

How to create AxF files compatible with the 3DEXPERIENCE® platform in PANTORA 1.6

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1 Overview

The 3DEXPERIENCE® platform by Dassault Systèmes® relies on its Enterprise PBR Shading Model (DSPBR) for representing material appearance.¹ In AxF 1.7 a new SVBRDF material representation compatible to DSPBR named EP-SVBRDF was introduced that enables support of AxF for 3DEXPERIENCE® applications.² The multi-representation workflow introduced with PANTORA 1.6 will guarantee best compatibility with respect to 3DEXPERIENCE® applications that require an EP-SVBRDF representation and other applications that do not yet support it.³

This document provides best practices for PANTORA 1.6 to ensure the creation of AxF files that are ready-to-use in the 3DEXPERIENCE® platform. In the following the workflow is described for each of the three different representation classes which are currently specified in AxF and supported by PANTORA⁴.

2 Create compatible AxF files for the SVBRDF / BRDF material class

The corresponding SVBRDF / BRDF representations are based on parametric (Microfacet-) BRDF models whose parameters can vary spatially (textures). They are used mostly for opaque materials like plastic, metals, textiles etc. whose appearance can be modelled well by microfacet-based BRDF models.

¹ The DSPBR specification can be found here: <https://dassaultsystemes-technology.github.io/EnterprisePBRShadingModel/>

² Details on EP-SVBRDF and its relation to DSPBR are given in the AxF 1.7 white paper and the AxF Decoding SDK documentation. A key technical difference of EP-SVBRDF to SVBRDF representations is the improved energy preservation, hence the prefix.

³ The multi-representation workflow is described in the PANTORA manual.

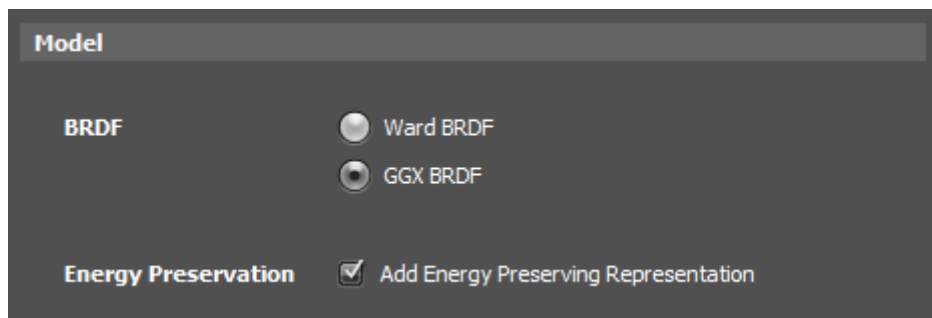
⁴ Note, that in the context of AxF and PANTORA, the BRDF representation class is considered a trivial special case of the SVBRDF representation class. Further, EP-SVBRDF representations are also subsumed under the SVBRDF representation class when selecting a material type in PANTORA for ease of use, though actual EP-SVBRDF and SVBRDF representations differ slightly in their underlying model.

For an AxF to work with 3DEXPERIENCE® applications it must contain an EP-SVBRDF or EP-BRDF representation respectively. In the following the necessary steps to ensure this are described. After following these steps, the resulting AxF file will contain two representations: An EP-SVBRDF representation as required by 3DEXPERIENCE® applications and a SVBRDF representation for applications not yet supporting EP-SVBRDF. It should be noted that both representations provide the same quality but are based on slightly different BRDF models underneath. When editing such an AxF file further in PANTORA, it will only allow to edit the EP-SVBRDF representation, while the SVBRDF representation will be synchronized automatically on any changes. The advantage of these files is their backwards compatibility. Applications without AxF 1.7 support will automatically choose the SVBRDF representation, while 3DEXPERIENCE® application (that do not support SVBRDF) will choose the EP-SVBRDF representation instead. Note that the resource sharing feature of AxF reduces the storage overhead of such a multi-representation significantly. However, in case no backwards compatible SVBRDF representation is needed, it can be deleted manually from the AxF in the PANTORA Editor as described below.

