# IMF **Studio**

IMF Studio Creator

User manual

# Contents

# 1    Welcome

Thank you for purchasing IMF Studio Creator software.

With the IMF Studio Creator software you are now able to create IMFs in a fast and easy way.

With IMF Studio Creator it is possible to create SMPTE compliant IMFs. This software solution needs only a standard PC/Mac to make content ready for the distribution. There is no special or additional hardware necessary.

# 2    Feature Overview

These are the features of IMF Studio Creator:

| Feature | IMF Studio Creator Demo | IMF Studio Creator |
|---|:---:|:---:|
| IMF creation | ✔ | ✔ |
| Stereo, 5.1 and 7.1 Surround Audio | ✔ | ✔ |
| DPX, TIFF and JPEG 2000 Input | ✔ | ✔ |
| IMSC 1.1 subtitles | ✔ | ✔ |
| Metadata adjustment (e.g. Offset, Entry Point, Duration, Content Titles, Content Types, Annotation Texts) | ✔ | ✔ |
| Graphical User Interface with Drag and Drop | ✔ | ✔ |
| Windows and Mac OS Version | ✔ | ✔ |
| QuickTime Input | ✔ | ✔ |
| Loading IMFs | ✔ | ✔ |
| Scriptable | ✔ | ✔ |
| Supplemental IMFs (IMFs with referenced MXF tracks) | ✔ | ✔ |
| Dolby Vision Packaging | ✔ | ✔ |

| | | |
|---|:---:|:---:|
| Available for 64 bit Windows 10 | ✔ | ✔ |
| Available for 64 bit Mac OS X (10.14-10.15) | ✔ | ✔ |

# 3    Licensing

## 3.1    License Activation

Download IMF Studio Creator at www.easydcp.com.

### 3.1.1    Offline workflow

After installing and starting IMF Studio Creator the following dialog appears:
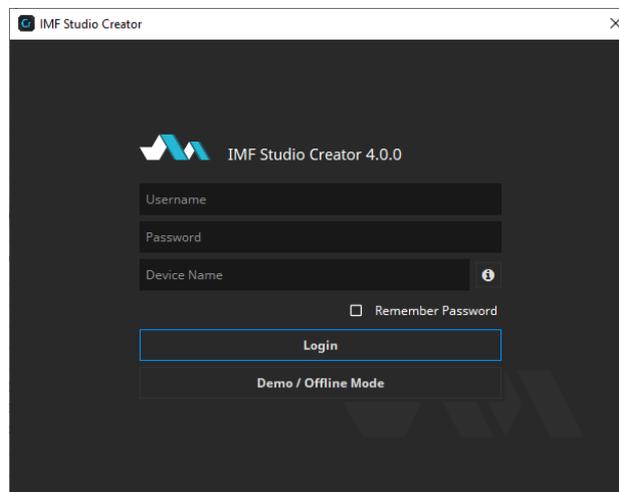


Click "Demo / Offline Mode" to  start a free version of IMF Studio Creator which is subjected to the demo mode restriction. After startup has finished, open the options dialog, select "Activation Status" and press "Request License". Fill in the licensee's name. If the computer is connected to the Internet, click the "submit" button. The default web-browser will open www.easydcp.com, where further instructions will guide you through the purchase process.

After the purchase, a link to the zip file with the License will be available for download within your user account at www.easydcp.com. The zip file can be dragged & dropped into IMF Studio Creator installation to unlock it.

The procedure is also described in a screen cast at www.easydcp.com.

### 3.1.2    Online workflow

Purchase one of the available subscription plans at www.easydcp.com. After the purchase, a license for IMF Studio Creator is linked to your easyDCP account.
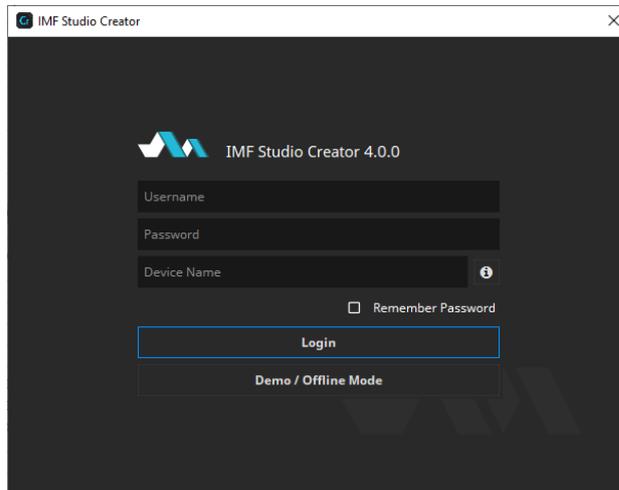
Install and start IMF Studio Creator and fill in the username and password you've used for your easyDCP account. After clicking "Login", IMF Studio Creator will query the linked license from www.easydcp.com and activate your instance.

The "Device Name" field is prefilled with the name of the machine you use IMF Studio Creator on. You can change the name freely. The name will be send to easyDCP.com and is used for convenient device identification only.

Please be aware that a permanent internet connection is required. As soon as IMF Studio Creator detects a connection loss, the graphical user interface will be locked until the internet connection has re-established.

With the online licensing workflow it's possible to run IMF Studio Creator on different systems with the same license. Please be aware that multiple subscriptions are necessary to run IMF Studio Creator instances at the same time on different machines.

## 3.2    View current license status

To view the license details with an offline license, go to "menu bar -> File -> Settings -> Activation Status" and select Details next to the "Licensee" entry.

## 3.3 Application Data and Settings

IMF Studio Creator automatically creates an application data folder. It contains the settings file as well as a repository for color transform files.

The folder is located at
`<User Application Data>/Fraunhofer IIS/IMF Studio Creator/`

Additionally, all IMF Studio applications share a folder with additional files such as color space descriptions. It is located at
`<User Application Data>/Fraunhofer IIS/IMF Studio Shared/`

The user application data folder on Windows is located
`C:/Users/<username>/AppData/Roaming/`

A shortcut is to just enter `%APPDATA%` into the address bar.

On Mac OS X, the user application data folder is at
`/Users/<username>/Library/Application Support/`

## 3.4 Software Update

Please make sure you leave the automatic check-for-updates enabled, so that you get informed immediately when new versions are available for download.

Multiple versions of IMF Studio Creator can be installed side-by-side, so there is no need to uninstall the old version before installing a new one.

With an active subscription it is possible to just login in the new version without further action required.

A new license file is only required for major updates, e.g. version 4.0 to version 4.1, and can be purchased at www.easydcp.com. Point releases do not require a new license, e.g. 4.0.0 to 4.0.1.

The update procedure is as follows

**Point Release** (only the last version number changes, e.g. 4.0.0 to 4.0.1)

1. Log into your account at www.easydcp.com

2. Download the new installer file and install it

3. **Offline licensing workflow:** The new IMF Studio Creator version will automatically detect your existing license file and is good to go.

4. **Online licensing workflow:** IMF Studio Creator will automatically download the necessary license and certificate information from www.easyDCP.com as described in 3.1.2. There is nothing else you have to do.

**Major Release** (first or second version number changes, e.g. 4.0.x to 4.1.x)

**Offline licensing workflow**

1. Log into your account at www.easydcp.com and purchase the license for the new version. The installer is then available for download. Download and install it.

2. Open the new IMF Studio Creator version and proceed with the steps described in 3.1.1.

**Online licensing workflow**

If you have a valid subscription plan the installer of the new version can be downloaded at www.easydcp.com. All further steps are described in 3.1.2.

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# 4    Getting Started

## 4.1    Project Settings

When creating a new project, the "New Project Settings" window pops up where you configure the main attributes:

After starting IMF Studio Creator, the following project settings screen comes up:
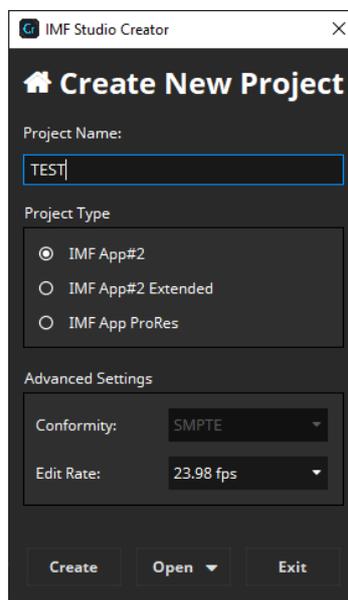


First, enter a Project Name. The Project Name will be used as title of the package and the first composition and can be changed again afterwards.

Next, select the project type and edit rate. For IMF only SMPTE conformity is available.

The edit rate should match your input material's native edit rate as IMF Studio Creator will not adjust your input material to the selected edit rate. There is only an edit rate conversion for the audio files if your input material has a different edit rate.

Finally, click "Create" to create the project.

### 4.1.1    Digital Cinema Naming Convention

In digital cinema, it is common practice to follow a certain naming convention. The most important attributes such as the resolution, language, audio layout and so on are coded into the title so that a projectionist can later see them at first glance. This technique is called Digital Cinema Naming Convention.

IMF Studio Creator provides an editor that helps you put together a proper title. The title will be used both for the project and also for the IMF and its Composition Playlist. Please note that it's not mandatory to fill in all fields.
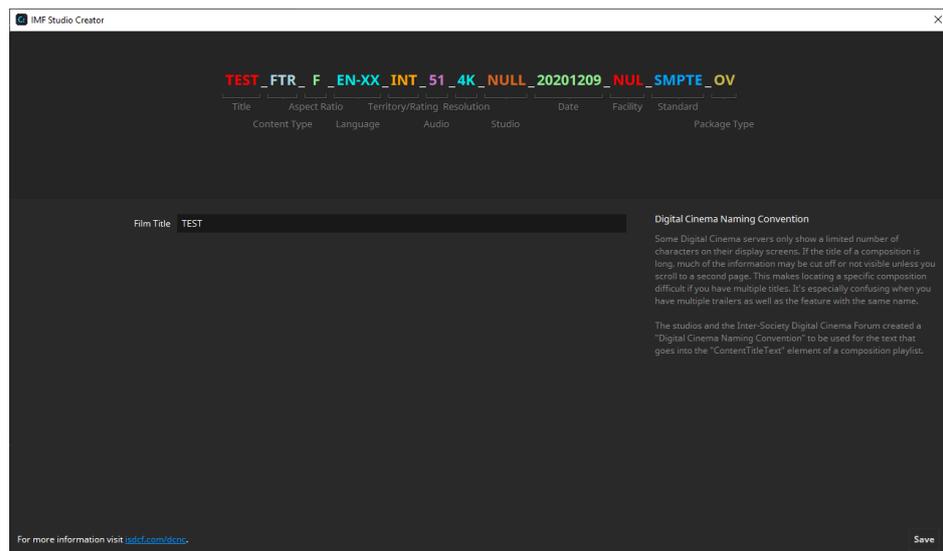


To change different properties you can select them at the top by clicking on the entry. This will open the edits for the selected group.

This dialog tries to fill out as many entries as possible automatically. Values like Content Type, Standard and Package Type are derived from the current project, but can be overridden manually.

All values are compliant to the Digital Cinema Naming Convention, Version V.9 (see http://www.digitalcinemanamingconvention.com).

## 4.2    The Main Window

After creating a new IMF Studio Creator project, the start-up screen comes up:

Main Menu

Timeline

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| Track Manager | Track/Reel Preview | Metadata Window |
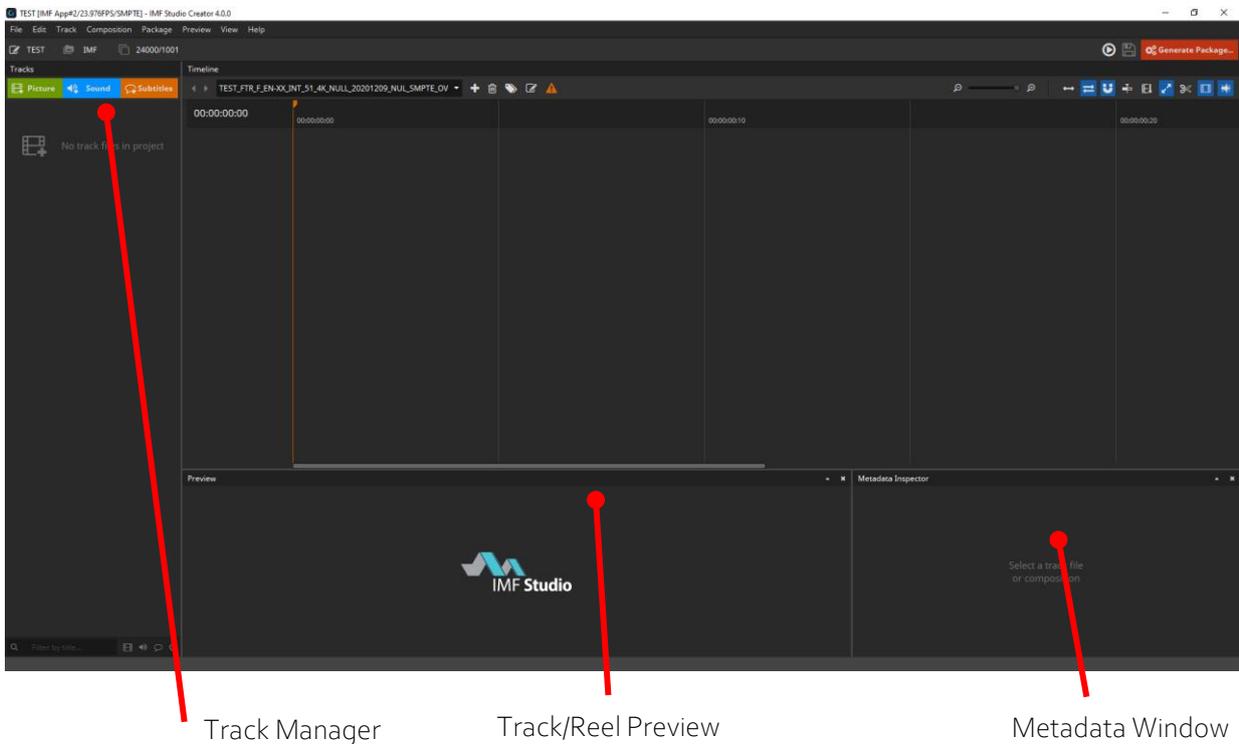
The main window is divided into several sub windows like a Track Manager and a timeline window. The following sections explain how to use the windows and features.

## 4.3    Packing List (PKL) Parameters

Each IMF has a packing list (PKL) that lists all files contained in the IMF as well as some top-level metadata such as the creator, issuer and annotation text. The PKL's annotation text can be regarded as the IMF title.

To edit the packing list parameters, click the edit-icon in the main tool-bar below the menu bar:
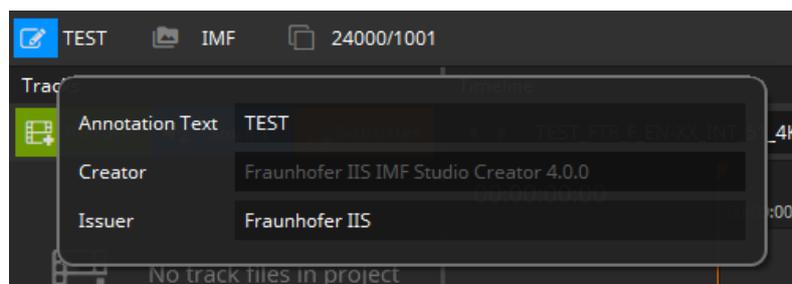
### Annotation Text

The Annotation Text appears on the screen if a volume (e.g. USB-Drive, Hard disc Drive) is connected to a digital cinema system before ingest. This annotation text can be regarded as the IMF title. For IMFs that only contain a single Composition, it is common to use the same title for both the PKL and CPL. The title should follow the digital cinema naming convention. For more details, please refer to chapter 4.1.1.

The symbol next to the line edit to enter the name allows synchronizing the package title with the composition. If the chain is connected, updates will also update the name of the first composition. The same vice versa happens when updating the composition content title.
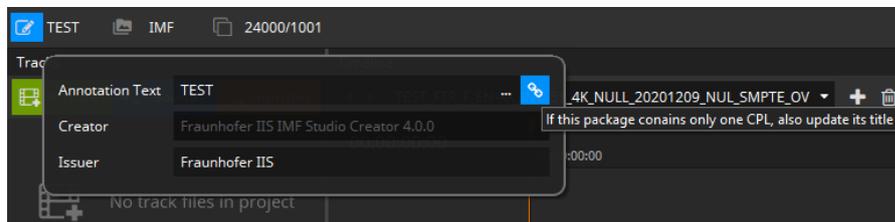


This synchronization mechanism is also available for Creator and Issuer of PKL and CPL.

### Creator

Commonly, the application that was used to create the IMF is stated here. This field is informational only.

The Creator is automatically filled with the IMF Studio Creator version used for generation.

### Issuer

State your company name here. This field is informational only.

## 4.4    Settings

With the settings you are able to set up default values for new projects, image processing and file naming options.

