performance will drop depending on the weather around you. While the cloud shaders have been optimized for this feature, this could still reduce the performance significantly.
- Ultra: this setting uses a 1024x1024 textures for the reflections.
    - You will see particles on the reflection map
    - You will see trees in the reflections
    - You will see ORBX street lights in the reflections (internally they are trees)

      The output quality with Ultra compared to High is not a huge step, while the performance lost is quite big.

Adjusting the Models

To use this feature, you not only have to adjust the shaders, you also have to modify the materials of the aircraft models. Therefore, a secondary tool is integrated into the package which helps you with that.

Note that you won’t have to adjust the model for each livery, you have to adjust it per model type. For example, if you adjust the Default Mooney Bravo, it will work on every livery using the same model.

The model tool supports loading and saving profiles per model. You can share the profiles with others, too. DO NOT SHARE COPYRIGHTED MATERIAL.

Things you should know

It is relatively important that you should know the following points. It will clear some misunderstands and help you understand, why there are some graphic artifacts when using this method.

Reflection Replacement

There are two possible reflection maps. A default, built-in reflection map and a custom reflection map, addon developers uses most of the time. When you enable “Dynamic Reflections” in P3D, only the default texture gets replaced by the dynamic one. That’s the reason, you won’t see it on most planes anyway. Because only one map is used for the output and the custom one is always preferred. There is no way to force the usage of the dynamic one externally.

Reflection Visibility

The current implementation of the reflection map is quite different from the way the new shader is based on. For example, the current reflection map intensity is dependent on the amount of light hitting a surface. So during night, you won’t see any reflection map while during daylight, the reflection map is displayed in full intensity. This is a legacy implementation of the engine which had to be changed.

Reflection Anomalies

The reflection map always gets generated from the point, the user camera is currently located. This will result in reflections or diffuse color changes as soon as the camera moves. Up until now, there is no fix for it available, so you will have to live with that unfortunately.

PBR, IBL, Metallic and Dielectric Materials, etc.

You might have heard some of these key words. Let me just briefly describe the meanings of these

- IBL stands for Image Based Lighting. It is a quite old rendering technique which came up again recently because the required GPU power was finally available to use it. It can be a replacement for the old ambient light value to simulate indirect lighting. In P3D, indirect lighting is approximated with the ambient light value. It is a simple value independent of the direction, a surface is pointing to. If you won’t use ambient lighting, areas in the shadow would be just pitch black, which looks very strange and unnatural. With the new rendering method, the constant ambient light is replaced by the reflection map as well which gives a much more natural lighting on the area

- PBR stands for Physically Based Rendering. It completely changes how light is calculated for each pixel by using more physically accurate functions to calculate the amount of light a surface reflects. PBR uses a different set of input parameters to calculate the output. Assets rendered with PBR must be designed for it. Because of this, full PBR cannot be used within P3D, because the engine itself must change (the required parameters must be stored somewhere) and all the model materials would have to get adjusted.
- Metallic and Dielectric materials are the two base materials PBR is working with. Metallic materials don't have a diffuse color at all – they only return specular and indirect specular light. Dielectric materials have a diffuse color and return that as well (this is only a brief summary). To make PBR at least a little bit possible inside P3D without modifying the engine/assets too much, only the dielectric part is implemented by this method
- Roughness/Glossiness is a parameter which has quite a lot of influence in the PBR pipeline. Glossiness is simply the inverse of the roughness value. It describes the micro surface structure of the surface and describes how "clear" a surface reflects light. If you look at a polished wooden table, you can see a blurry reflection of the surrounding area on it. While the surface might feel smooth, it still won't reflect a clear image of the surrounding area like a mirror. Because P3D doesn't have a value of surface roughness, it is approximated using the available material information.