2.1 TAC7 Processing Options to ensure an EP-SVBRDF representation in the AxF file

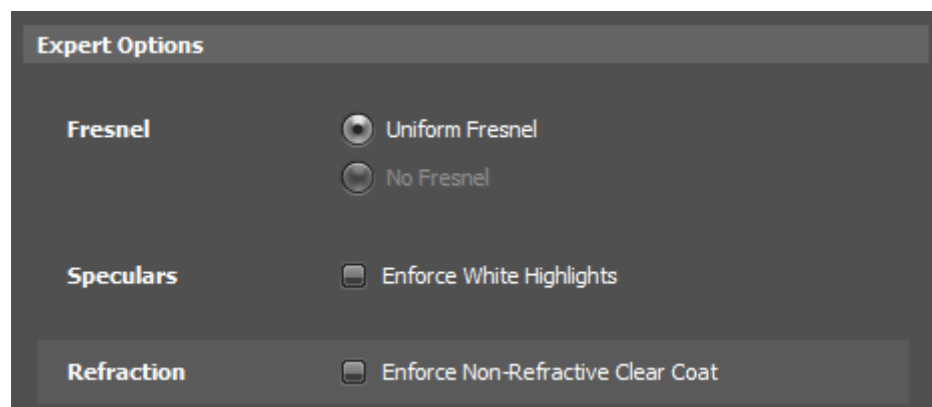
When encoding an AxF file from a TAC7 measurement using the material type SVBRDF or BRDF the option “Add Energy Preserving Representation” under the Model section must be enabled for an EP-SVBRDF representation to be generated. This will guarantee the compatibility of the resulting AxF with the 3DEXPERIENCE® platform.

This option is enabled by default in Pantora 1.6.



Note that the Ward BRDF model is not supported by the EP-SVBRDF representation. Therefore, it is not possible in PANTORA 1.6 to create a 3DEXPERIENCE® platform compatible AxF with the Ward BRDF option.

If clear coat is enabled, the expert option to enforce non-refractive clear coat should be left at its default setting, i.e. unchecked.

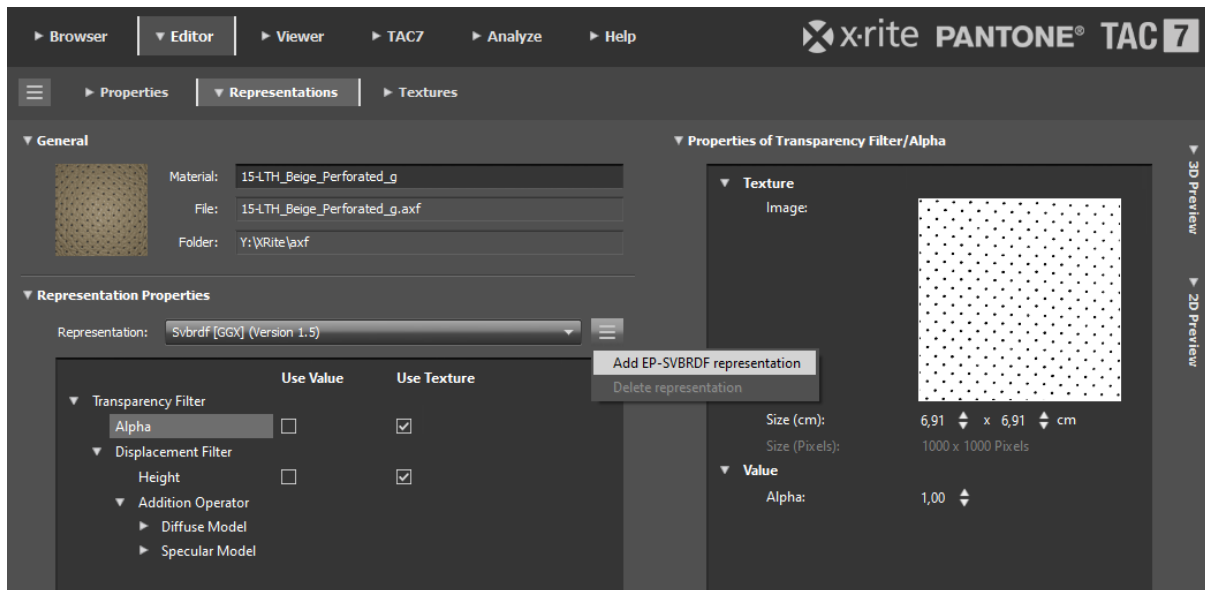


2.2 Manual workflows to add an EP-SVBRDF representation to an existing AxF file

Existing AxF files containing an SVBRDF representation can be converted for use in the 3DEXPERIENCE® platform by adding an EP-SVBRDF representation manually, either via the PANTORA Editor or a command line program that allows convenient batch conversion of a larger number of files.