To set up settings, got to "`File -> Options`"

A new dialog will appear to set up the options described in the following chapters:

### 4.4.1    New Project Defaults

Default project settings are automatically applied when creating a new project. You can set your own company name as the issuer or a default Composition Playlist (CPL) content kind (e.g. feature, trailer etc.).
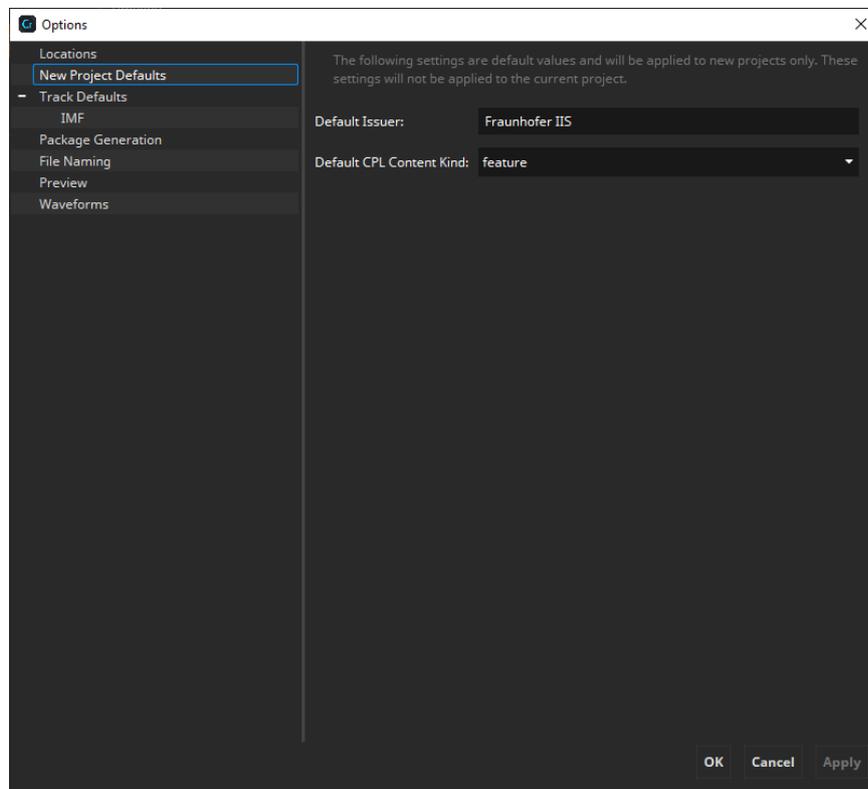


These settings are default values that will be applied to new projects only. They will not be applied to the current project.

### 4.4.2    Track Defaults

Default Track settings are automatically applied when adding new Tracks to a project.
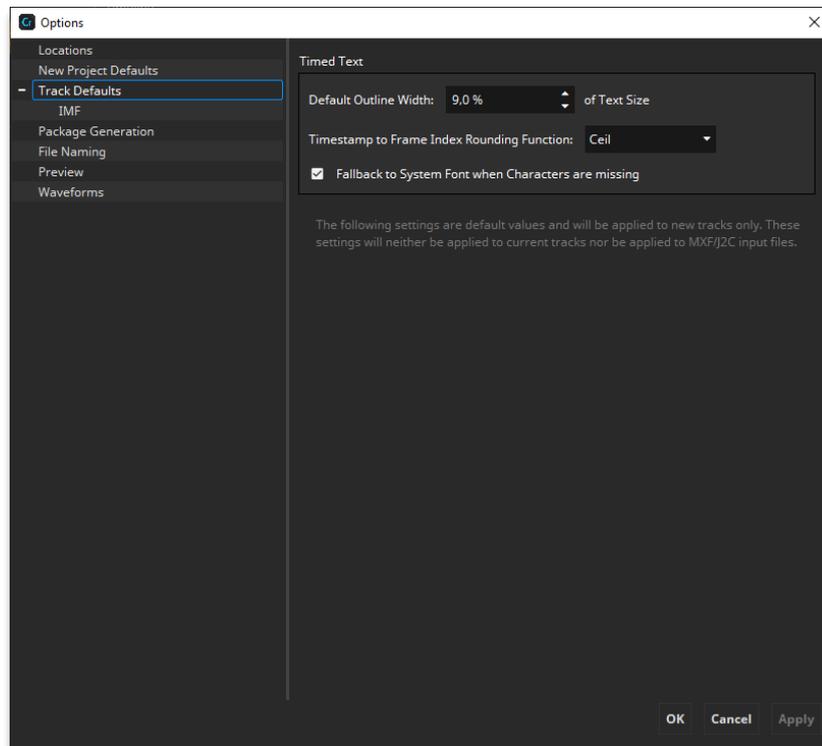


### 4.4.2.1  Common Defaults

#### Default Outline Width

The outline thickness for timed text is not defined in the specifications. With this setting, the default outline thickness can be configured and will be applied to new Timed Text Tracks.

This setting only affects the way timed text is rendered in IMF Studio Creator. Unless timed text is burnt into the images, this setting will not affect how a cinema server renders the outlines.

#### Timestamp to Frame Index Rounding Function

The rounding mode influences in some cases at which exact frame index a subtitle appears or disappears.

This setting only affects the way timed text is rendered in IMF Studio Creator. Unless timed text is burnt into the images, this setting will not affect how a cinema server renders the timed text.

### Fallback to System Font when Characters are missing

If characters are missing in the loaded font and this option is enabled, missing characters will be replaced with characters from a similar font.

This setting only affects the way timed text is rendered in IMF Studio Creator. Unless timed text is burnt into the images, this setting will not affect how a cinema server renders the outlines.

These settings are default values and will be applied to new Tracks only. They will not be applied to already present Tracks.

## 4.4.2.2 IMF

### Default Color Transformation

Specify here which default source color space should be assumed for new Picture Tracks.

The "Overrides auto-detected color spaces" option disables auto-detection of color spaces and will always use the configured Source Color Space. When disabled the selected Source Color Space is chosen when the color space can't be determined automatically.

### Default Letterboxing

Specify here which letterboxing mode, if any, should be used for new Picture Tracks. If a mode is chosen as default that is incompatible with the current project type, IMF Studio Creator will choose a best fit for the project type and the input material.

### Default Subsampling

Specify here which default subsampling scheme should be assumed for new Picture Tracks.

### Audio Language

Specify here the default audio language being used for new Sound Tracks.

These settings are default values and will be applied to new Tracks only. They will not be applied to already present Tracks.
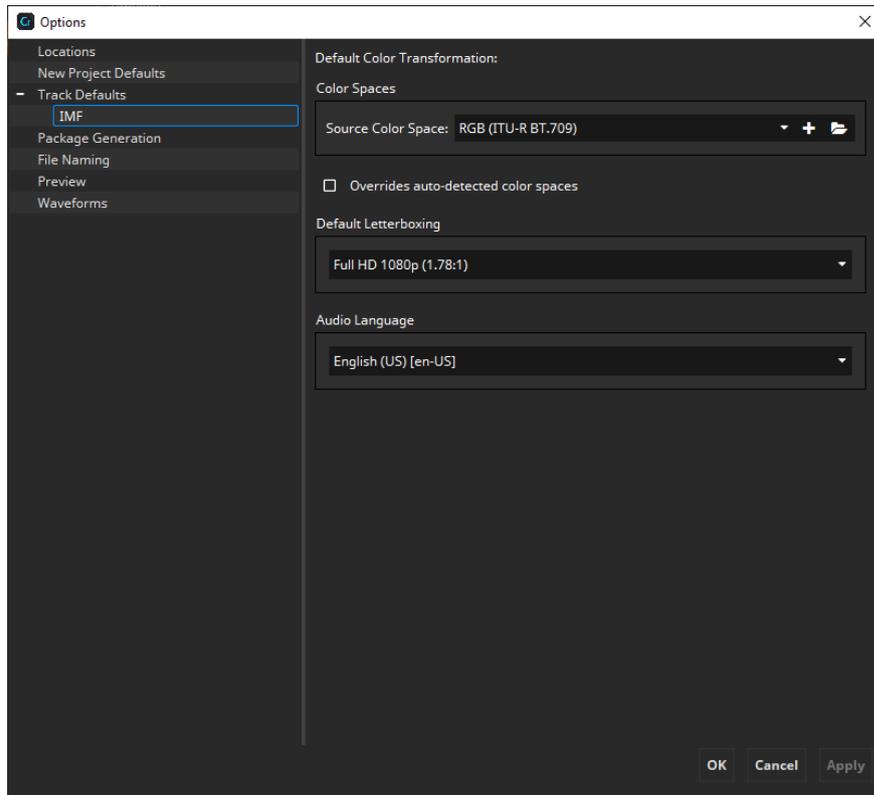
### 4.4.3 Package Generation

With the package generation options you are able to modify the way images will be processed during IMF generation.
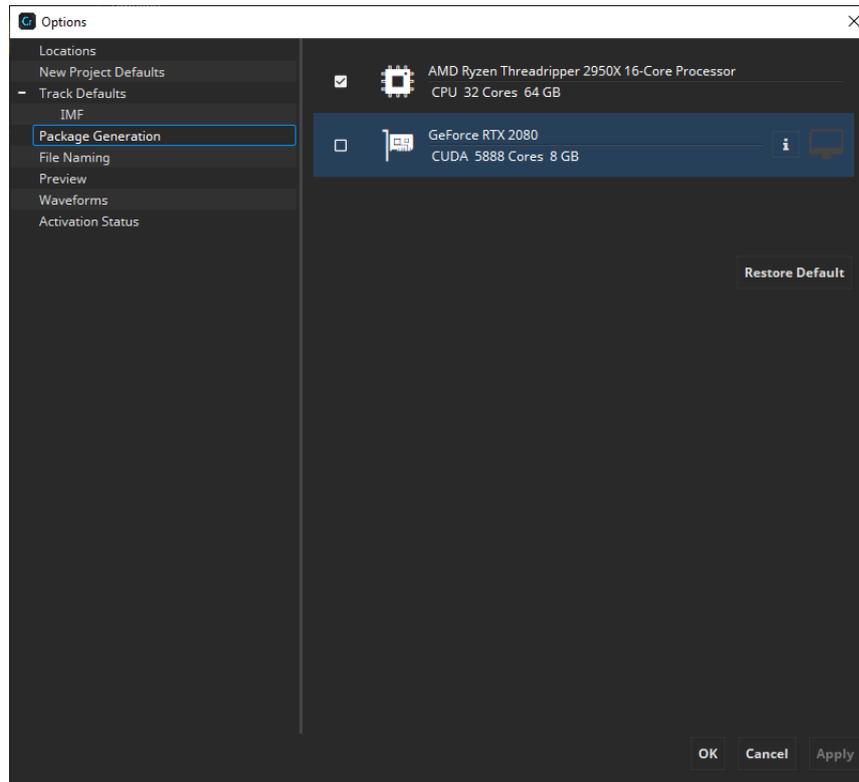
## CPU/GPU Encoding

Choose whether you want to use the CPU or GPU for encoding of the JPEG 2000 images.

> GPU encoding is only available on Windows.

### 4.4.4 File Naming

In the File Naming pane, you may specify how the files of a generated IMF shall be named. Adjusting the naming scheme is optional.

There are two presets available, but it's also possible to define your own file naming presets.

### Preset "UUID"

By default, the names of all generated files (except VOLINDEX and ASSETMAP) are composed of its UUID and default suffix, e. g. "CPL_feae1e80-0760-4c0f-a806-53414bcc8dab.xml" or "2a3d577d-0ace-482a-bb60-61b5ebbd5ba4_j2c.mxf".

**Preset "Content Title"**

The names of all generated files (except VOLINDEX and ASSETMAP) are composed of its Content Title, Reel number, UUID and default suffix, e. g. "CPL_MovieTitle_TRL1_3D_48_F133_OV_feae1e80-0760-4c.xml" or "MovieTitle_TRL1_3D_48_F133_OV_Reel1_2a3d577d-0ace-48_j2c.mxf".

**Preset "Custom"**

When this preset is selected, you can customize your own file naming via the placeholders shown in the usage.
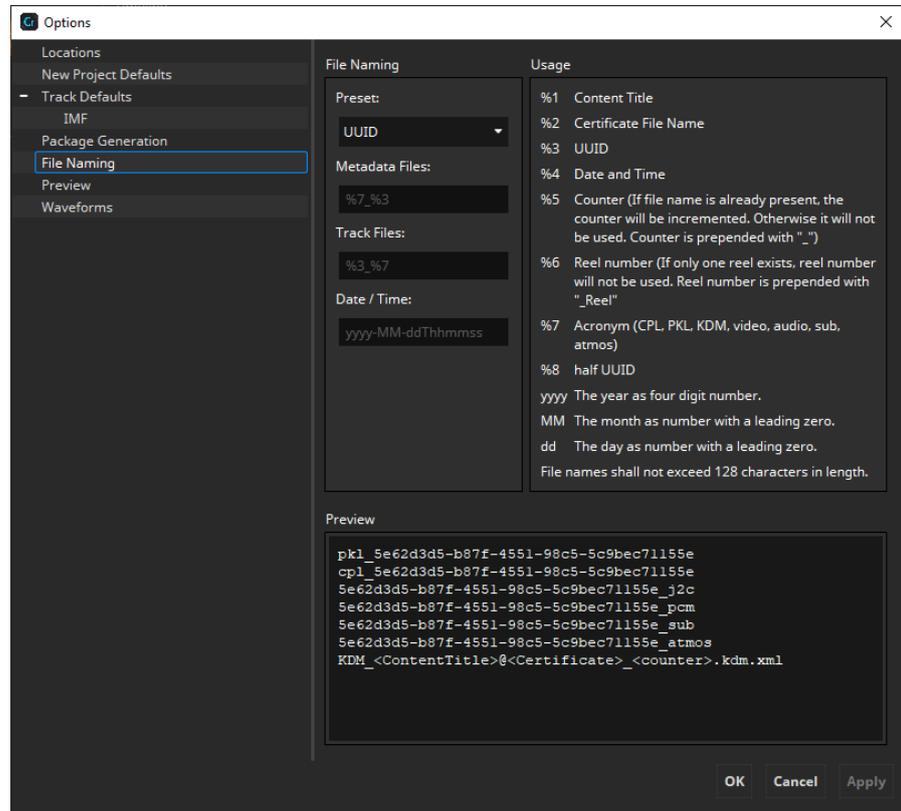
## 4.4.5    Preview

In the Preview pane you can select the Color Space that will be used for the thumbnails in the timeline as well as the preview. If a color transform isn't available from the source to the timeline color space, the source color space will be shown.
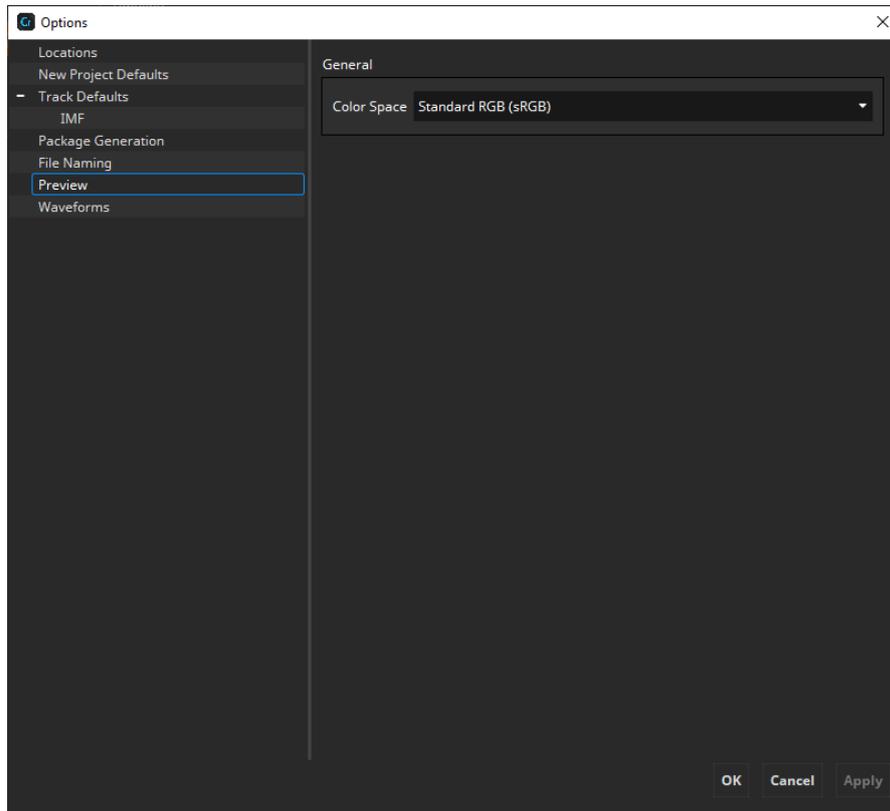
### 4.4.6 Activation Status

In the Activation Status pane you see all your license and certificate information. You can see the Licensee and the certificates in the upper area and show the details by clicking the "Details…" button next to them.

A new license or certificates can be requested and imported using the "Request License" and "Import License" buttons.

Activation Status in only available in Demo mode and when importing an offline license.

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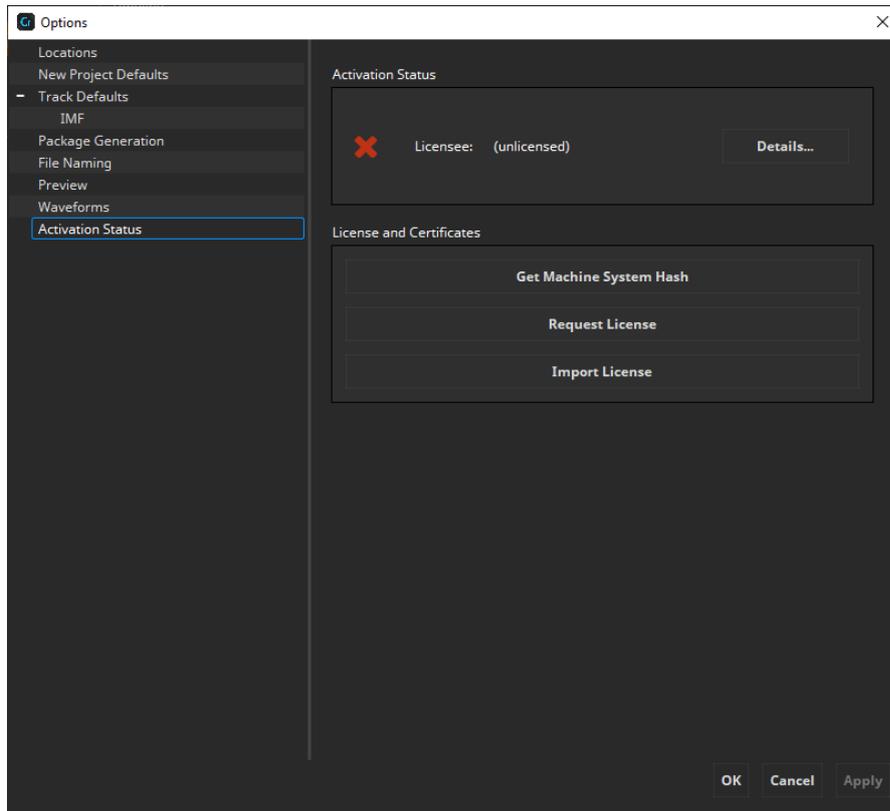
## 4.5    Undo/Redo functionality

Starting with IMF Studio Creator 4.0 it is possible to revert/redo changes done to the project. Undo is triggered with Ctrl/Cmd + Z, redo with Ctrl/Cmd + Y. It's also possible to use the UI for it. There you find the option in the Edit menu. That will also show you which action will be reverted/redone.

Below you can find lists of covered and uncovered features.

Covered functionality:

- Changing PKL/CPL title

- Changing issuer

- Changing issuer language

- Changing CPL content kind

- Timeline

    o   Adding clips

    o   Removing clips

    o   Moving clips

    o   Split

    o   Insert

    o   Add Silence Sound Track

    o   Add Empty Subtitle

    o   Pre-/append Black Frames

    o   Switiching composition

    o   Adding/removing compositions

- Track Manager

    o   Adding/removing tracks to/from the track manager

    o   Changing track annotation text

    o   Changing letterboxing

- o Changing color space/transform

- o Changing supplemental state

- o Changing subtitle burn-in state

- o Changing subtitle display type

- o Changing audio configuration

- o Changing audio language

Uncovered functionality:

- Track Manager

    - o Some IMF audio settings

# 5    Track Manager

On the left side of the main window you can find the Track Manager. Content, which should be part of a package, must be added to this Track Manager first in form of Tracks.

A Track is the smallest building block of a IMF and represents either

- an image sequence

- an image still picture (which gets internally multiplied for a given duration)

- a sound Track comprised of either a multi-channel audio file or a multiple mono-sound files (or a combination thereof)

- or timed text (Open/Closed Subtitles/Captions).

Tracks are just references, "pointing" at the original source files. Do not move or rename the source files after you have imported them. Each Track that is used in at least one Reel will become a single file in the created IMF. Tracks may have a
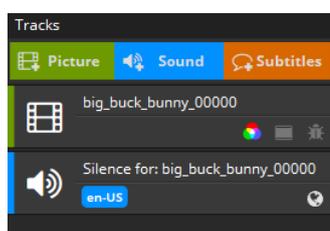
description (i.e. Annotation Text).

Tracks that are not used anywhere will automatically be omitted.

When you have an IMF with many Tracks, it is convenient to search for a Track by title or by type using the bar at the bottom:
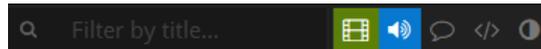


## 5.1 Picture Tracks

### 5.1.1 Add Picture Track

To add a picture sequence to the Track Manager, just click the "Picture" button at the top of the Track Manager or simply drag and drop files onto the Track Manager or directly into a Composition. You can also add a picture track using the main menu navigating through `"Track -> Add Picture Track…"`.

Depending on the amount of image files in the selected directory, both browsing and opening an image file sequence may take some time.

IMF Studio Creator will take the selected picture file as the first frame for the Picture Track and will also pick all subsequent images (of this format) in the same folder which belong to the sequence. If the fifth picture file (e.g. big_buck_bunny_00004.j2c) of this image sequence is selected, the imported Picture Track will start at this fifth picture and the first four pictures will be ignored.

According to the SMPTE standards, the duration of an IMF has to be at least one frame. If you open an image file sequence with duration less than one second, an error will be shown for the reel and before generation.

Furthermore, each picture in a sequence is required to have the same resolution.

### 5.1.2 Numbering of input image file sequences

To represent an image sequence, the image files shall be numbered with or without leading zeroes (see Examples 1 and 2). Additionally, the prefix may also contain digits (see Example 3).

Example 1 (with leading zeroes)

```
Img_0000001.DPX
Img_0000002.DPX
Img_0000003.DPX
Img_0000004.DPX
…
```

**Example 2 (without leading zeroes)**

```
Pic_998.J2C
Pic_999.J2C
Pic_1000.J2C
Pic_1001.J2C
…
```

**Example 3 (with numbers in filename)**

```
Pic2001_998.TIF
Pic2001_999.TIF
Pic2001_1000.TIF
Pic2001_1001.TIF
…
```

### 5.1.3    Add Still Picture Track

A Still Picture Track is a convenient way to show small local advertisements.
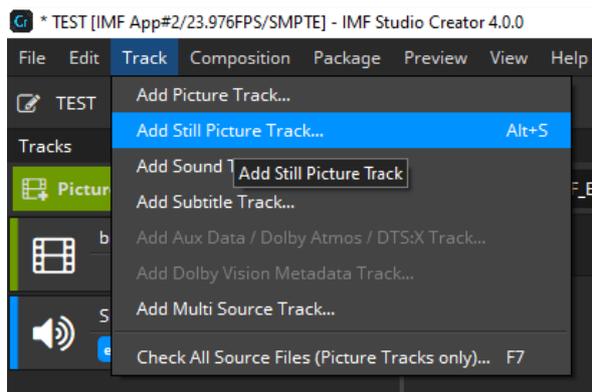


To add a still Picture Track to the Track Manager, click in the main menu bar "Track" → "Add Still Picture Track…"

The following dialog should appear:
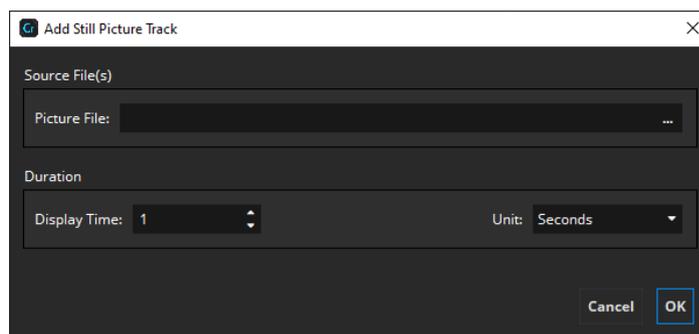
Now you can choose a picture file and a display time in seconds that defines how long the picture will be displayed on screen.

After pressing „OK", the still picture will be added to the Track Manager. The frame count of the still picture will be calculated automatically, depending on the current project's frame rate.

### 5.1.4    Letterboxing & Scaling

**Pillarboxing** is the process of adding black bars ("pillars") at the left and right sides.

**Letterboxing** is the process of adding black bars on the top and bottom.

By default, all input images will be pillar- or letterboxed to Flat, Scope or Full container, whichever is the closest match.

**Example**: if the source material were in 1900x1080, narrow black bars (each 10 pixels wide) would then be added to the left and right so that the IMF's aspect ratio becomes "HD" (1920x1080).

This ensures that all sequences within a multi-Reel Composition will have identical resolutions.

Of course you may manually override the automatic mode and pick any other strategy.
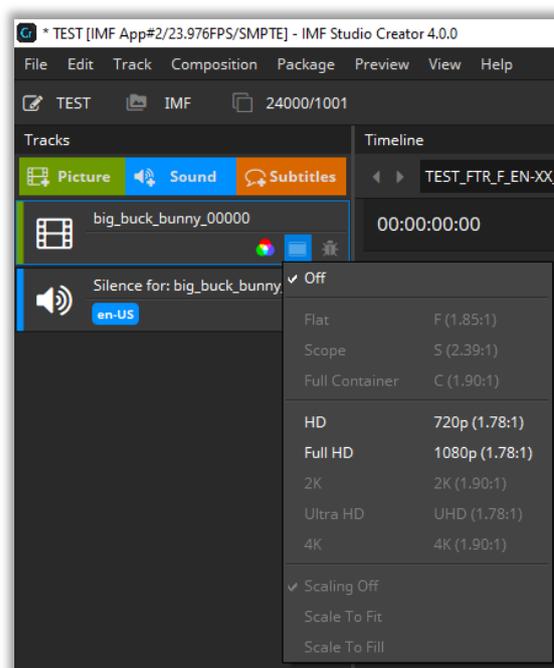
If scaling is set to **Scaling Off**, no scaling will be applied.

**Scale To Fit** will scale the image so that it completely fits the target resolution, but without any cropping. Black bars will probably have to be added to reach the target resolution. The aspect ratio of the input image will not be changed.

**Scale To Fill** will scale the image until the target resolution is reached in both width and height. No black bars will be added. In case the scaled width or height then stretches beyond the target resolution, parts of the input image will then have to get cropped. The aspect ratio of the input image will not be changed.

Regardless which combination of boxing or scaling options is selected, the input image sequences' native aspect ratio will always be maintained so that images will never get disproportionally distorted.

## 5.1.5    Color Processing

In an IMF, all images are usually in the "RGB" or "Y'Cb'Cr" color space. Since the input material imported into IMF Studio Creator is typically not in this color space, but often in RGB, all images have to be color processed. In case the imported image sequences are in the right color space, e.g. when you are importing JPEG2000 codestream files (*.j2c) from an existing IMF, color processing can be bypassed by setting the source color space to the destination color space. This will also have a positive impact on the IMF render performance.

In IMF Studio Creator, color processing can be done via selection of

- source and destination color spaces XML file presets (*.xml),

If color processing is activated, you see a small icon on the track. If color transformation is bypassed, the color processing icon is absent.

In IMF Studio Creator the color processing is specified individually for each picture Track. To do so, right click on a picture Track and select "Color Processing" or simply
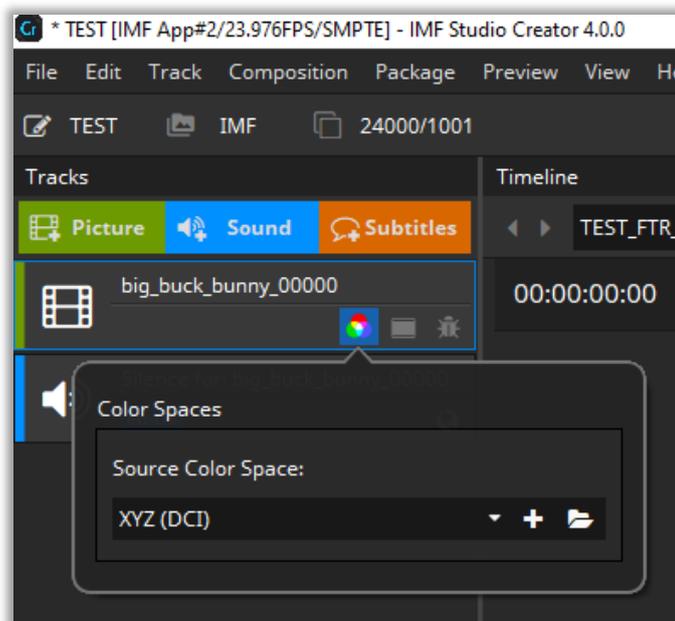
click the picture Track's color space button:

### 5.1.5.1 Bypass Color Processing

Bypassed color processing is used if the source image files already are in the right color gamut.

To bypass color processing for a specific Picture Track, right-click on the Picture Track and select the destination color space of the IMF as source color space of the track:

Color Transformation has to be bypassed if you want use direct copying of the source image files into the final IMF without re-encoding. For proper metadata you sometimes need to select and identity color transformation by selecting the same source and destination color space.

### 5.1.6 Export Frames to JPEG 2000 Codestream (J2C) Files

To export the source image files of a specific Picture Track, right-click on the Picture Track and choose "`Export Frames…`":
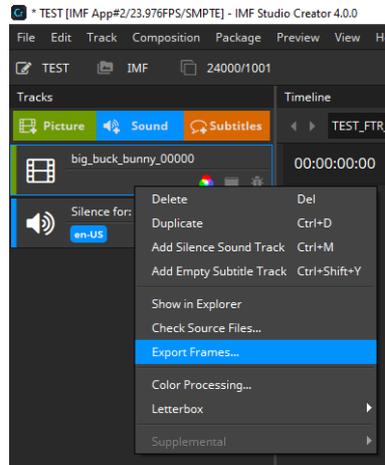


After pressing „`Export Frames…`", the IMF Studio Standalone JPEG 2000 Transcoder comes up:
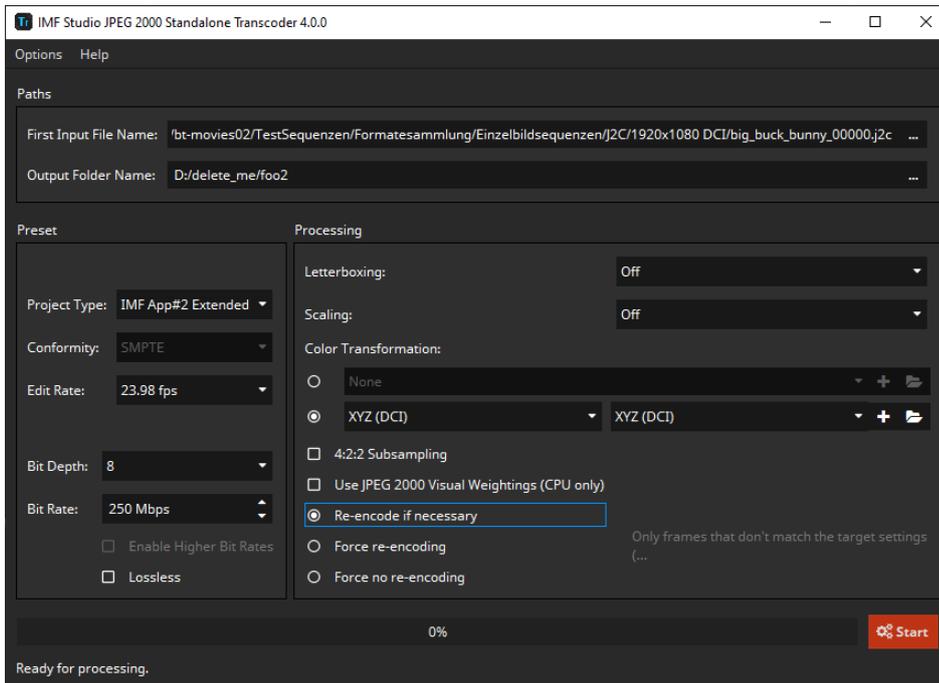
Several settings are obtained from the current IMF Studio Creator project (e.g. resolution, framerate, color processing, pillar-/letterboxing, scaling, bitrate).

Choose an output folder where the processed image files will be stored. Press Start to start the processing.

## 5.2 Sound Tracks

### 5.2.1 Add Sound Track

To add sound material to the Track Manager, click the "Sound"-button on the top of the Track Manager or use the main menu "Track -> Add Sound Track...".