The PANTORA Editor provides a context menu in the Representation Properties section. Depending on the available representations and current selection this allows to:

1. Add an EP-SVBRDF representation
2. Delete the selected representation



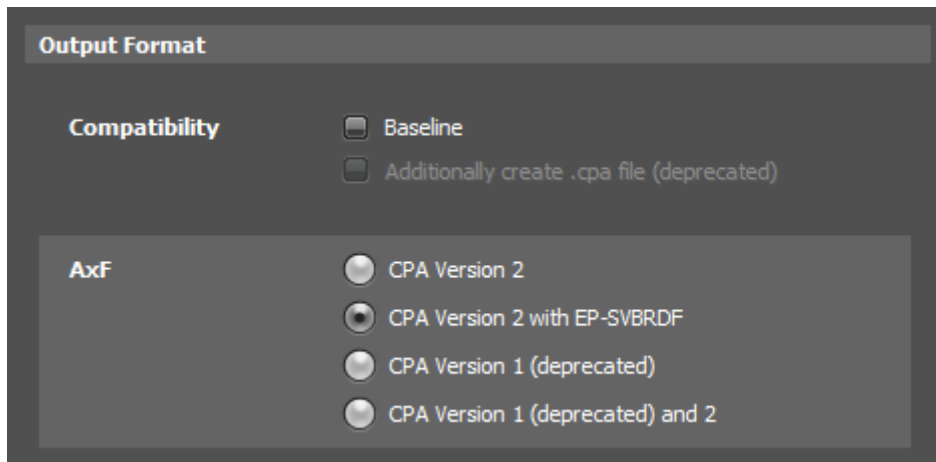
3 Create compatible AxF files for the Carpaint material class

The corresponding representations are specifically designed for representing metallic paints as used e.g. in the automotive industry. The main differences to the EP-SVBRDF representations are two angular dependent tables/textures to model color-flop and effect pigments. These components cannot be fully represented by the EP-SVBRDF representations currently specified in AxF. Therefore, the CPA2 representation is considered as reference by PANTORA, implying that only the CPA2 representation can be edited, while the EP-SVBRDF is synchronized automatically.

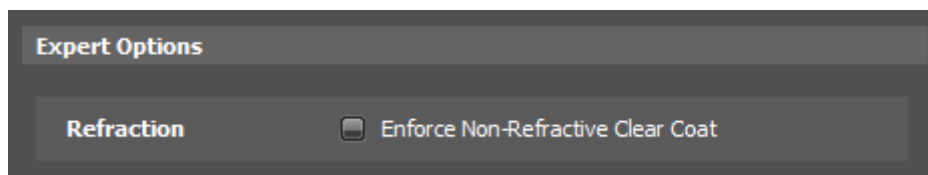
3.1 TAC7 Processing Options to ensure an EP-SVBRDF representation in the AxF file

When encoding an AxF file from a TAC7 measurement using the material type Carpaint the option "CPA Version 2 with EP-SVBRDF" under the Output Format section must be enabled for an EP-SVBRDF representation to be generated alongside a CPA2 one. This will guarantee the compatibility of the resulting AxF with the 3DEXPERIENCE® platform.

Please note that any visible metallic effects ("Flakes") and strong color-flop visible in the CPA2 representation will be missing in the EP-SVBRDF representation.



Furthermore, the non-refractive clear coat option should be left at its default unchecked state.



3.2 Manual workflow to add an EP-SVBRDF representation to an existing AxF file

Existing AxF files containing a Carpaint representation can be converted for use in the 3DEXPERIENCE® platform by adding an EP-SVBRDF representation manually, either via the PANTORA Editor or a command line program that allows convenient batch conversion of a larger number of files.

For the PANTORA Editor the same workflow as above apply. The main difference is the loss of “Flakes” and strong color-flop effects when converting a Carpaint CPA2 representation into a EP-SVBRDF representation.

Note that a future AxF version might provide an extension to the EP-SVBRDF representation that includes the Procedural Flake component as specified in DSPBR.

4 Notes on the Volumetric material class

The corresponding representations for translucent materials are based on general (spectral) volumetric scattering parameters like absorption, scattering and phase-function. The DSPBR specification 2020x defines a volumetric material with a slightly different, more artist friendly parameterization. In addition, DSPBR allows to combine a volumetric material with a dielectric interface. This is currently not supported by AxF 1.7 but is planned as a feature for an upcoming AxF version.

5 Summary

Best practices for PANTORA 1.6 are described on how to create AxF 1.7 files that are compatible with 3DEXPERIENCE® platform applications. In particular it is shown how to add a DSPBR compatible EP-SVBRDF representation, either to an AxF file created from a TAC7 measurement, or by converting an existing AxF file.

Following this instructions 3DEXPERIENCE® compatible AxF can be created for

- AxF SVBRDF/BRDF materials with GGX BRDF model and

- AxF Carpaint materials with CPA2 model, but at a loss of flakes and color-flop.

Not yet amenable for 3DEXPERIENCE® are

- AxF Volumetric materials and
- AxF SVBRDF/BRDF materials with Ward BRDF model.