The following dialog will appear where you can load one or more single- or Multi-channel files that will be combined into a sound Track:
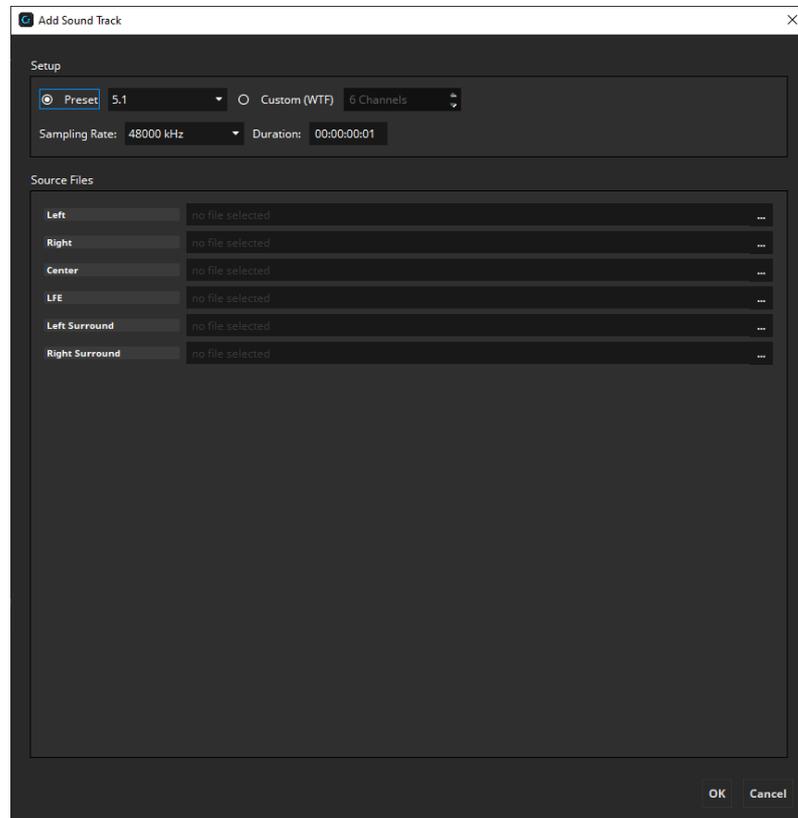


The audio format section allows you to choose between Stereo (L+R), 5.1, and 7.1 Surround content. IMF Studio Creator supports 16 bit and 24 bit WAV files (see 5.2.3 Supported Sound File Formats). After choosing the format and picking the desired audio files, click "Add Sound Track" and a new sound item will appear in the Track Manager.

Instead of loading mono wav-files, you can also import a multichannel input. Supported formats are

- QuickTime (*.mov) containing any Codec that is installed on your computer (e.g. AAC)

- WAV files (*.wav) with one or more audio channel (incl. Broadcast Wav)

The audio format of an IMF is specified to be

- uncompressed

- 24 bits per sample

- Sampling rate of 48 KHz or 96 KHz

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- Up to 16 Channels

If the input audio format is in a different format, it will be automatically converted when the IMF is rendered.

> With the dropdown on the right side it's possible to change the channel being used from the source file. It's also possible to reorder the channels.

### 5.2.2 Setting Audio Language and other MCA Parameters

IMF Packages – specifically the IMF Audio Track Files – carry information about the audio language, as well as other characteristics of the audio track. You can fill in that information in the dialog seen below. To bring up the dialog, click onto the globe-button inside the audio track element. The button is only present in IMF projects.

Please refer to your specific delivery specification to find out what to put into the fields.
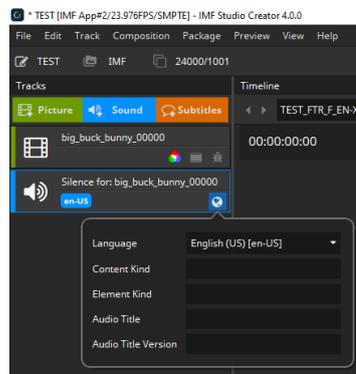


### 5.2.3 Supported Sound File Formats

IMF Studio Creator supports the following sound file formats:

```
WAV, 16 Bit, 48 kHz or 96 kHz, mono, uncompressed
WAV, 24 Bit, 48 kHz or 96 kHz, mono, uncompressed
```

> WAV files with a sample rate other than 48 or 96 kHz will be converted.

**What happens if the audio samples are only 16 Bit?**

According to SMPTE standards, audio samples shall be 24 Bit. When using 16 bit samples as input, the bit depth will be automatically up-converted to 24 bit.

## 5.3    Subtitle Tracks

### 5.3.1    Add Subtitle Track

To add timed text to the Track Manager, click the quick button "Subtitle" on the top of the Track list. The word "subtitle" is used here as a synonym for **timed text**.

**Subtitle** is only one example of timed text. The other example is **Captions**. Both subtitles and captions can be either **Open** or **Close**. This yields four combinations:

- Open Subtitles

- Closed Subtitles

- Open Captions

- Closed Captions

*Open* subtitles or captions will be displayed on the main screen and be visible to everyone in the audience, while *Closed* subtitles or captions are meant to be displayed on secondary screens available on demand.

*Subtitles* usually translate only the spoken words, while *Captions* are meant to aid deaf and hearing-impaired audiences and often also describe background sounds ("classical music is playing in the radio").

### 5.3.2    Supported Subtitle File Formats

Currently IMF Studio Creator does not support converting between timed text formats.

The subtitles are required to be IMSC 1.1 compliant.

## 5.4    Add Dolby Vision Metadata Track

IMF App #2 Extended support also Dolby Vision metadata. Click the menu entry to add the XML or just drop the file on the Track Manager.
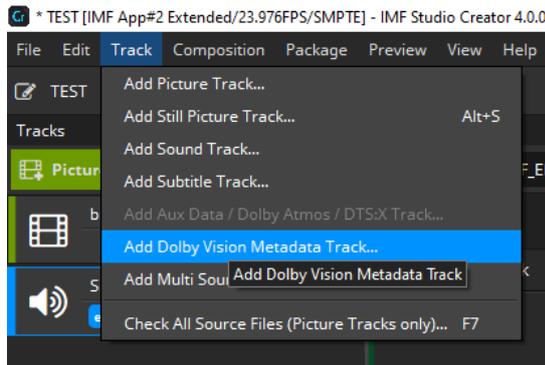
For Dolby Vision IMFs to be created you have to set the proper color space for the picture track files. The correct ones are those with PQ. Besides that Dolby Vision projects work the same way as anything else.
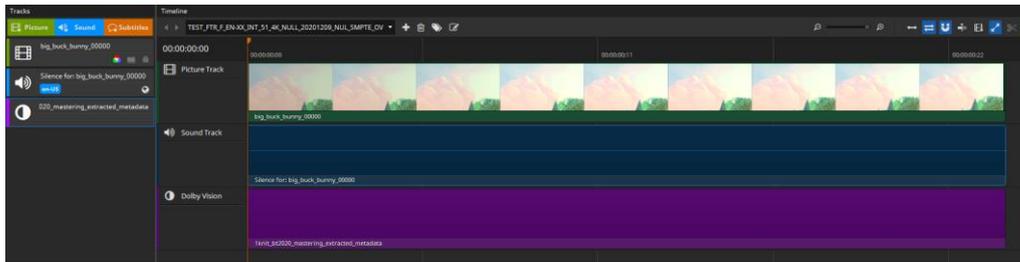


## 5.5    Add multi source track

If you need to combine multiple separate files into one mxf you can use this option. This also applies for Dolby Vision metadata. The order of files determines the order they are shown, from top to down. Adding a file sequence the whole sequence counts not just the selected frame.
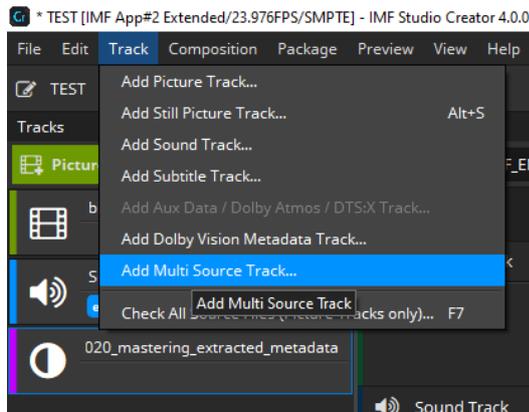


With the "+" und "-" button you can add and remove files. With "Arrow up" and "Arrow down" buttons you can change the order.
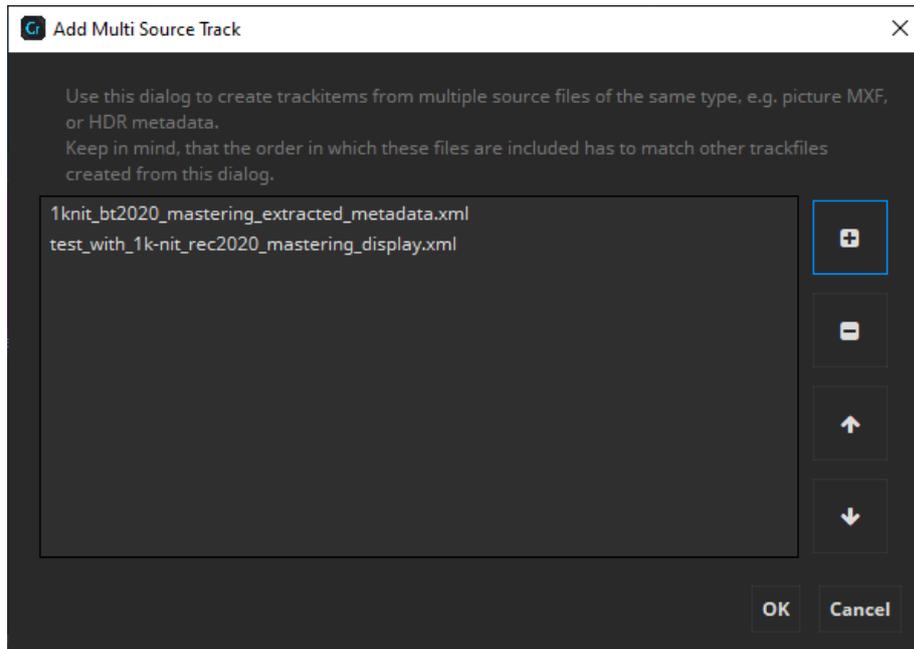
The formats and properties of the files have to match to be used together, e.g. same resolution and same file format.

## 5.6    Check Source Files

To check only the source files of a single Track, right-click on a Track and choose `"Check Source Files…"`:
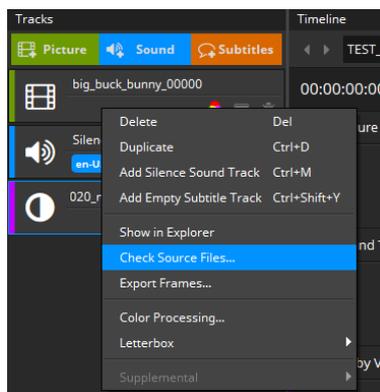


The following dialog will appear:
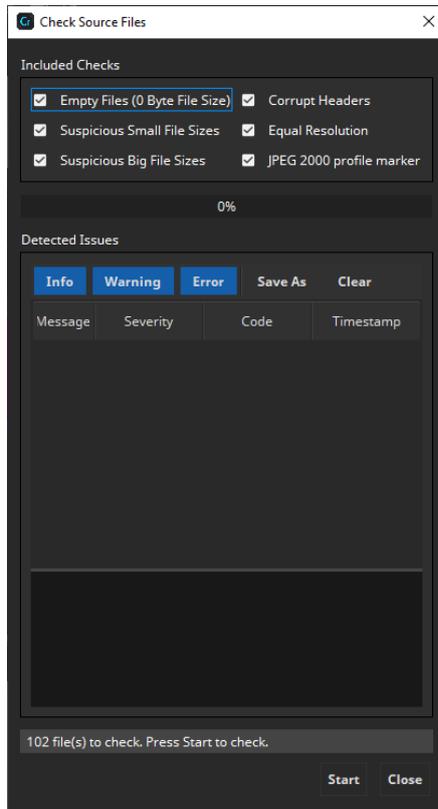
By default all checks are included (recommended). Checking for headers may slow down the checking progress, so if this will take too long you can disable this option.

Error Messages are displayed. If errors occurs during check, for example is a file is zero in size, read the warnings carefully and try to fix the problem. Then try again until no problems occur anymore.

### 5.6.1    Check All Source Files

To check all source files, choose the menu entry `"Track -> Check All Source Files…"` or simply press F7 (see screenshot below).
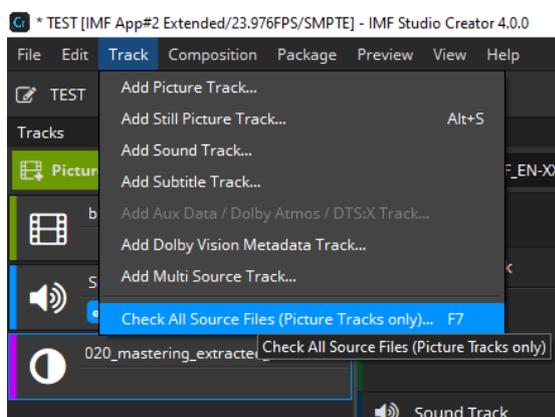
## 5.7    Remove / Delete Tracks

To remove an item from the Track Manager, mark it and press the "Delete" key. Alternatively right-click the Track to open its context menu and select "Delete". The Track will be removed from the list. This action will not physically delete any source files.
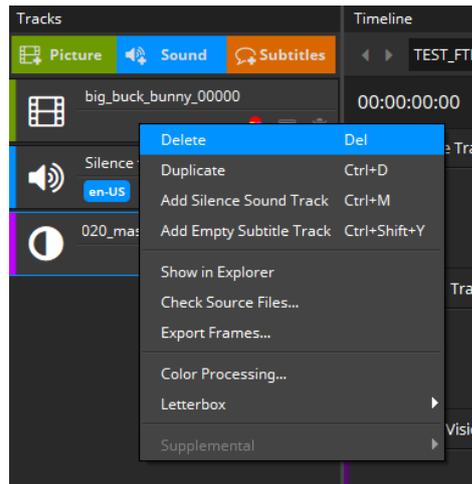


If the Track has already been added to one or more Reels, these references will be removed as well.

# 6    Timeline

You are able to preview your compositions and edit offsets and durations. The timeline can display picture, audio and timed text tracks. Audio tracks can be shown both as combined waveform and with the channels split up.
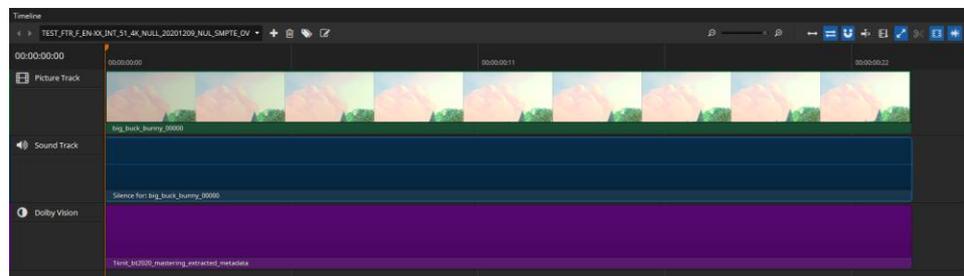


## 6.1    Timeline Controls

### Time Code Edit

The time code on the left side of the timeline is clickable and allows to jump directly to a specific time code. When it is selected it becomes blue and accepts all keys from 0 to 9. Pressing enter will accept the input and jump to the position in the timeline. It is also possible to start the editing via Ctrl + G after clicking the timeline once.

### Composition List

With the box on the upper left of the Timeline you can choose the composition to be previewed in the Timeline. You can either select it using the combo box or navigate through them with the arrows on the left.

```
◀ ▶  TEARSOFSTEEL_FTR_S_EN-XX_51_2K_20130822_FHG_INT_OV          ▼
```
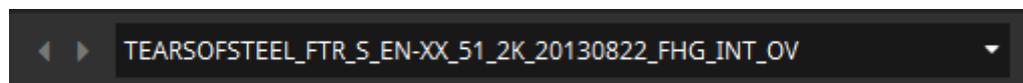
✚ **Add Composition**
Adds a new composition.

🗑 **Delete Composition**
Deletes the composition that is currently selected for preview in the timeline.

🏷 **Duplicate Composition**
Clicking this button duplicates the current composition. In the popup you have the possibility to reference the same track files as in the original or to duplicate them.

✎ **Editing Composition Properties**
See **Fehler! Verweisquelle konnte nicht gefunden werden.**.

🔍 🔍 **Zoom**
Use the slider to define the zoom level of the timeline. You can also zoom using "CTRL + mouse wheel" while the mouse is over the timeline.

↔ **Zoom to fit**
Shows the entire timeline in respect to the available space in the user interface.

⇄ **Ripple edits for later items**
Moves later items together with the currently selected clip.

🧲 **Snap to clip borders**
Helps to properly align different tracks in the timeline. If it is necessary to align the duration of a video clip to the shorter duration of a given audio track, you can simply reduce the length of the video track by clicking on the right edge of the longer track file and moving the mouse to the left. Once the mouse pointer gets close to the end of the shorter track, the size of the current track will snap to the same length if snap to clip borders is activated. Once triggered, the snap feature will also show a red vertical line at the boundary of the tracks it is currently aligning.
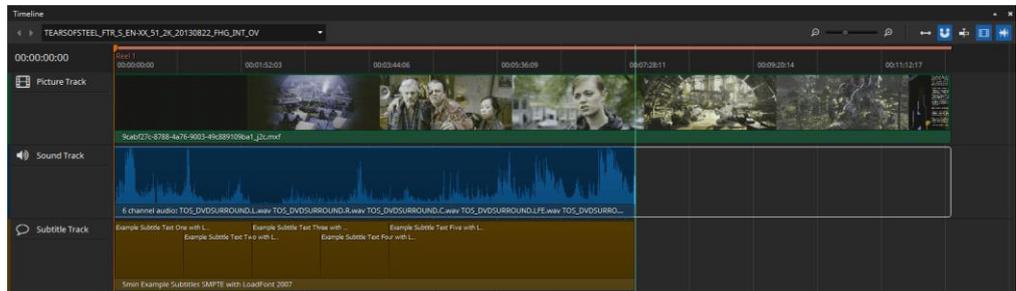
### Center view on play head

Auto-aligns the timeline so that the play head is placed in the center.

### Merge segments when possible

When enabled the whole timeline uses as less segments as possible and instead adds multiple sequences per segment.

### Split sequence

Splits the sequence containing the playhead marker at the playhead marker position into two reels and adjusts their offsets and duration to fit the original length. Only selected clips that contain the playhead are split, so it's possible to split just picture while keeping sound one clip.

### Render segments

In order to know where you're segments will be split you can toggle rendering of segments on. This will display the reel/segment markers in ascending order on top of the timeline with slightly alternating colors.

### Render thumbnails

If active, thumbnails will be rendered for all video tracks in the timeline.

### Render waveforms

If active, a visual representation of each audio track will be displayed in the timeline. Depending on the length of the audio tracks the rendering of the waveform for the first time can take a while.

### Navigation

Using arrow key left and right allows for frame wise stepping in the timeline. With arrow up and down it is possible to jump to the next/previous clip in the timeline.

### Switching between time codes and frames

With a right-click into the empty space of the timeline a context menu opens. There you can switch between the time code representation in the timeline and frames.
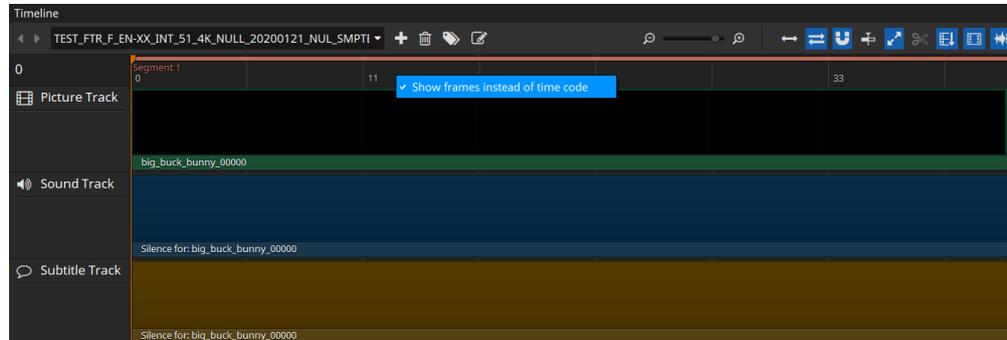


## 6.2    Editing in the Timeline

The Timeline supports editing of offsets and durations of the Tracks, rearranging sequences, drag & drop of tracks and files and functionality to split sequences and insert tracks in between.

To edit the offset (entry point) of a track, just drag the left border of it. The offset is directly updated in the Metadata Window. Dragging to the left reduces the offset (if not already at 0), while dragging to the right will increase the offset as long as possible.
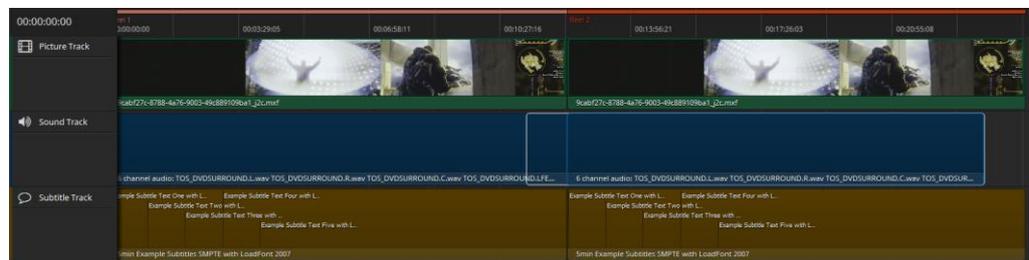


To change the duration of a track, drag the right border. Dragging to the right will increase the duration while dragging to the left will shorten the track.



Both offset and duration are directly updated in the Metadata Window. The maximum offset/duration depends on the tracks and the project type (IMF 1 frame).

To add new tracks to the timeline it is possible to drag a track from the track manager directly on the timeline. The track can be inserted in between two existing sequences. To make an insert in an existing segment for creating supplemental IMFs drop at the position on select "Insert" in the context menu. This will split the existing clip in the timeline at the mouse position and insert the new clip resulting in a total of three clips instead of the previous one with all offsets and durations being automatically adjusted.

Rearranging clips is also possible. Clips in the timeline can't overlap and will automatically be reset to their origin position when dragging started. But when dragging a clip in between two others everything left will be moved left (when coming from the left side) or right (when coming from the right side).

IMF allows to use multiple virtual sound tracks. In order to build such a timeline, instead of dropping the new sound track on the existing sound track in the timeline just drop it below it. This will append a new virtual track.

## 6.3    Appending/prepending black frames

For some purposes it's necessary to add black frames before or after a reel/segment. To do so right-click the picture track file.
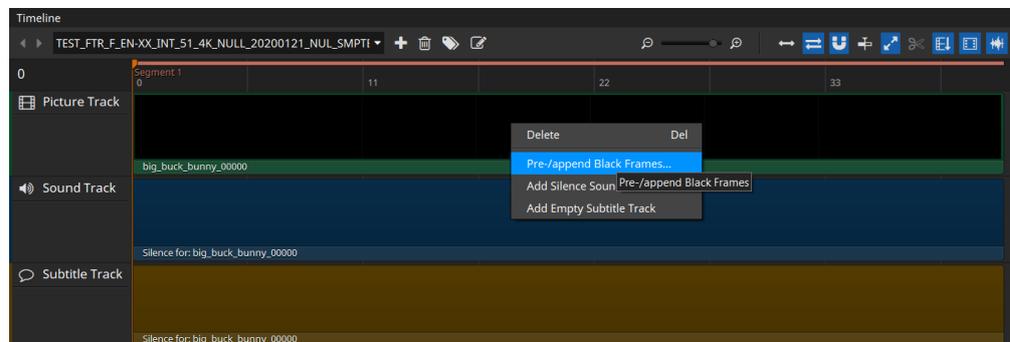


In the dialog that will open up next you can select whether you want to prepend or append to the reel you right clicked on. You can also select how many frames/seconds of black frames you want to prepend/append.
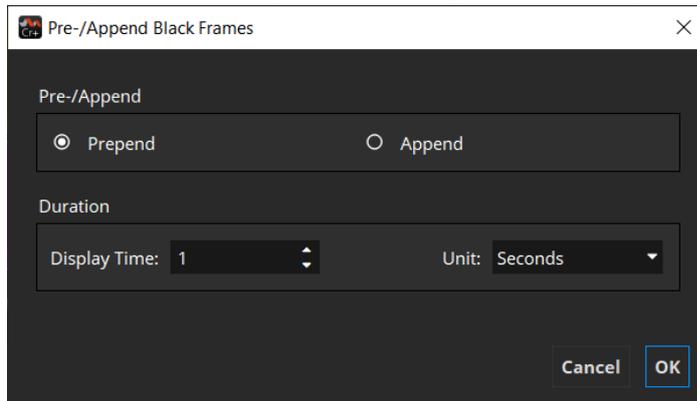
## 6.4    Adding Silence Sound

As in the compositor it's also possible to add silence sound in the timeline. When no clip is selected the silence track is added to the clip you right click on. If you have selected a clip or multiple ones, the silence sound track will span all of them. This results in just one sound sequence.
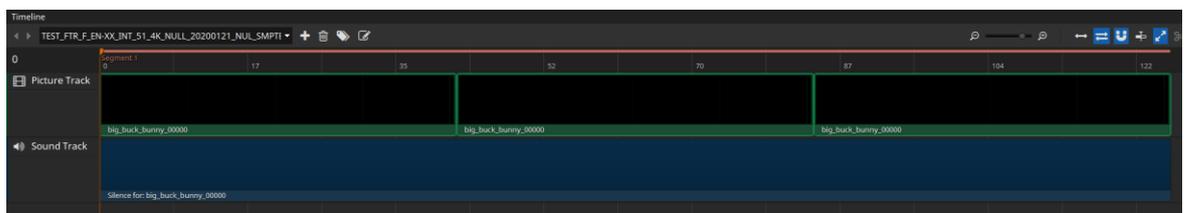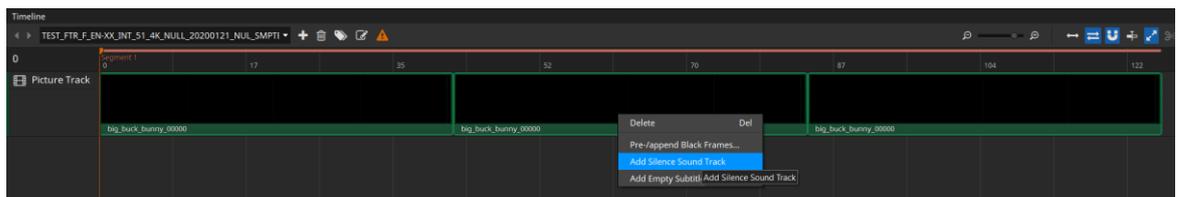




## 6.5    Timeline Validation

Every once in a while the current timeline is validated so you can see if your project is valid and can be generated. In case of errors or warnings, a warning symbol appears in the toolbar. Clicking it opens a popup containing detailed information about what's wrong.
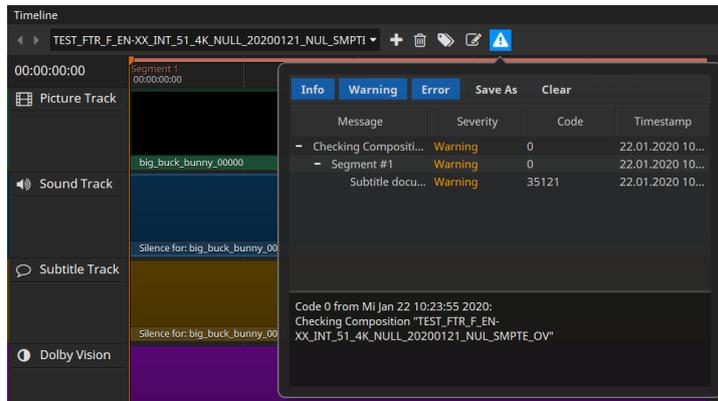
## 6.6    Editing Composition Properties

You can easily edit the properties of your Composition by double clicking it or by
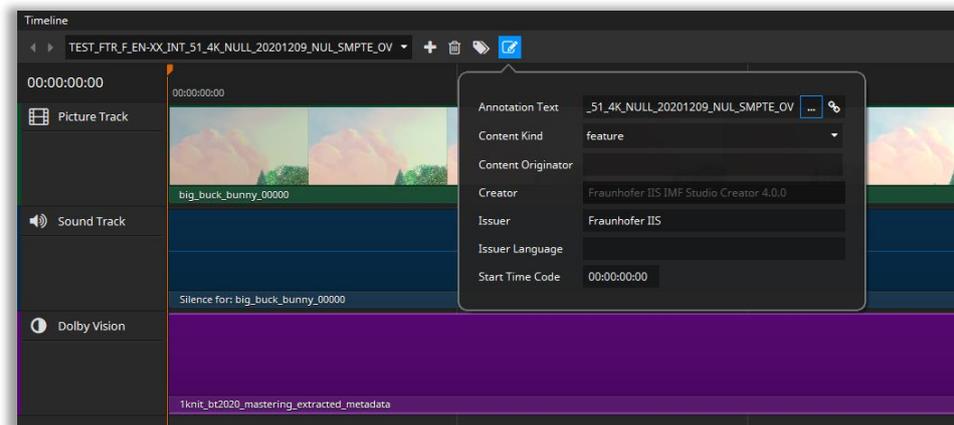


clicking the Edit-icon on the right of the CPL.

### 6.6.1    Content Kind of a Composition

The content kind is informational only. It defines the kind of material referred to by the Composition playlist. The content shall match one of the values listed in the table below. This kind may be displayed to the operator in the cinema server. Some servers sort their IMFs and playlists by content kind so that the projectionist can easily find trailers, advertisements or feature films.

| Kind | Description |
|------|-------------|
| **feature** | A theatrical feature. |
| **trailer** | Short (2 to 3 minutes) content promoting an upcoming theatrical feature. |

| | |
|---|---|
| `test` | Content used to test, calibrate or setup D-Cinema exhibition equipment. |
| `teaser` | Very short (typically less than 1 minute) content promoting an upcoming theatrical feature. |
| `rating` | Slate/still picture indicating the recommended age group permitted to view the content to follow. This rating is generally unique per country. |
| `advertisement` | Content promoting a product or service other than an upcoming feature. |
| `short` | Non advertising/promotional content (3 to 15 minutes) typically before a theatrical feature. |
| `transitional` | Extremely short content (1 to 15 seconds) separating unrelated Compositions. |
| `psa` | Public service announcement. |
| `policy` | Content defining the code of conduct for patrons. |

To edit the content kind of a Composition, double click or click the "Edit Composition Parameters" button and select a kind from the dropdown list.
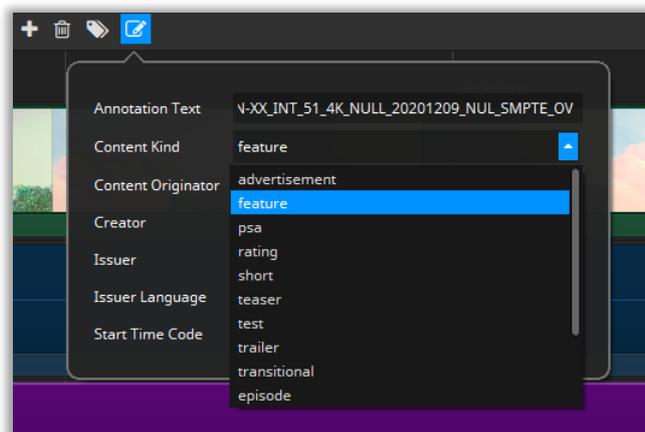


If you typically create IMFs of the same content kind, it is convenient to change the Default CPL Content Kind in the Options dialog.

### 6.6.2   Content Title

The Content Title appears on the screen if a volume (e.g. USB-Drive, Hard disc Drive) is connected to a digital cinema system before ingest. This annotation text describes

the whole IMF. In contrast to the Annotation Text of the Composition (CPL Annotation Text) it describes the whole IMF.

## 6.7 Preview package

Before starting package generation, it is possible to preview the entire project in IMF Studio Player. If you have installed IMF Studio Player, just click on the "Play Preview" button in the upper right corner:
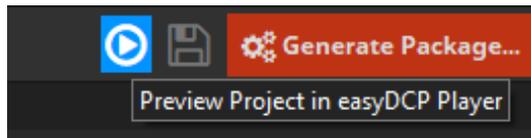


The IMF Studio Player can directly play back project files (*.imfproj) containing source files (e.g. DPX, WAV and Subtitle XML files), so it is possible to check e.g. audio and video synchronization before generating the package.

# 7 The Metadata Window

The metadata window shows the most important technical properties of whatever item is currently selected. It is merely a read-only element and cannot be used to
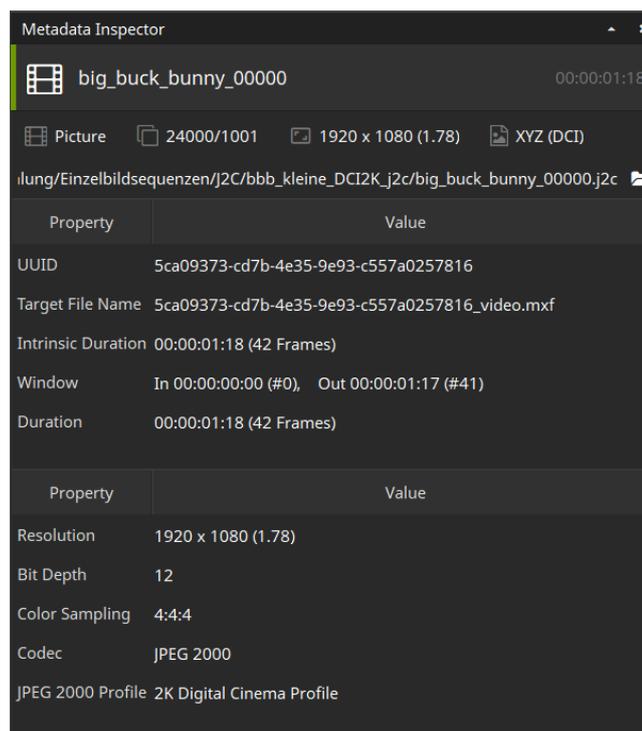
change any of the properties.

The set of properties that are displayed depends on what item type was selected:

- Track (picture, sound or timed text)

- Track in Segment  (picture, sound or timed text)

- Composition

The Metadata and Preview windows always refer to the same item.

# 8      The Preview Window

In the preview window, you are able to take a look into each Picture and Subtitle Track.

The previewed frame number is shown in white letters in the box on the bottom right of the preview window (starting with 0). If you scroll to a position before offset or after duration, this number will turn red.

By default, color processing will not be shown. To activate the color processing preview, toggle the "`Preview color transform`" button next to the frame number:
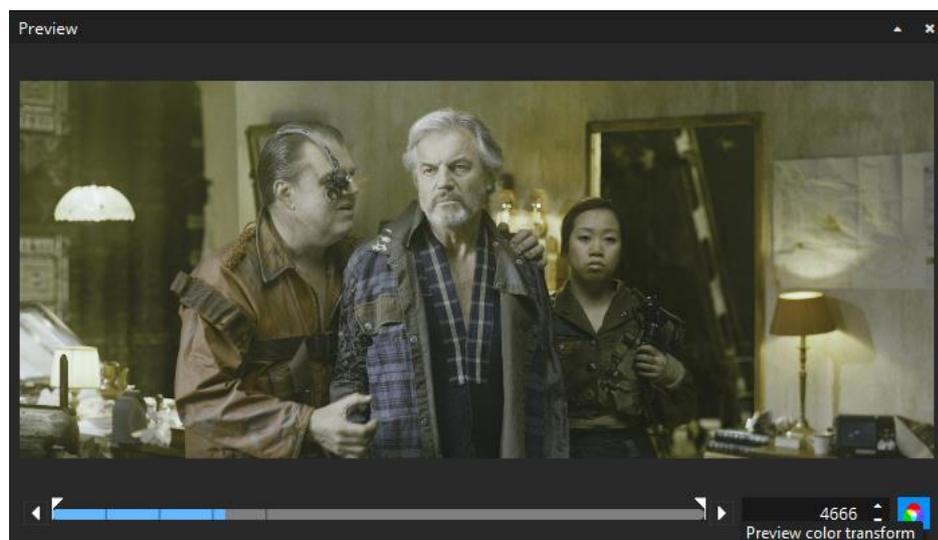
When color processing is disabled, the source color space will be previewed. When it is enabled, the configure Preview color space (see Settings => Preview) will be used.

Color processing won't affect subtitle preview.

Preview for audio tracks is not yet supported.

## 8.1    Safe Areas

Introduced in version 3.6.0, IMF Studio Creator can overlay „Title Safe" and „Action Safe" areas as well as the DCI containers *Flat*, *Scope* and *Full*.
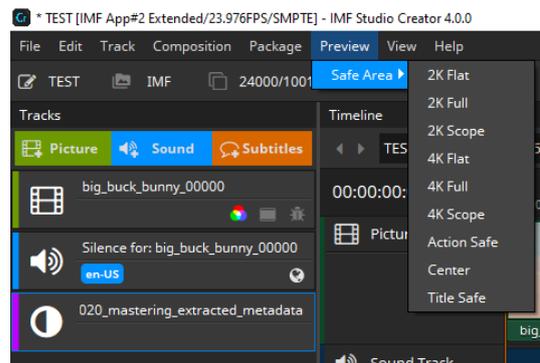


Each preset is based on an XML file that is located in a directory which can be opened by selecting "Open Repository". The "Title Safe", "Action Safe"and "Center" presets are defined by specifying coordinates relative to the image. The remaining presets, on the other hand, are defined based on absolute coordinates. Based on the presets it should be straight forward to add additional custom presets, when required. They can either be copied into the directory where they will be detected by IMF Studio Creator after a restart or they can be imported by selecting the "Add new preset…" option. The colors or thickness can currently not be changed. The overlays cannot be burnt into the image when exporting the IMF package.
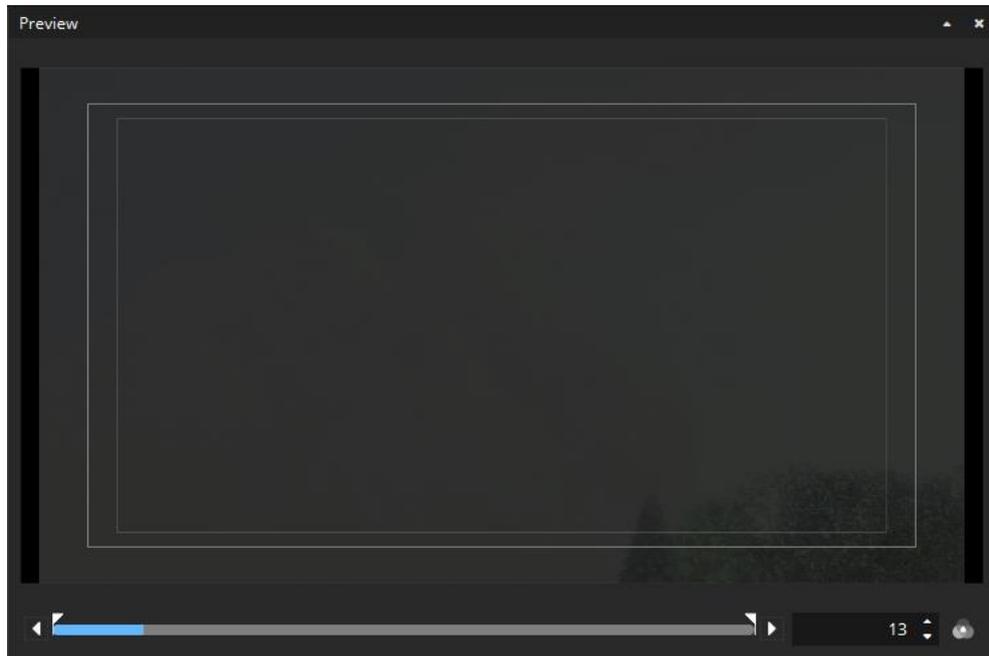
# 9    Generate an IMF

After adding content to compositions, press the "`Generate Package…`" button in the upper right corner of the main window.

A wizard dialog will appear to guide you through the generation process. The first page allows you to specify the destination folder for your package. It is recommended to name the folder with your package title and select a folder on an EXT-2 or EXT-3 formatted drive.
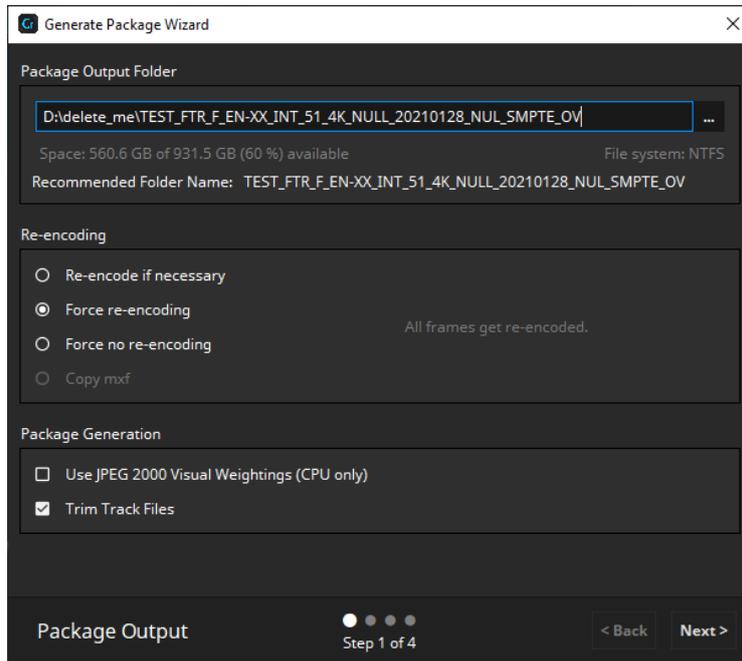
## Re-encoding

For re-encoding a total of four options exist with different behaviors.

With the Force re-encoding option enabled, each source image file will be re-encoded, regardless if the source files are JPEG 2000 codestreams (*.j2c files and codestreams from MXF files) or not. This ensures that each final image will have the right format (i.e. the correct DCI compliant profile, bitrate, color gamut etc.).

Disabling force re-encoding option is only available in the full licensed version of easyDCP Creator, since the easyDCP logo will be burned into each picture frame at the top left. Thus, each picture has to be re-encoded.

The force no re-encoding option causes the codestreams to be packed directly into the final package. This may speed up the package generation process. The user has to make sure that the source files are already in the right format. No source file checks will be made, the source files will be copied directly into the package and just the mxf file will be written.

The copy mxf option is similar to force no re-encoding, but doesn't even unpack the codestreams and just copy the whole mxf file. In this case even the mxf metadata has to be correct.

Using force no re-encoding or copy source option you are responsible for compatibility of the data with the selected package type in regards of codec/profile,

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With the re-encode if necessary option selected easyDCP Creator doesn't check the input images if the input format is JPEG 2000 in terms of e.g. color space. easyDCP Creator checks image dimensions, bit depth, bitrate and wavelets only. Using this chain a user can create his own JPEG 2000 files in the post production and easyDCP Creator will just do the faster packaging. The advantage is that if any color processing is bypassed, packaging will be much faster.

To ensure that JPEG 2000 codestreams will be directly copied into the final package, the following settings must be done:

- All source files shall be DCI compliant JPEG 2000 codestreams.

- The JPEG 2000 codestream re-encoding shall be switched off.

- The pillar-/letterboxing & scaling shall be switched off (see 5.1.4 Letterboxing & Scaling).

- The source color space has to be XYZ.

### Use JPEG 2000 Visual Weightings (CPU only)

Enable this option if you want to use visual weightings mechanisms in the JPEG 2000 encoding process. This settings only affects the package generation using CPU and improves the image quality at low bitrates.

### Trim Track Files

Enabling this option causes unused frames being stripped from the mxf files. This happens as pre-processing step of the generation and can reduce generation time.

Example: Source sequence has 100000 frames, but just 1000 frames are used in the package. As a result just these 1000 frames are encoded while the remaining 99000 frames aren't touched.

The next page allows specifying the maximum bitrate of the generated IMF.

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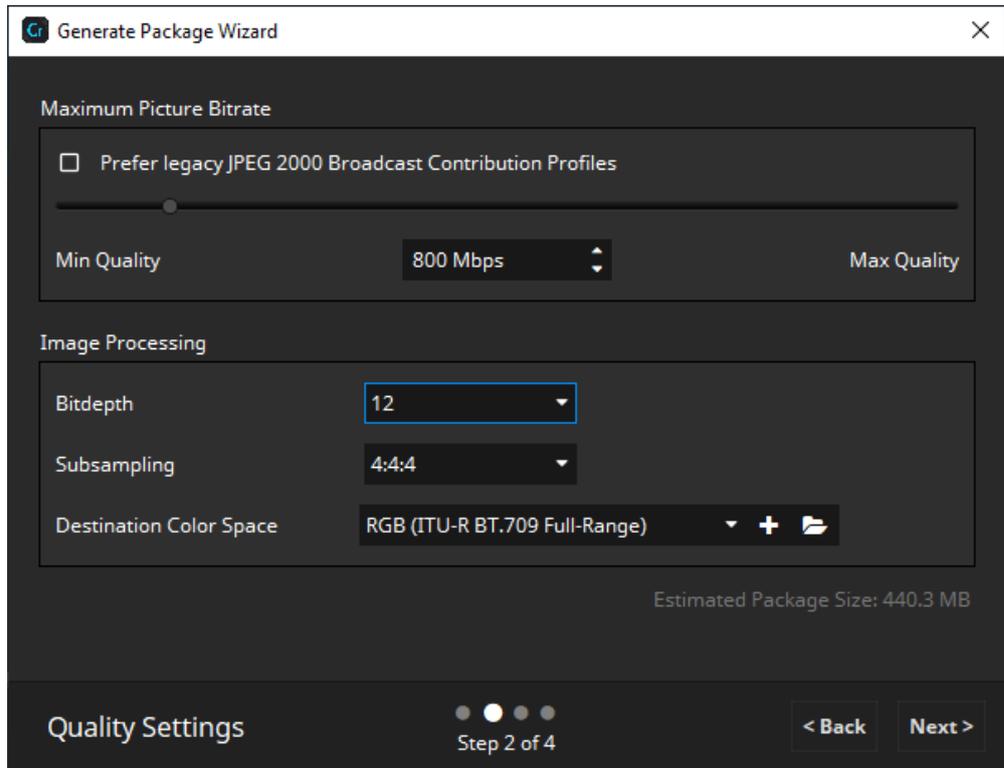
Keep in mind that a lower maximum bitrate can decrease the picture quality of the IMF.

### Destination Color Space

Select the color space your package shall be encoded to.

### Color Subsampling

IMF App2 and App2 Extended Packages support 4:4:4 sampling as well as 4:2:2 subsampling. Please refer to the individual delivery spec to find out which way to go. When choosing 4:2:2 subsampling, make sure to also select a YCC target color space in the color processing settings. Vice versa, only combine RGB target color spaces with 4:4:4 sampling.

Please note that IMF Packages at DCI 4K resolution are only supported in RGB/444, while UHD packages usually use YCC/422.

The next page will show a summary of your project configuration.
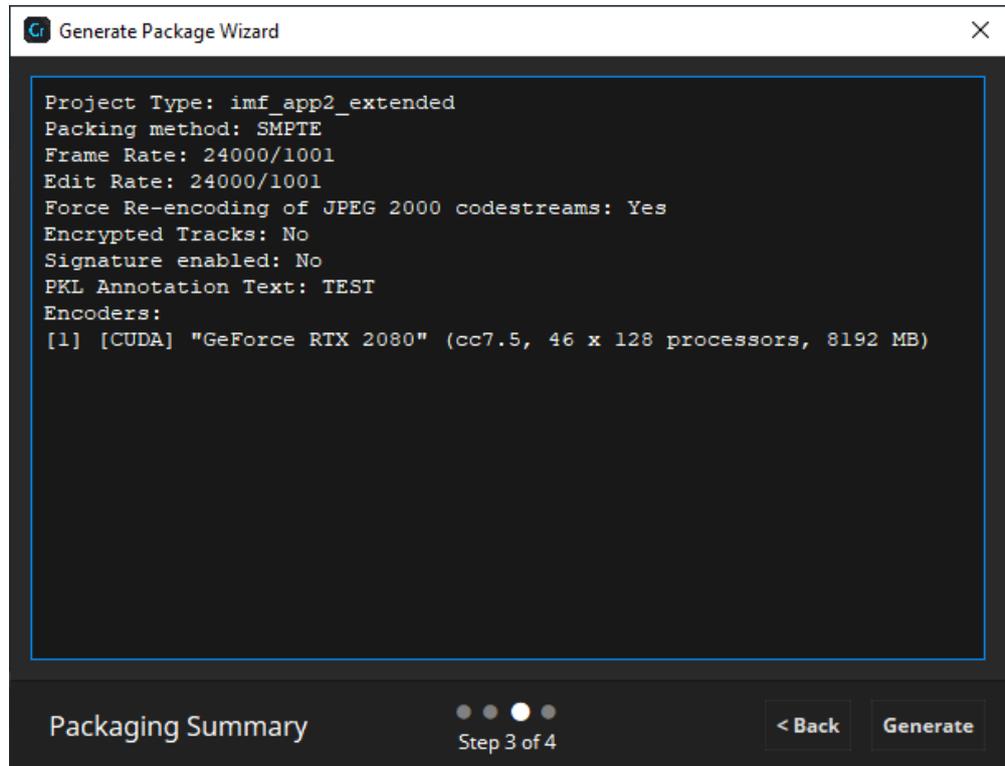
During the render process some statistics will be shown, like "Estimated Time Left" or the current rendering throughput.

After the rendering process has finished the result will be shown on the last page of the generation wizard. Please have a careful look if there were any issues detected during the rendering process.

Here you also have the option to validate your project (see 10.4), open it for a preview
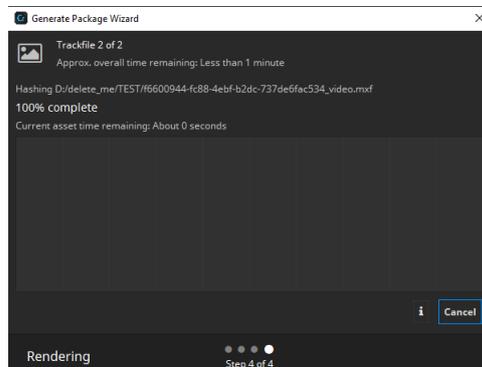


in IMF Studio Player or browse the folder containing the package.

**Generate Package Wizard**

Rendering finished after 3 seconds.

**▼ Summary**

```
Generating Package started at: 2020-12-09T14:08:01
Generating Package successfully finished at: 2020-12-09T14:08:04
Generating Package took: 3 second(s).
Target Path: D:/delete_me/TEST
Project Type: imf_app2_extended
JPEG 2000 Bit Rate: 800 Mbps
JPEG 2000 Lossyness: Lossy
Frame Rate: 24000/1001
Edit Rate: 24000/1001
Force re-encoding of JPEG 2000 codestreams: Yes
Packing method: SMPTE
Signature enabled: No
Package has referenced Tracks (Supplemental Package): No
Total Track count: 2
Total Frames processed: 102
Encoders:
```

👤 **Validate…**   ▶ **Open in IMF Studio Player**   📂 **Browse folder**   **Close**

Result

## 9.1 Prefer Legacy JPEG 2000 Broadcast Contribution Profiles Option

IMF App2 Extended allows for different JPEG 2000 Profiles to be used. While IMF Studio Creator 3.4.10 and older did only support JPEG 2000 Broadcast Contribution Profiles (BCP), version 3.4.11 introduced support for JPEG 2000 2k/4k IMF Profiles. These profiles are now used by default for IMF App2 Extended Packages.

J2K Broadcast Contribution Profiles do only allow a limited number of samples per second, do only support resolutions up to UHD/2160p and do only support a maximum compressed bitrate of 800Mbit/s for lossy compression. If the current project parameters do not exceed the limits of BCP, the following checkbox becomes available in the generate dialog
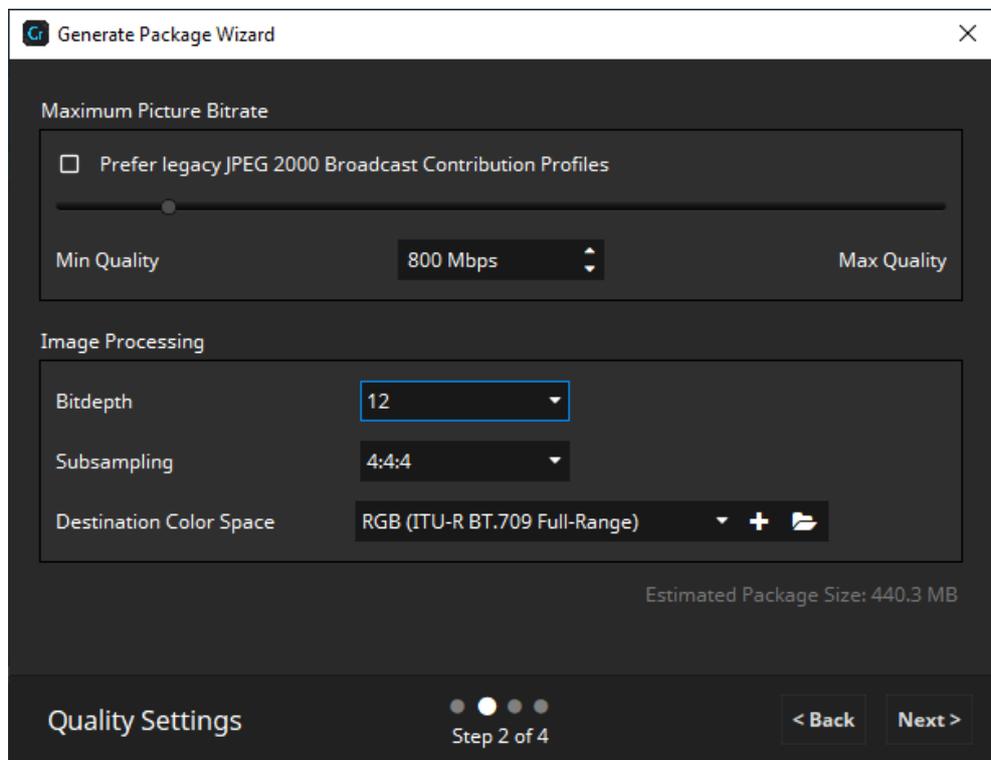


If this box is checked, IMF Studio Creator will encode the picture track using JPEG 2000 Broadcast Contribution Profiles. Otherwise it will use the appropriate JPEG 2000 IMF Profile. Profile (Main-)levels and Sublevels are determined automatically, based on image characteristics (resolution, sampling and framerate) and the selected bit rate (for lossy compression).

Please refer to your specific delivery specification to determine which profiles to use. If in doubt, go with the default setting.

Some Examples:

- UHD/2160p resolution, 4:2:2 subsampled, 23.976fps

- o Lossy at 800Mbit/s

  - ▪ BCP-Checkbox checked: BCP5

  - ▪ BCP-Checkbox not checked: 4k IMF Single Tile Lossy Profile Mainlevel 5 Sublevel 3

- o Lossless

  - ▪ BCP-Checkbox checked: BCP7

  - ▪ BCP-Checkbox not checked: 4k IMF single/multi-tile reversible profile Mainlevel 5 Sublevel 0

- • DCI 4K resolution, 4:4:4 sampled, 23.976fps

  - o Checkbox not available, since BCP max sampling rate is exceeded

  - o Lossy at 1600Mbit/s: 4k IMF Single Tile Lossy Profile Mainlevel 6 Sublevel 4

  - o Lossless: 4k IMF single/multi-tile reversible profile Mainlevel 6 Sublevel 0

# 10    Opening IMFs

With the function for opening packages the IMF Studio Creator provides a powerful feature to apply changes to existing IMFs fast and easily. With this function you are able to open your own IMFs or third party IMFs and deploy any changes e.g. adding subtitles, adding sound tracks, adding and rearranging segments and so forth.
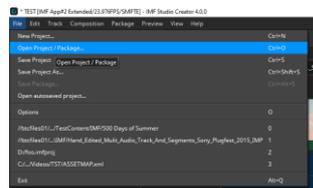


## 10.1    Editing an opened IMF

An opened IMF can be edited just like a IMF that is built from scratch. It is also possible to save the opened IMF and the deployed changes as a Project (*.imfproj) in the IMF Studio Creator. From the edited IMF, you can then generate a new IMF or a supplemental IMF.

## 10.2    Saving an opened package

When you have opened a package and just make changes on the metadata of the package, you don't have to generate a new package, you can also just save your changes to the existing one. Changes of the metadata include the offset, duration and annotation text of reels, rearranging, deleting and adding reels, renaming, deleting and adding compositions. To save the changes, choose "Save Package" in the file menu. If saving is not possible and re-encoding of the whole IMF is necessary, an error message will appear.

When saving the IMF, new UUIDs for all compositions and reels and the packing list will be generated.

If you change the Tracks of the package, e.g. applying a color transformation or add new Tracks, you have to generate a new IMF or a supplemental IMF using the button "Generate Package...".

## 10.3    Supplemental IMFs

Generating a feature movie is a time expensive procedure. If you're just adding subtitles or an additional sound track to an existing movie, IMF Studio Creator provides a solution saving you a lot of time. You can generate a supplemental IMF. A supplemental IMF is an IMF, which enhances or modifies an existing IMF by providing just the changes and using the Tracks of the original IMF as references. Hence you don't have to build a whole IMF when just adding material to an existing one. Because a supplemental IMF amends an existing IMF, both the original IMF and the supplemental IMF have to be ingested to playback the compositions of the supplemental IMF.

To generate a supplemental IMF with IMF Studio Creator you have to open an IMF and mark the original track and subtitle files as references (supplemental). For that, you have to click with the right mouse button on the Track and select "Supplemental -> This Track" in the displayed menu:
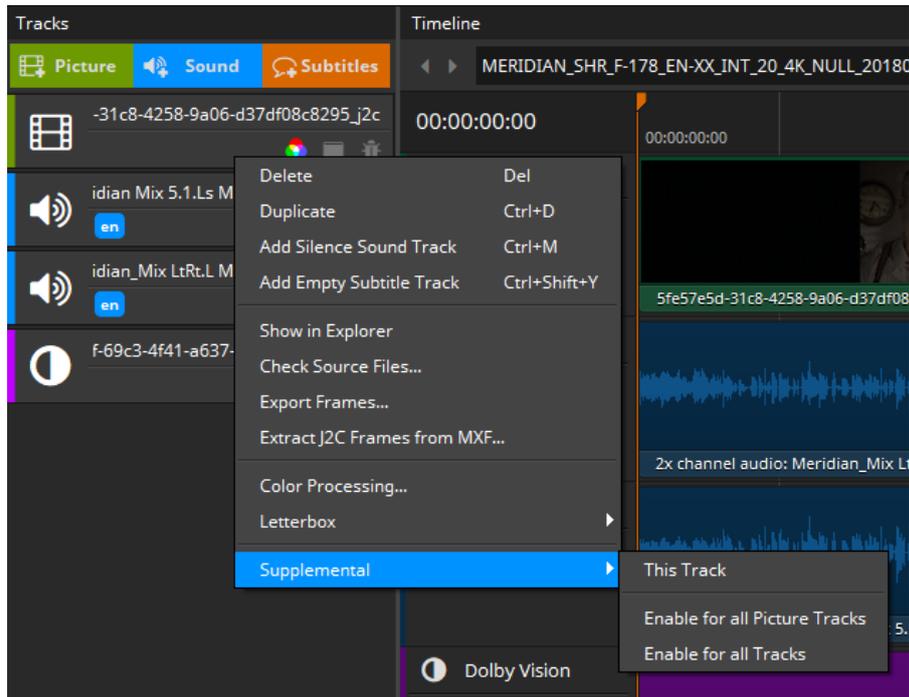
Then new compositions and new Tracks can be added and changes at existing compositions can be applied.

By clicking on the "Generate Package…" button the supplemental IMF will be generated. The difference to a normal IMF is, all Tracks marked as reference are not packed into the supplemental IMF, they are only referenced by CPL(s). This saves disk space and time during the generation process of the IMF.
With the IMF Studio Creator it is even possible to open and edit supplemental IMFs and generate further supplemental IMFs to them.

## 10.4    Validator

The validation module can be used to automatically search for a range of potential issues in an IMF. The validation is split up into many individual tests. Tests are executed one after the other. Some tests only take a split second (for instance: check if all files exist) while others may take a while (for instance: check if all JPEG 2000 images can be decoded).

Once a test was executed, it gives a result that is either Success, Warning or Failed. When selecting a test, more details can be found in the bottom section of the validation dialog. A tree of events will describe what the test has done and each entry in the tree can in turn be selected to see its details in the dark-grey text edit below. It is often not possible to foresee whether an issue will cause the IMF to be rejected by another tool in the production chain. For this reason we encourage the user to even take warnings seriously.

IMF Studio Creator User Manual
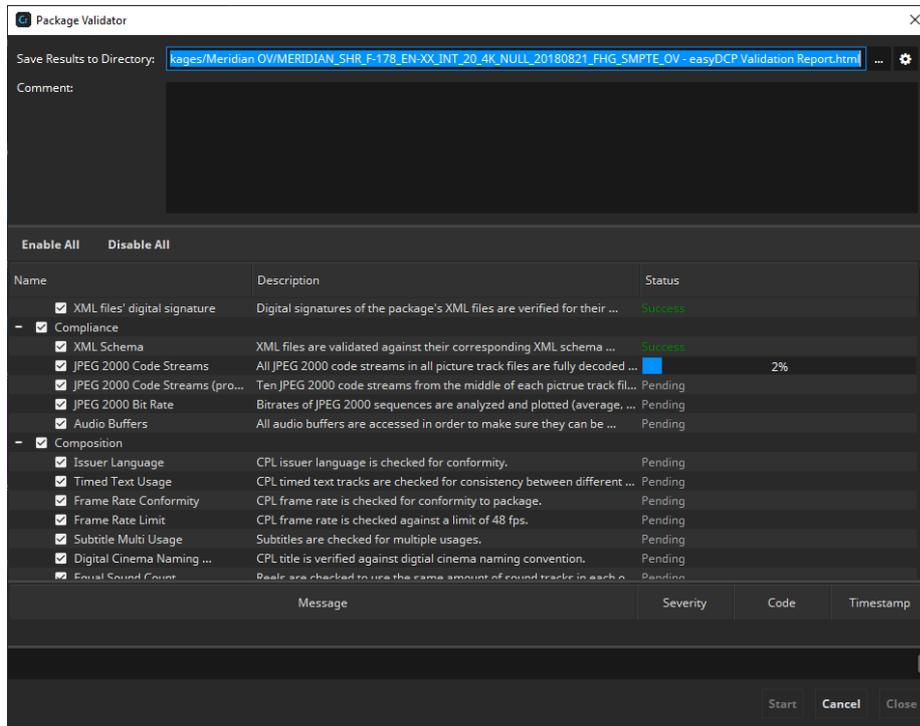
The result of a validation run is always stored as a report in HTML format. By default, the file will be named after the folder that contains the IMF and be located next to it. Also, the overall test result will be included in the file name:

```
IMF: C:\MyImfs\AliceWonder_FTR-1_S_EN-LAS_US-13_51_2K_DI_20060607_TDC_OV\
 Report: C:\MyImfs\AliceWonder_FTR-1_S_EN-LAS_US-13_51_2K_DI_20060607_TDC_OV –
         IMF Studio Validation Report (Success).html
```

By clicking the cogwheel icon next to the "Save Results to Directory" field, the default behavior can be changed so that the file be located inside the IMF/IMP directory and/or that the overall validation result not be included in the filename.

```
IMF: C:\MyImfs\AliceWonder_FTR-1_S_EN-LAS_US-13_51_2K_DI_20060607_TDC_OV\
 Report: C:\MyImfs\AliceWonder_FTR-1_S_EN-LAS_US-13_51_2K_DI_20060607_TDC_OV\
         AliceWonder_FTR-1_S_EN-LAS_US-13_51_2K_DI_20060607_TDC_OV – IMF Studio
         Validation Report.html
```

The validation report is separated into six sections:

- **General Information** – contains top-level metadata on the package, the test result and the computer and IMF Studio version where the validation was carried out. Custom annotations that the user entered into the validation dialog's "comment" field will also be added to this section.

- **Composition Playlists** – lists technical properties (such as duration, resolution, package type, IMF application, JPEG 2000 profile, audio layout, etc.) individually for each composition.

- **Quality Report** – contains all the test results and details in an interactive view

- **Recommendations** – contains all the test results that are compliant to the standard but can cause issues in cinemas

- **JPEG 2000 Bitrate Analysis** – contains an interactive plot of the bitrate in Mbit/s over time for each CPL. Additionally, some statistics such as peak and average bitrate or the time code of the largest frame are stated.

- **Files** – lists the content of each XML file as well as the metadata of each MXF file in the package. If the package is a supplemental package (version file - VF) and the original version (OV) was also loaded, both packages' files are listed.

- **Directory Snapshot** – lists of all files (including those that don't belong to the package) within the folder or any subfolders of the package, including the file's size in Bytes and date of its last modification. Paths are stated relative to the package's root folder so that names of the user's local or network repository are not disclosed.
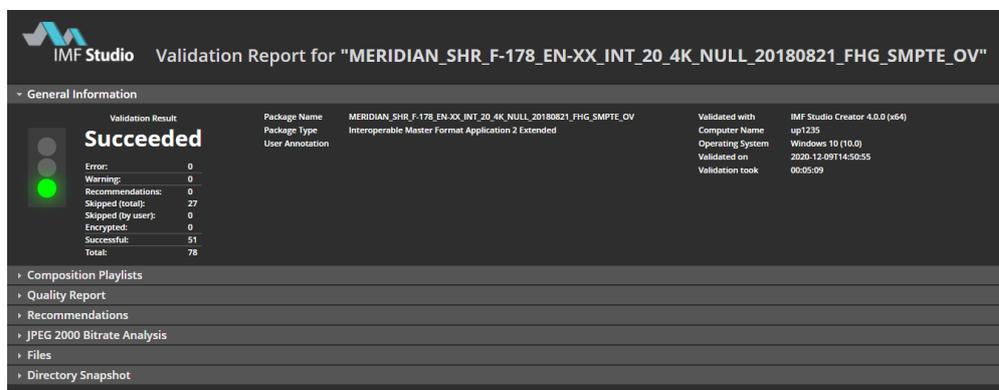


The **overall result** of the validation is

- **Failed** – if at least one test found an error

- **Warning**, if at least one test found a warning or has been deliberately disabled by the user (by clicking the check box next to the test in the validation dialog), and no test found an error

- **Success** – if all tests were executed and none of them found any potential issues (warnings or errors)

The quality report shows the results and details of all tests. When selecting a test, details are shown in the dark grey box on the bottom. In the below example, the test result is a warning, because the tests was deliberately disabled by the user by deselecting it before the start of the validation.



The **Bitrate Analysis** tab gives information on the JPEG 2000 bitrate. Every IMF is subject to a maximum bitrate that should never be exceeded. For IMFs the maximum bitrate depends on the JPEG 2000 profile employed and goes all the way up to 800 Mbit/s for lossy IMFs. IMF Studio Creator will infer the maximum bitrate based on the package type and JPEG 2000 profile.

JPEG 2000 is a highly data-dependent image compression scheme, though. If a particular image is easy to compress, e.g. because there are not a lot of details in it, then the maximum bitrate will not be reached. Only images with many details (or a lot of noise) will have to be capped in order not to exceed the data rate. The bitrate computed by IMF Studio is based only on the size of the decrypted JPEG 2000 file (i.e. without MXF overhead) and is converted from bits to Megabits using $10^3$ (1000) as demanded by the specifications - and not $2^{10}$ (1024).

The diagram plots the bitrate over the time for each CPL. The plot is zoom-able via the mouse wheel and can be moved left or right by dragging it with the left mouse button pressed.
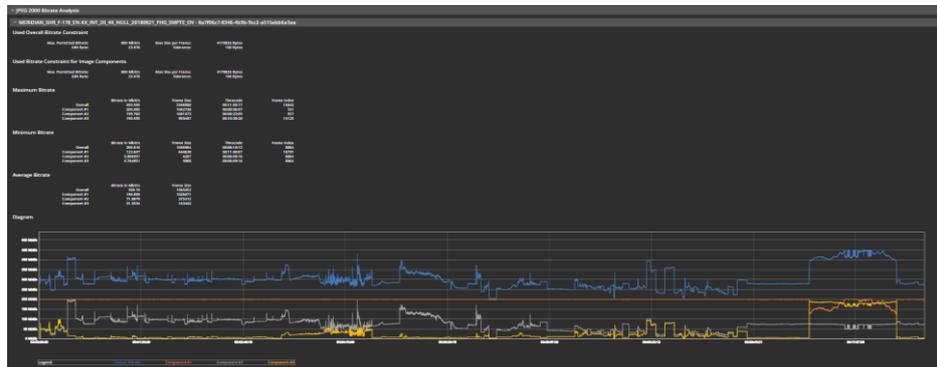
The validation can also be triggered from the command line. This way it is also easy to batch-validate an existing collection of IMFs

Below is an example of Windows Batch file for validating all IMFs in a given folder:

```
@echo off
pushd \\networkstorage\MyImfRepository
set IMFStudioBin=C:\Program Files\Fraunhofer IIS\IMF Studio Creator 4.0.0\bin\IMF
Studio Creator.com

for /f "tokens=*" %%D in ('dir /S /B /A:-D assetmap*') do (
  echo Validating %%D
  echo.
  "%IMFStudioBin%" "%%D" -validate -o C:\\Reports
  echo.
)
popd
```

For more details on how to use IMF Studio Creator from the command line, please refer to chapter 0.

## 10.5    Photon

The Photon module allows the validation of the currently opened IMF package by using Netflix's Java based implementation of the IMF standard (please see https://github.com/Netflix/photon for more information).

The Photon module requires an installed version of the Java runtime environment. If no Java runtime environment is installed, IMF Studio Creator displays a corresponding error message.

## 10.6      Merge CPLs

IMF Studio Creator can merge CPLs from other IMFs or complete other IMFs into the currently opened project. Via Package => Merge CPLs the file, either the ASSETMAP or the CPL XML file, can be selected. The CPLs of the selected package will be added to the active project. In case of matching track files (e.g. when adding a VF to the OV) the track files are automatically reused.

There currently are some limitations for the import process:

- Project types have to match: you can't import a DCP package into IMF Studio Creator

- Framerates of the packages have to match

# 11 Using Scripting Functionality

IMF Studio Creator can be used with command line arguments. Using IMF Studio Creator with command line arguments can be very useful for scripting purposes or in a scripting environment where many operations have to be executed automatically. For example this can be a weekly advertisement where the workflow is always the same. Or maybe you want to create a bunch of IMFs all with the same picture but with a somewhat different sound to find out which is the best.

## 11.1 On Windows

On Windows, the command prompt or a script (e.g. a batch file) would typically be used to pass command line parameters to IMF Studio Creator. IMF Studio Creator.exe / IMF Studio Creator.exe were built using the Windows Subsystem and therefore their output is not visible in the command prompt. Instead, IMF Studio Creator.com / IMF Studio Creator.com should be used. Since the executable file contains a space, enclose any calls into "", e.g.

```
C:\>"Program Files\Fraunhofer IIS\IMF Studio Creator 4.0.0\bin\IMF Studio
Creator.com" –help
```

## 11.2 On Mac OS X

On Mac OS X, the terminal or a script (e.g. a shell script) would typically be used to pass command line parameters to IMF Studio Creator. The IMF Studio Creator application is in truth a directory called "IMF Studio Creator.app". The executable file which can be started and get passed parameters is "IMF Studio Creator.app/Contents/MacOS/IMF Studio Creator". Since the executable file contains a space, enclose any calls into "", e.g.

```
Mymac:~ user$ "/Applications/IMF Studio Creator 4.0.0.app/Contents/MacOS/IMF
Studio Creator 4.0.0" -help
```

## 11.3 Using command line (CLI) arguments

For detailed descriptions of the available parameters, call the executable file with the parameter "–help".

```
C:\Program Files\Fraunhofer IIS\IMF Studio Creator 4.0.0\bin>"IMF Studio Creator.com" –h

IMF Studio Creator 4.0.0 rev.105190

Usage: "C:/Program Files/Fraunhofer IIS/IMF Studio Creator 4.0.0/bin/IMF Studio
Creator.exe" <parameters> "


Optional parameters:

 -username            Login username - optional if already stored
 -password            Login password - optional if already stored
 -i                   <projectfile>
```

```
 -o                    <output directory>
 -mbits                <mbits> optional - set mbits per second for encoding.
                       Default: lossless for IMF
 -bps                  <bps> optional - set target bitdepth for package.
 -trimTrackFiles       Set Track File trimming enabled
                       This setting will cause mxf files to only contain used ranges of
frames
 -forceReencoding      Force re-encoding of sources
                       All frames get re-encoded
 -forceNoReencoding    Force no re-encoding, just re-wrapping
                       No frames will be re-encoded and the frames will be packed into a
new mxf file
                       You have to make sure that the content properties are valid for
the selected package type (profile/codec, bitrate, color space).
 -reencodeOnDemand     Re-encode if necessary
                       Only frames that don't match the target settings (profile/codec,
bitrate, color space) get re-encoded.
                       All other frames will be packaged as they are.
 -copySourceFiles      Copy mxf files to destination without touching sources
                       No frames will be re-encoded and the existing MXF files will be
copied to the destination folder.
                       You have to make sure that the content properties are valid for
the selected package type (profile/codec, bitrate, color space).
 -ph                   print system hash (required for requesting a license)
 -log                  <logfile>|CON|CONSOLE
                       enable log and write it to a file or the console
 -h                    print this help

Device management:
Select which devices should be used for generation
-deviceCpuOnly                  Use only CPU for generation
-deviceGpuOnly                  Use most powerful GPU for generation
-deviceId                       <device ID>
                                Use specific GPU, identified by device id

CUDA devices:
None

Color processing for Interoperable Master Packages (IMFs):

-dcs    Set the desired output color space.
        "Eclair Color"
        "RGB (ITU-R BT.2020 / PQ)"
        "RGB (ITU-R BT.2020 / PQ) - Full Range"
        "RGB (ITU-R BT.709 Full-Range)"
        "RGB (ITU-R BT.709)"
        "RGB P3 (D65)"
        "RGB P3 (D65) PQ"
        "RGB P3 (DCI)"
        "Standard RGB (sRGB)"
        "XYZ (DCI)"
        "YCbCr (ITU-R BT.709)"

-dss    Select chroma subsampling scheme.
        444
        422

Default values for chroma subsampling scheme and color spaces:
        dcs     dss     Default
                        RGB (ITU-R BT.709),   444
                422     YCbCr (ITU-R BT.709), 422
                444     RGB (ITU-R BT.709),   444

Target codec for IMF App ProRes:

-dCdc   Set the target ProRes codec.
        "apcs" (Apple ProRes 422 LT)
        "apcn" (Apple ProRes 422)
        "apch" (Apple ProRes 422 HQ)
        "ap4h" (Apple ProRes 4444)
        "ap4x" (Apple ProRes 4444 XQ)
Example:
C:\Program Files\Fraunhofer IIS\IMF Studio Creator 4.0.0\bin\IMF Studio Creator.exe -i
C:\myDCPprojs\test.dcpproj -o C:\myDCP\newDCP -d C:\MyDigests\newDigest.dcpdig


Validation parameters:

 -validate
   Performs a validation of the provided package.
```

```
[--reportFile|-o <report.html>]
    Sets the path for the output file of validation. The directory has to exist.

    If the path is a directory, the package's folder name will be used as file base name.

    This way, all reports for a validation batch job can be conveniently stored in a
single folder.

[--comment|-c <comment>]
    Write a custom comment to the quality report.

[--tests|-t <"1,2,3">]
    List of tests which should be executed. If no tests are selected, all available tests
will be executed.

    Mutually exclusive with -skipTests.

[--skipTests|-s <"1,2,3">]
    List of tests which should not be executed. All other tests will be enabled.

    Mutually exclusive with -tests.

    Available tests:
     Id Name
     1  File Sizes
     2  XML files' digital signature
     3  XML Schema
     9  File Hashes
     10 File Hashes (small files only)
     11 JPEG 2000 Code Streams
     12 JPEG 2000 Code Streams (probe only)
     13 JPEG 2000 Bit Rate
     14 Audio Buffers
     15 Digital Cinema Naming Convention
     16 Package Title
     17 Consistent Trackfiles
     18 XML Format
     19 Fonts/PNGs Listed in Package
     20 Out of Bounds Timestamps
     21 Characters Available
     23 Fonts/PNGs Available
     24 Order of Time-in Timestamps
     25 Order of Timed Text Spot Numbers
     26 Open Subtitles Language
     27 Subtitle Burnin Overlap
     28 Number of Compositions
     29 Conformity
     30 Output Profile List
     31 Issuer Language
     32 Timed Text Usage
     33 Frame Rate Conformity
     34 Frame Rate Limit
     35 Subtitle Multi Usage
     36 Digital Cinema Naming Convention
     37 Audio Language Codes
     38 Track Edit Rates
     39 Track Frame Rates
     40 Subtitle Display Type
     41 Subtitle Language
     42 Resolution
     43 Image Subsampling
     44 Source Colorspace
     45 Audio Channel Configuration
     46 Audio Sampling Rate
     47 Audio Bits
     48 JPEG 2000 Properties
     50 Number of Sequences/Tracks
     51 Sequence Durations
     52 Sequence Edit Rates
     53 Subtitle Burn-in
     54 Subtitle Display Type
     55 Subtitle Language
     56 Subtitle Multi Usage
     57 Dolby Atmos
     58 Sequence Duration
     59 Audio Sequence Duration with NTSC Frame Rates
     60 Number of Entries
     61 Sound Language Code
     62 Intrinsic Duration
     63 Frame and Edit Rate
     64 Frame and Edit Rate Metadata
```

```
65 Picture Track Subsampling
66 Resolution
67 Track audio padding
68 Subtitle Track Source Document
69 Subtitle Track Conformity
70 Subtitle Track Schema Check
71 Subtitle Track Semantics Check
72 Subtitle Track Edit Rate
73 Subtitle Track Resource
74 Subtitle Track Encryption
75 Subtitle Entries After Picture
76 Frame Rate Conformity
77 Subsampling Resolution
78 Dolby Vision Metadata
79 Dolby Vision Metadata Supplemental
80 Equal Sound Count
81 CPL contains Reel
82 Contains CPLs
83 Parsing OPLs
84 Max Path Length of Package Files
85 Valid color processing configuration
86 Valid subsampling configuration
87 Check for valid CPL metadata
88 Check for CPL metadata extension sign language video
89 JPEG 2000 Component Bit Rate Recommendation
90 Subtitle Track ReelNumber
91 SMPTE Subtitle Namespace Prefix
```

## 11.4     Examples

`imfStudio_Creator "c:/myprojects/Africa.imfproj"`

Starts IMF Studio Creator and automatically opens the Project File "c:/myprojects/Africa.imfproj".

`imfStudio_Creator –i "c:\IMFproj\test.imfproj" -o "c:\IMF"`

Creates an IMF into the folder "`c:\IMF`" using the Project File "`test.imfproj`".

## 11.5     Standalone Transcoder

The standalone transcoder application can be used in the same way as described for IMF Studio Creator above. Starting IMF Studio Standalone Transcoder with the parameter "–help" will display a list of available parameters.

```
C:\Program Files\Fraunhofer IIS\IMF Studio Creator 4.0.0\bin>"IMF Studio JPEG 2000
Standalone Transcoder.com" -h

Usage:
C:\Program Files\Fraunhofer IIS\IMF Studio Creator 4.0.0\bin\IMF Studio JPEG 2000
Standalone Transcoder.exe
    -input               /-i   <input_file>
    [-start              /-s   <start_frame>              ]
    [-end                /-e   <end_frame>                ]
    -output              /-o   <output_folder>
        [-subfolder             /-sf                              ]
    [-type               /-t   <project_type>             ]
    [-fpsnum             /-f   <fps_numerator>            ]
    [-fpsdenom           /-d   <fps_denominator>          ]
    [-bitrate            /-b   <bitrate>                  ]
```

```
[-bps                          <bitDepth>                    ]
[-letterboxing        /-p  <letterboxing>                ]
[-scaling             /-sc <scaling>                     ]
[-colortransform      /-c  <color_transformation>        ]
[-sourcecolorspace    /-ss <source_color_space>          ]
[-destinationcolorspace /-ds <destination_color_space>   ]
[-chromasampling      /-r  <chroma_sampling>             ]
[-numthreads          /-n  <number_of_threads>           ]
[-log                    <log_file_path>                 ]
[-gui                 /-g                                ]
[-help                /-h                                ]
    [-username                 <username>                     ]
    [-password                 <password>                     ]
```

```
<input_file>    First input image or the movie file.
<start_frame>   First frame which will be processed.
                (Default: 0)
<end_frame>     Last frame which will be processed.
                (Default: last frame)
<output_folder> Output folder.
-subfolder / -sf       Create subfolder with name based on the input file name.
                          (Default: Don't create subfolder)
<project_type>  Type of the project and images.
                Options: IMF, IMFApp2
                (Default: IMF)
<fps_numerator> Numerator of frames per second.
                (Default: 24)
<fps_denominator> Denominator of frames per second.
                (Default: 1)
<bitrate>       Bitrate for the JPEG 2000 compression in MBit/s or lossless:
                60 - for 60MBit/s,
                lossless - lossless compression
                If project type is stereoscopic, the given value is
                the overall bitrate for both eyes.
<bps>           Bitdepth for the JPEG 2000 compression.
                8, 10, 12 or 16
                For DCPs ulways 12 bit are used.
<letterboxing>  Letterboxing applied.
                Options: full, flat, scope, automatic and off
                (Default: automatic)
<scaling>       Scaling applied.
                Options: off, fit, fill
                (Default: off)
<color_transformation> Color transformation, name or filename.
                (Default: None)
<source_color_space> Color space of source, name or filename.
                (Default: None)
<destination_color_space> Color space of destination, name or filename.
                (Default: None)
<chroma_sampling>       444 - no chroma subsampling (default)
                        422 - apply chroma subsampling
<number_of_threads> Number of threads used for the processing.
                (Default: maximum)
<status_xml_output> Output will be send to a file or the serverport.
                When given a path and file name, the status will be written to
                that file. When given a server port number, the status will be
                available at the given port.
<status_stylesheet_file> Path and file name of the stylesheet, used with the
                status xml.
                When using a xml file output, the path has to be given
                relatively to the status xml file. When using the server output
                the path has to be given relatively to this program.
<status_stylesheet_file> Path and file name of the stylesheet, used with the
                status xml.
                When using a xml file output, the path has to be given
                relatively to the status xml file. When using the server output
                the path has to be given relatively to this program.
<log_file_path> Path where log file shall be created ot "-"/"Con" for console logging
-gui/-g         Force start of gui.
<username>      Login username to connect to easyDcp license server
<password>      Login password to connect to easyDcp license server


Available color transforms:

Available color spaces:
Eclair Color
RGB (ITU-R BT.2020 / PQ)
RGB (ITU-R BT.2020 / PQ) - Full Range
RGB (ITU-R BT.709 Full-Range)
RGB (ITU-R BT.709)
```

```
RGB P3 (D65)
RGB P3 (D65) PQ
RGB P3 (DCI)
Standard RGB (sRGB)
XYZ (DCI)
YCbCr (ITU-R BT.709)
```

# 12    Tips and Tricks handling IMFs

## 12.1    Opening XML files in text file editors

Opening XML-files of an IMF (e. g. PKL, CPL and KDM) in a text editor is a dangerous thing. After opening the files for viewing please make sure you do not save the files. Do not simply edit the XML-files. For example if you want to change your company name or correct a typo error you have to recreate the whole IMF. One changed character is enough to fail the signature test and errors may occur during ingest or playback of the IMF.

# 13 Limitations

## 13.1 IMPs

Resolutions higher than 4K are not supported.

Rendering of IMF subtitles is an experimental feature.

Existing OPLs are ignored and a new dummy OPL is generated for every CPL.

## 13.2 Timed Text

The timed text formats specified for IMF packages are supported.

Only a subset of the elements defined in TTML IMSC1 ("IMF timed text") are supported. This subset covers PNG as well as text subtitles or captions, rendered horizontally with or without custom fonts, outlines or shadows. A not exclusive list of ignored elements are ruby characters (Rt tag), attributes related to rotation, attributes related to scaling, attributes and related to stretching.

# 14      Frequently Asked Questions (FAQs)

please refer to FAQs at www.easydcp.com

# 15   Contact

We appreciate very much to have your feedback and your annotations about IMF Studio Creator. In order to enhance the software and to optimize it for your applications, we are looking forward to your cooperation.

If you have any problems or questions, please contact us at the following addresses:

**Sales & Technical Support**

easyDCP GmbH
Eiblwiesweg 2
82418 Murnau, Germany
info@easyDCP.com

**Product Management**

Fraunhofer Institute for Integrated Circuits IIS
Department Moving Picture Technologies
Heiko Sparenberg
91058 Erlangen, Germany
heiko.sparenberg@iis.fraunhofer.de